Regaining the High Ground at Sea

Transforming the U.S. Navy's Carrier Air Wing for Great Power Competition

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Center for Strategic and Budgetary Assessments

Study outline

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- Key operational challenges for naval forces
- Naval strategy and posture
- New carrier air wing operational concepts
- Proposed aircraft and air wing composition
- Recommendations and implementation

Long-range sensors & weapons provide escalation dominance

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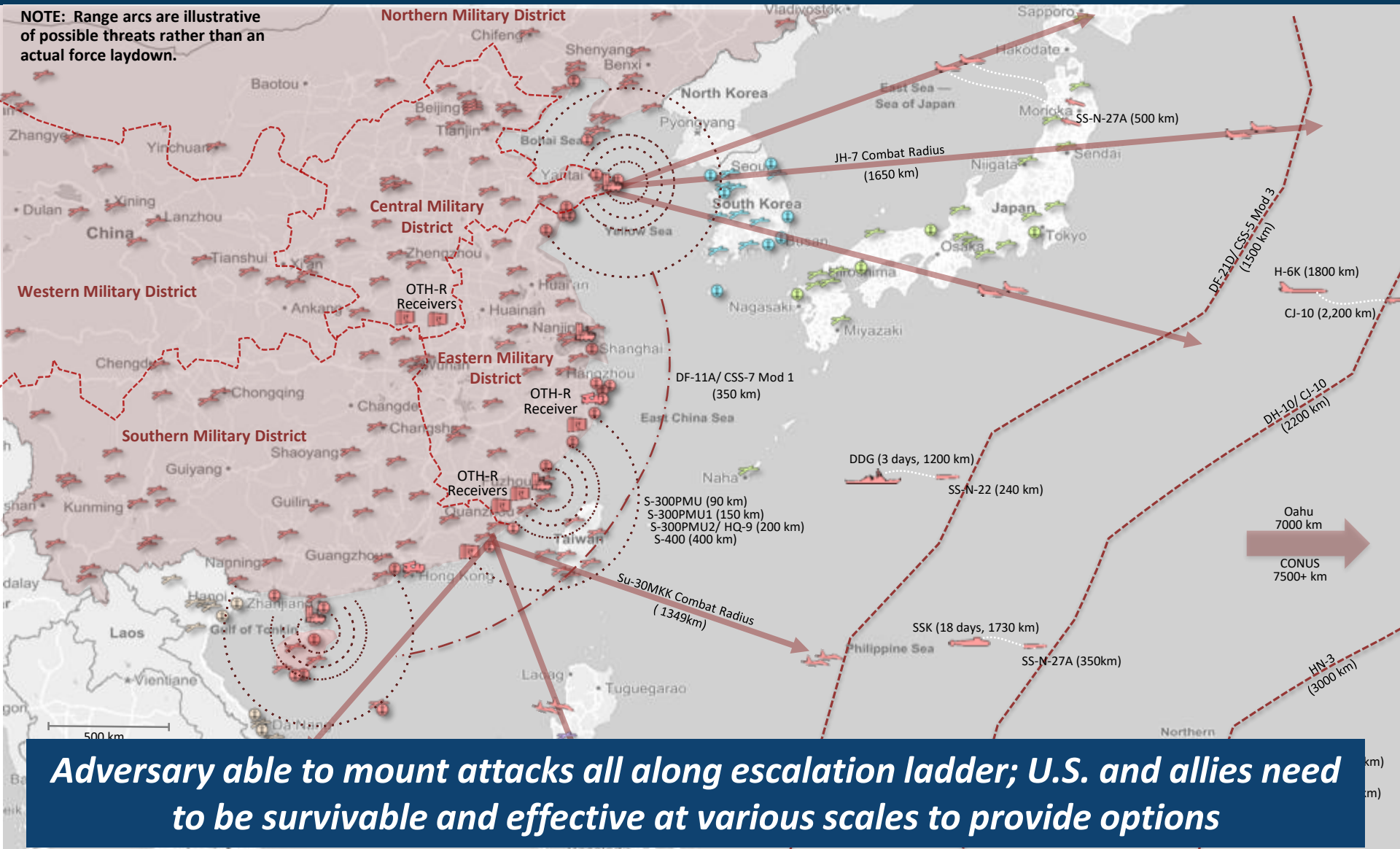

Adversary able to mount attacks all along escalation ladder; U.S. and allies need to be survivable and effective at various scales to provide options

Threat inside 1000 nm may prevent effective CVW or air base operations

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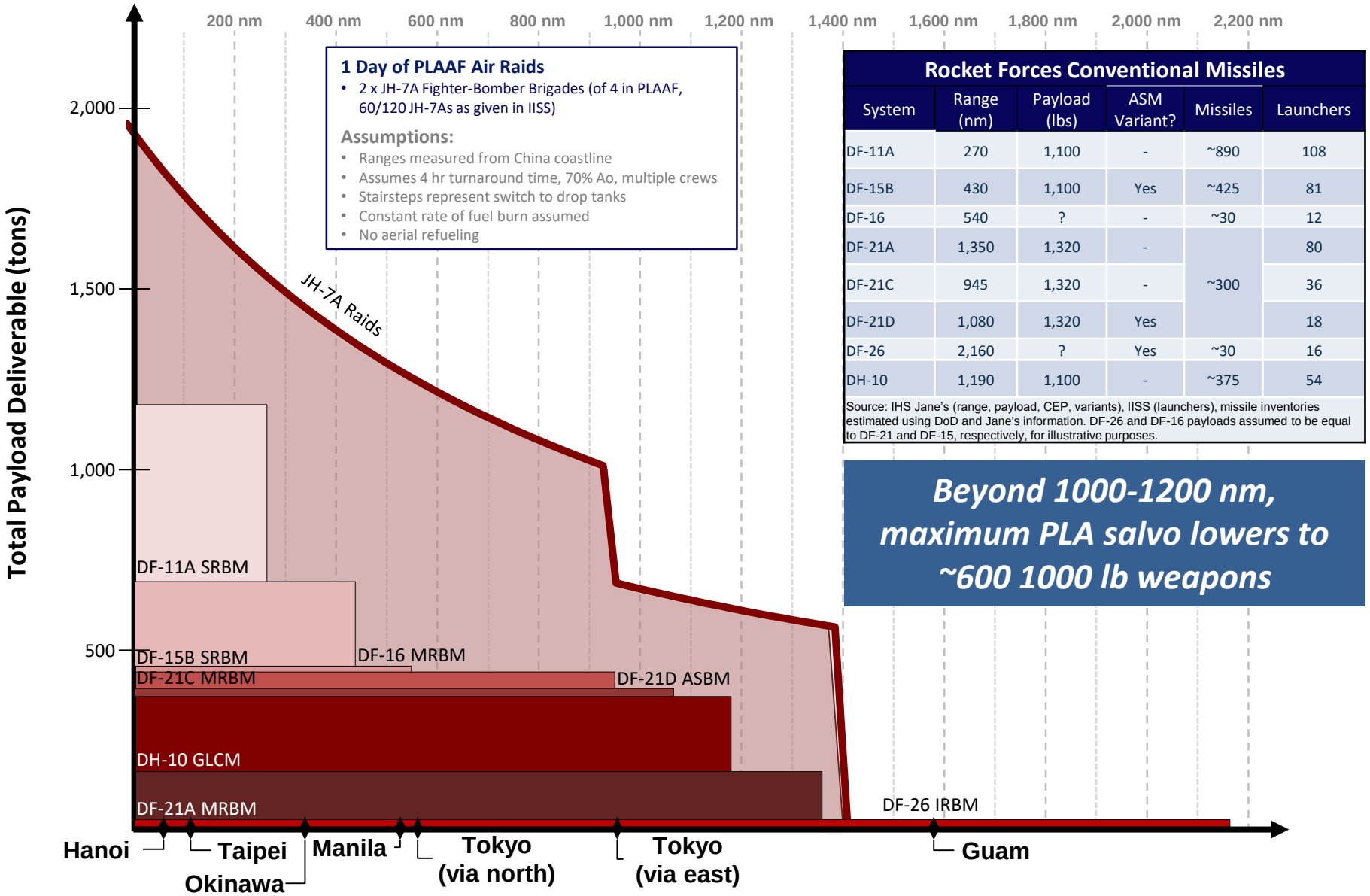

Rocket Forces Conventional Missiles					
System	Range (nm)	Payload (lbs)	ASM Variant?	Missiles	Launchers
DF-11A	270	1,100	-	~890	108
DF-15B	430	1,100	Yes	~425	81
DF-16	540	?	-	~30	12
DF-21A	1,350	1,320	-	~300	80
DF-21C	945	1,320	-		36
DF-21D	1,080	1,320	Yes		18
DF-26	2,160	?	Yes	~30	16
DH-10	1,190	1,100	-	~375	54

Source: IHS Jane's (range, payload, CEP, variants), IISS (launchers), missile inventories estimated using DoD and Jane's information. DF-26 and DF-16 payloads assumed to be equal to DF-21 and DF-15, respectively, for illustrative purposes.

Beyond 1000-1200 nm, maximum PLA salvo lowers to ~600 1000 lb weapons

New air defenses could enable CSGs to counter aggression in contested areas

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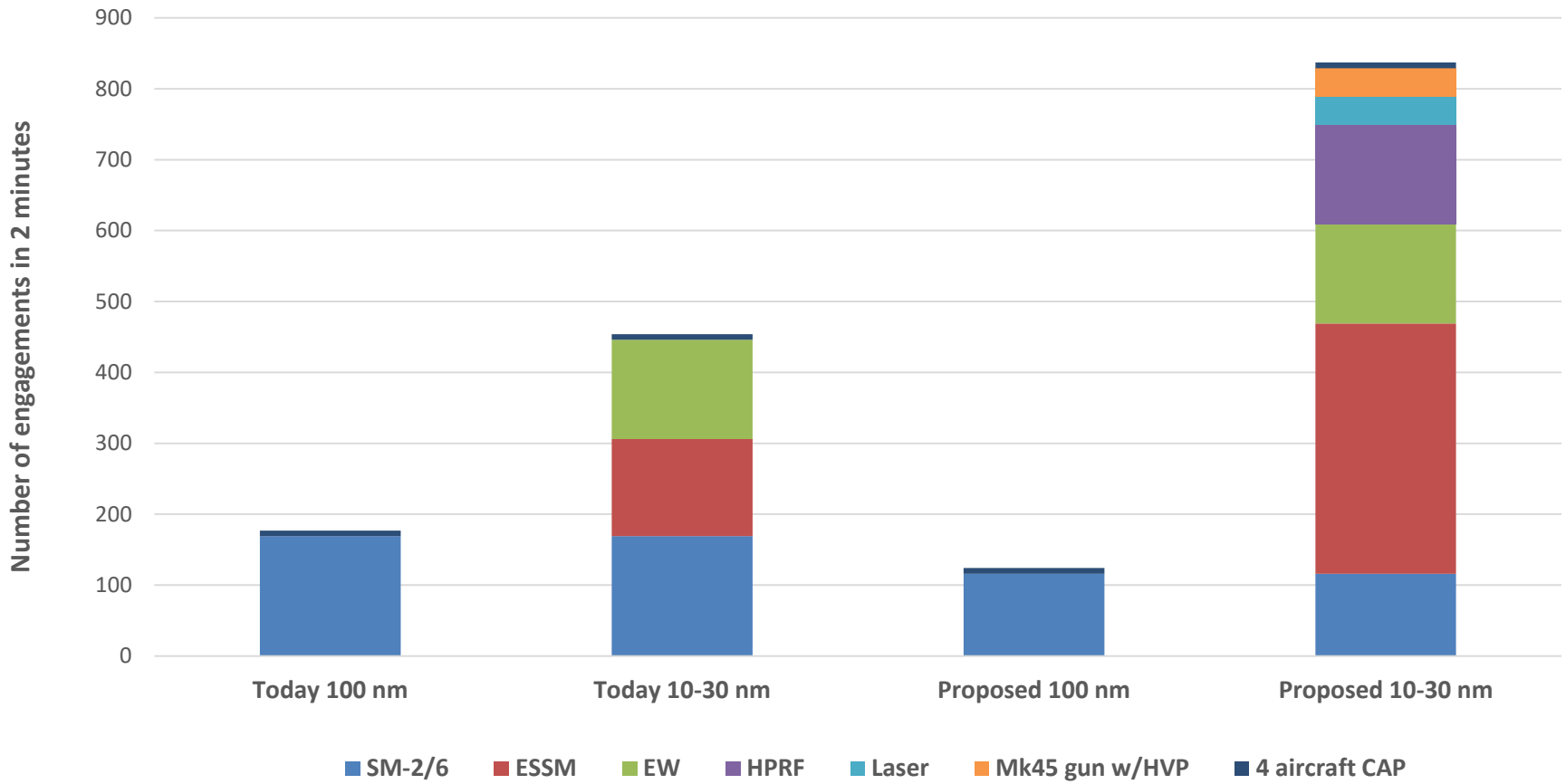

Could enable CSG to withstand a single PLA salvo at 1000 nm; goal is to cause PLA to wait for a better opportunity, creating a window for CVW operations

CVW ops focus on regional powers and periphery of great power conflict

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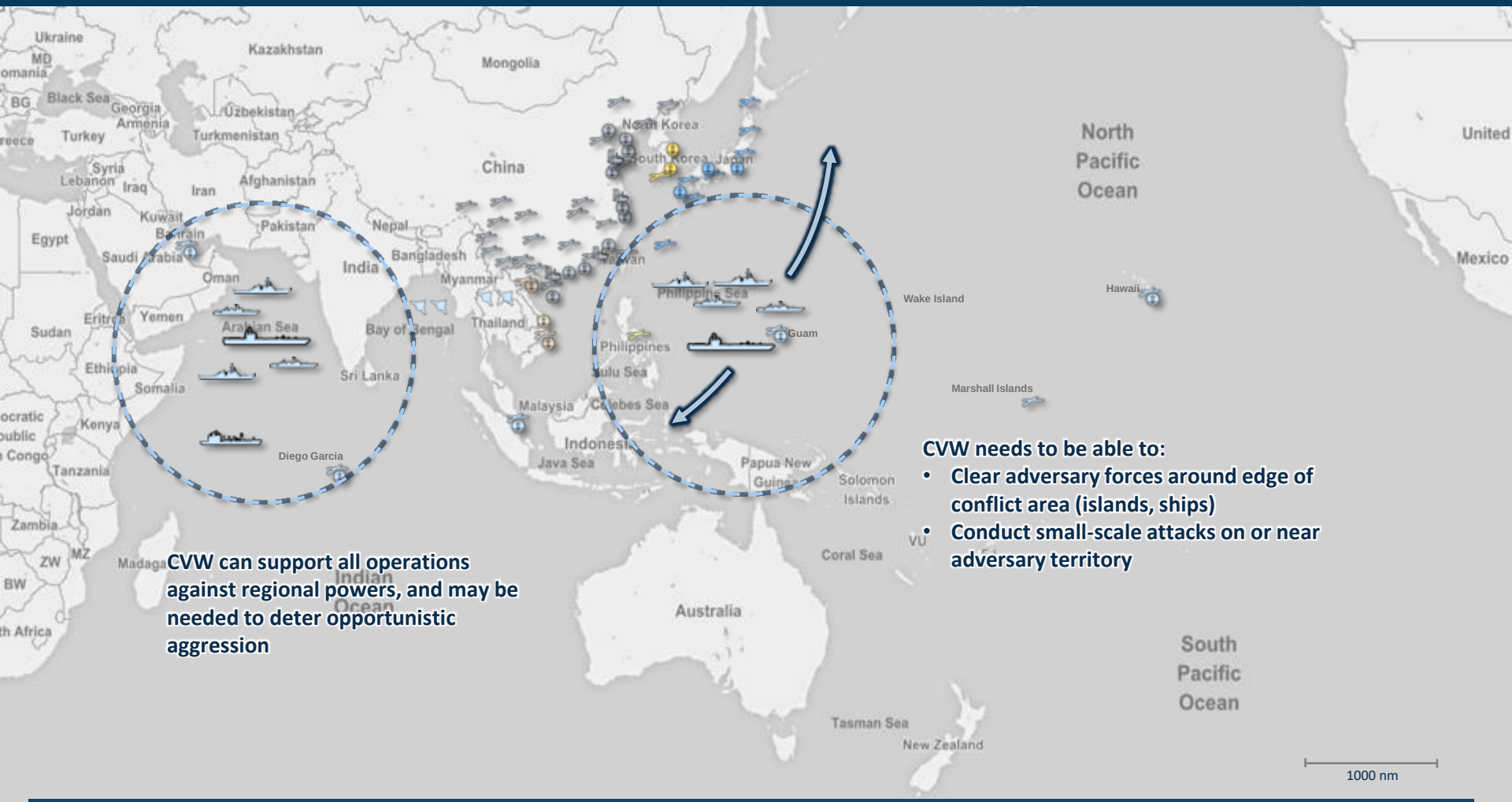

CVW can support all operations against regional powers, and may be needed to deter opportunistic aggression

CVW needs to be able to:

- Clear adversary forces around edge of conflict area (islands, ships)
- Conduct small-scale attacks on or near adversary territory

CSGs best suited for small-scale ops at long-range; large-scale ops at edge of great power confrontations; & full range of ops against regional powers

Strategy and CVW Posture

CSBA architecture aligns with NDS posture of "contact" & "blunt" forces

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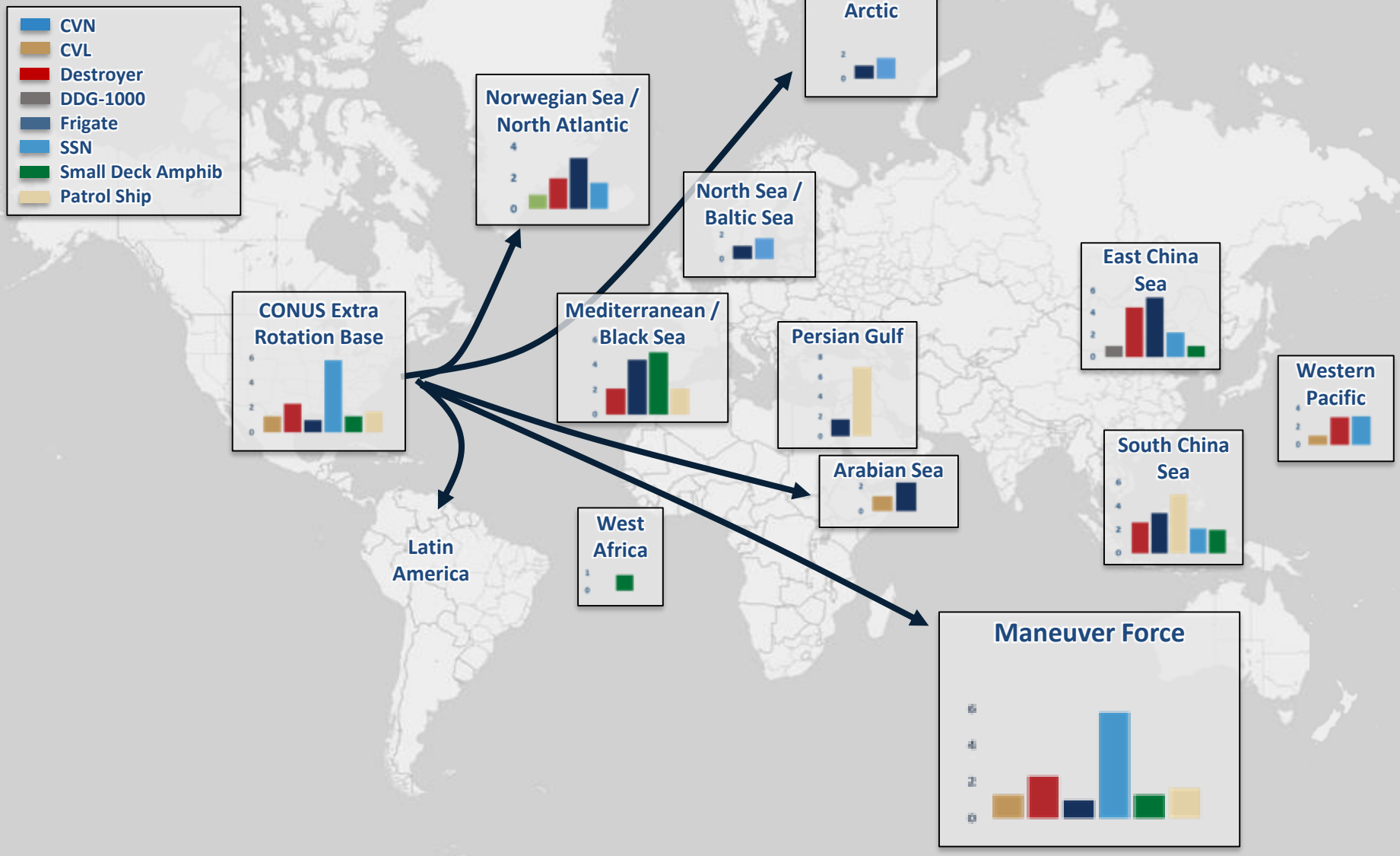

Surface/sub forces for rapid, high-volume response; CVW sustains operations

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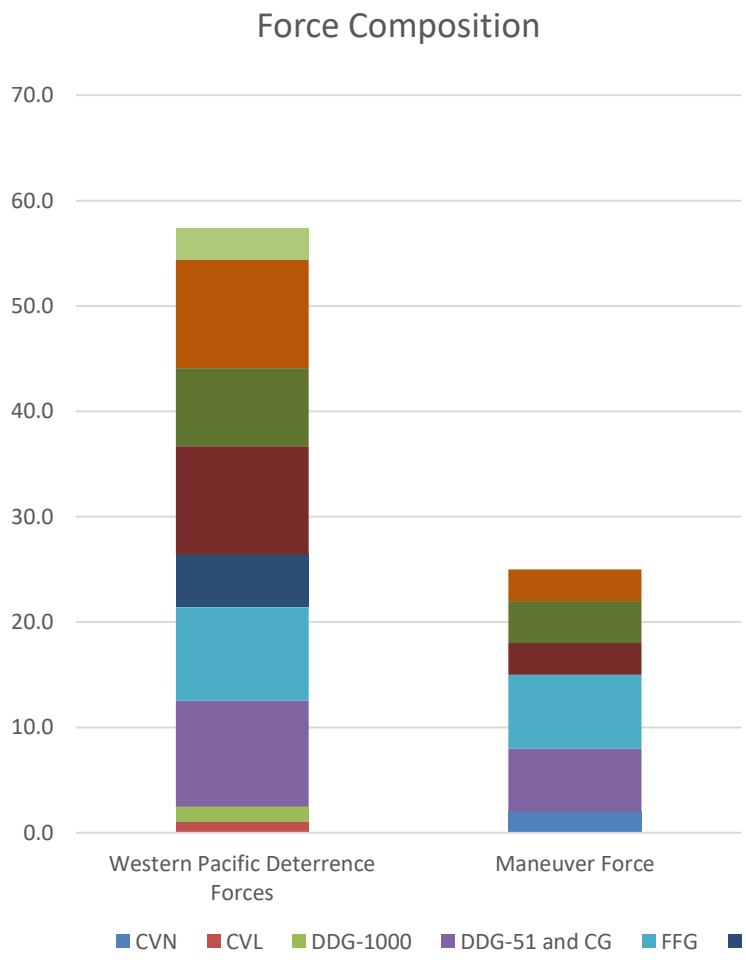

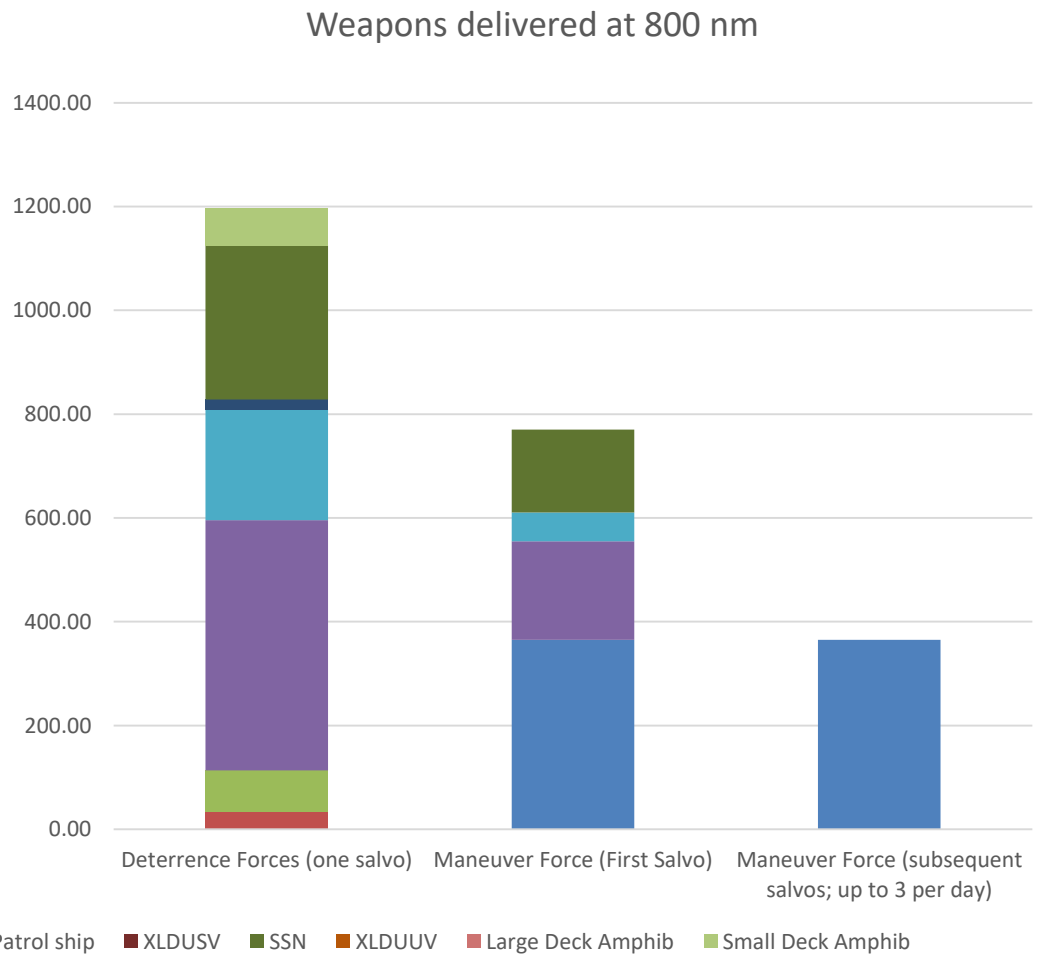

CVN CVL DDG-1000 DDG-51 and CG FFG Patrol ship XLDUSV SSN XLDUUV Large Deck Amphib Small Deck Amphib

CVW can deliver relatively large salvos multiple times a day, whereas Deterrence Forces can deliver a large salvo once before withdrawing to reload

Evolution of the CVW

Battle of Midway– USS *Yorktown* (CV-5) in June 1942

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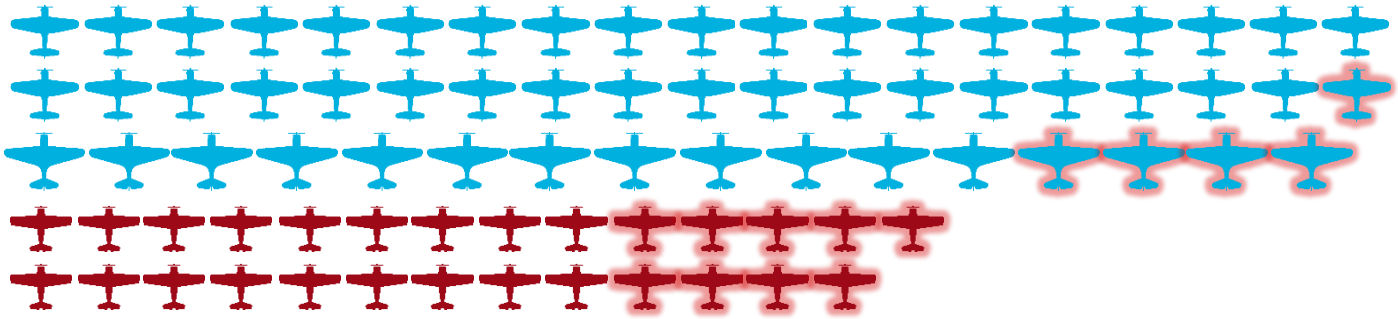
79 Aircraft

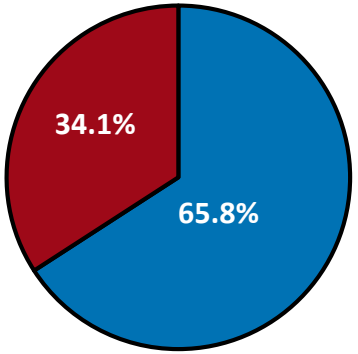
36 x SBD Dauntless (2 sq)

16 x TBD Devastator (1 sq)

27 x F4F Wildcat (1 sq)



 = **Added to USS *Yorktown* after the Battle of the Coral Sea**



- **Attack – Strike**
- **Attack – Surface Warfare (SUW)**
- **Multi-role**
- **Air Defense - Fighter/Interceptor**
- **Electronic Warfare (EW)**
- **Airborne Early Warning (AEW)**
- **Anti-Submarine Warfare (ASW)**
- **Aerial Refueling**
- **Intelligence, Surveillance, Reconnaissance (ISR)**

Atomic Mission Era – USS *Forrestal* (CV-59) in 1960

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83 Aircraft

10 x A-3 Skywarriors (1 sq)

12 x A-1 Skyraiders (1 sq)

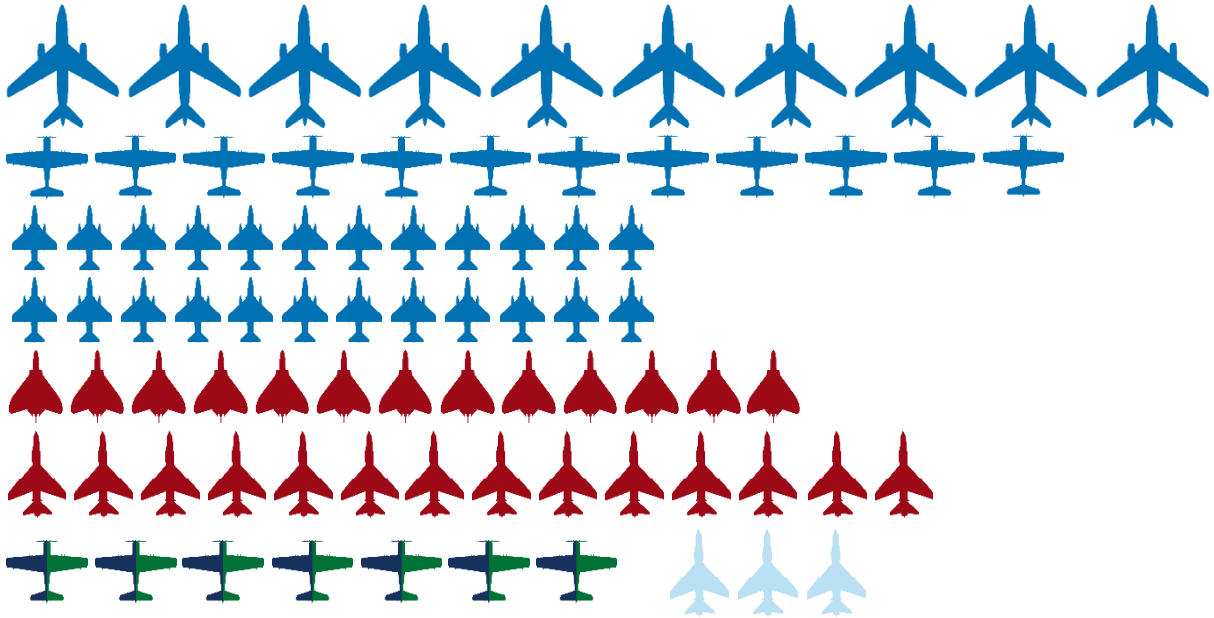
24 x A-4 Skyhawks (2 sq)

13 x F-6 Skyray (1 sq)

14 x F-8 Crusader (1 sq)

7 x A-1 AEW/ASW variants (1 det.)

3 x F-8 ISR variants (1 det.)



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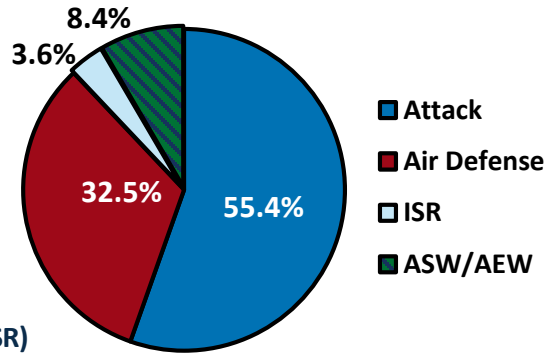

Vietnam War Era – USS *Forrestal* (CV-59) in 1972

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73 Aircraft

24 x A-7 Corsair IIs (2 sq)

8 x A-6 Intruders (1 sq)

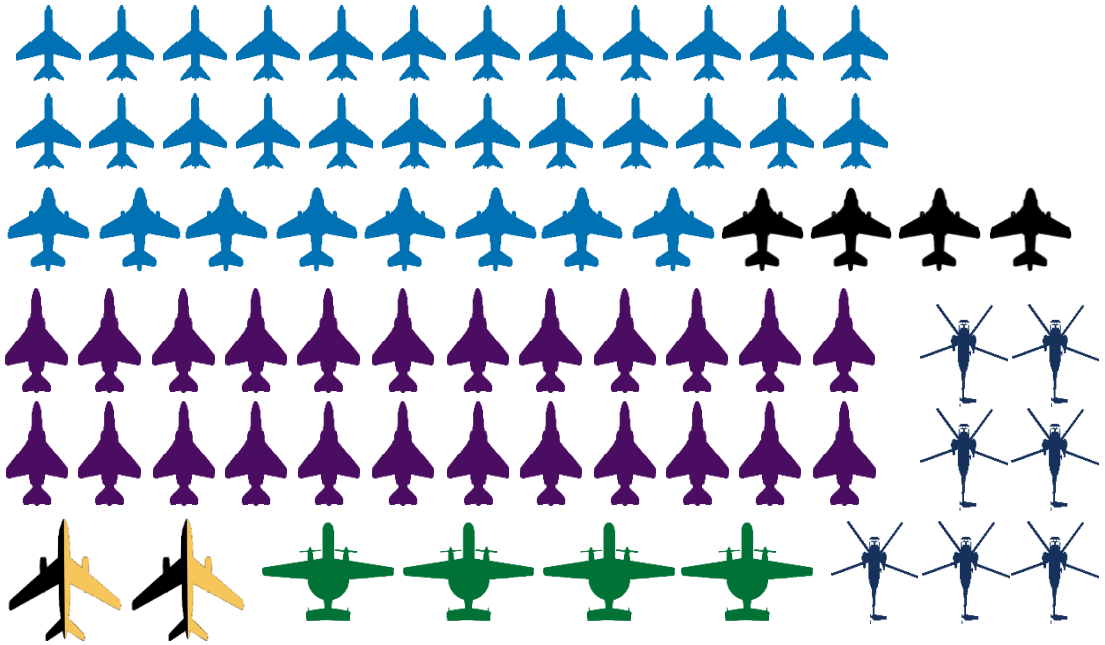
4 x A-6 refueling variants (part of A-6 sq)

24 x F-4 Phantom IIs (1 sq)

7 x SH-3 Sea Kings (1 sq)

2 x A-3 EW/refueling variants (1 det.)

4 x E-2B Hawkeyes (1 sq)



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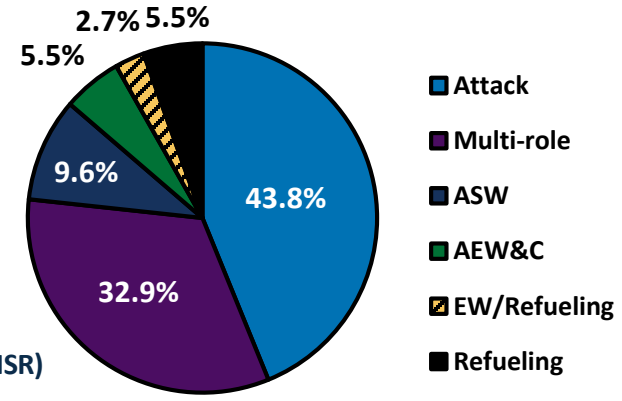

Late Cold War – USS *Eisenhower* (CVN-69) in 1988

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73 Aircraft

20 x A-7 Corsair IIs (2 sq)

3 x EA-6B Prowlers (1 sq)

10 x A-6 Intruders (1 sq)

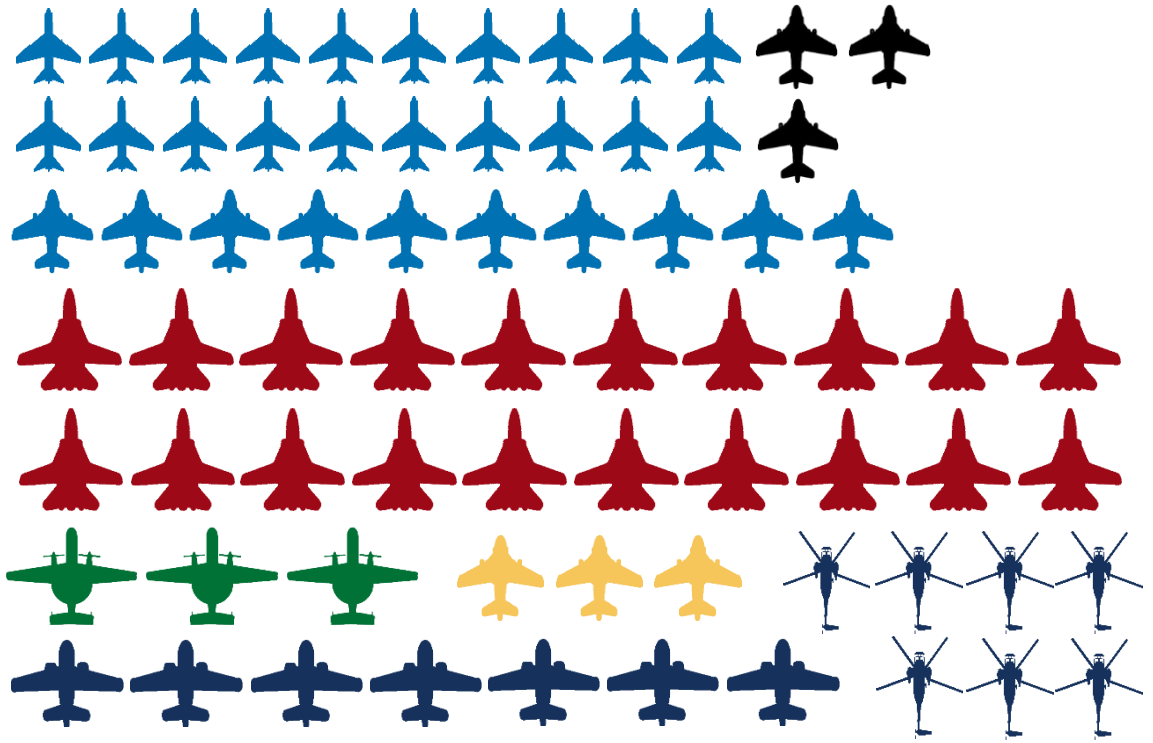
20 x F-14A Tomcats (2 sq)

7 x SH-3 Sea Kings (1 sq)

3 x E-2C Hawkeyes (1 sq)

3 x A-6 refueling variants (part of A-6 sq)

7 x S-3 Vikings (1 sq)



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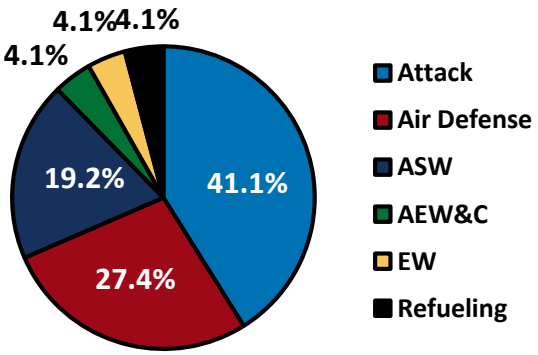

Current CVW - USS *Ronald Reagan* (CVN-76) in 2018

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69 Aircraft

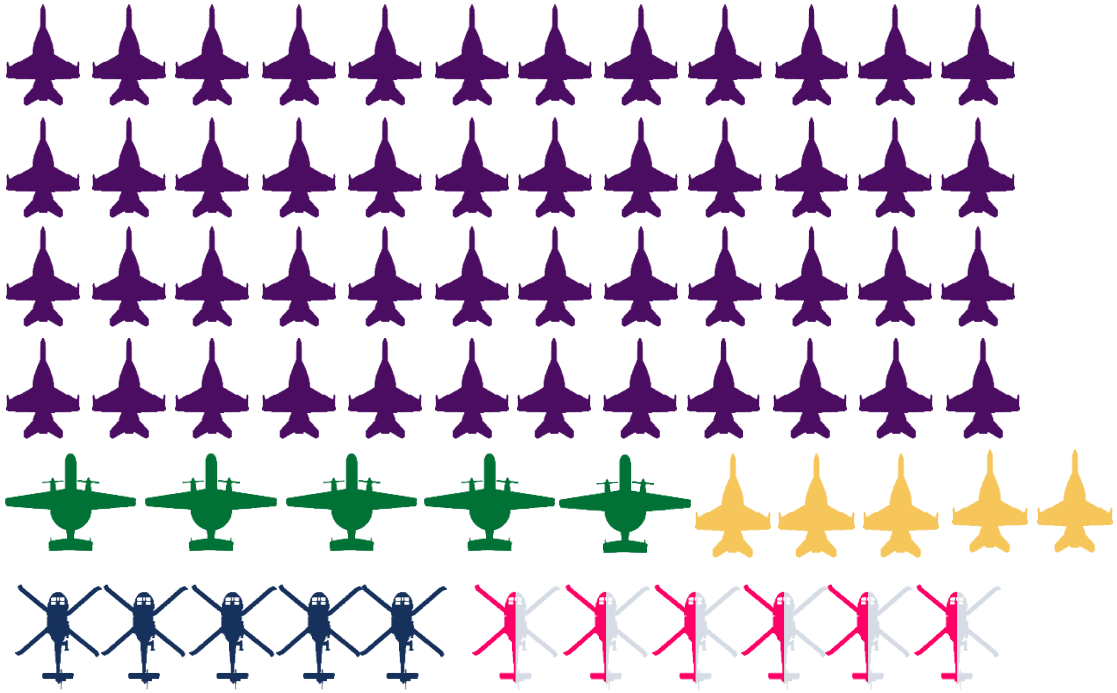
48 x F/A-18 E/F Super Hornets (4 sq)

5 x E-2D Hawkeyes (1 sq)

5 x EA-18G Growlers (1 sq)

6 x MH-60S Seahawks (1 sq)

5 x MH-60R Seahawks (1 sq)



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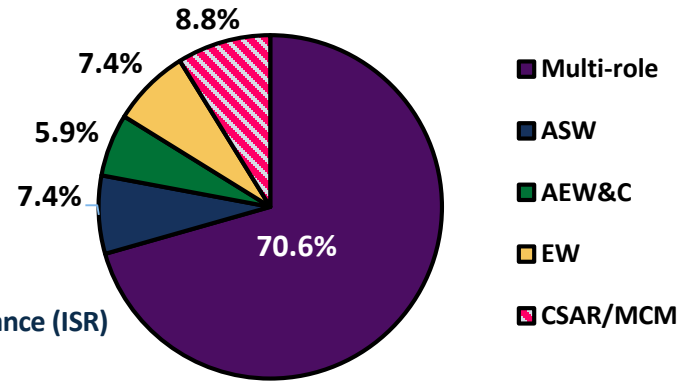

CVW Operational Concepts

21st Century Outer Air Battle uses distributed air defense at 800-1000 nm

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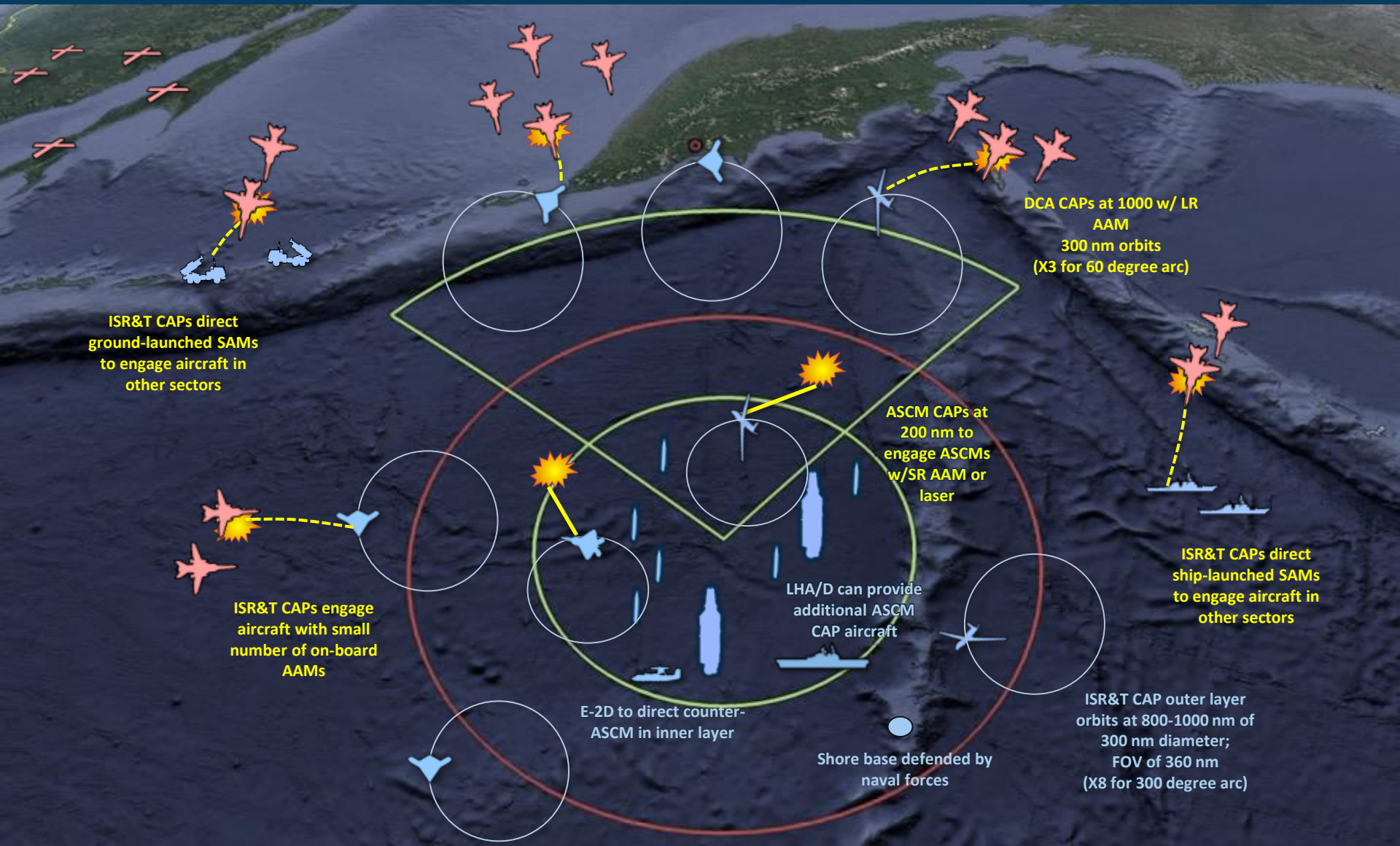

Future EMW relies on survivable platforms and expendable payloads

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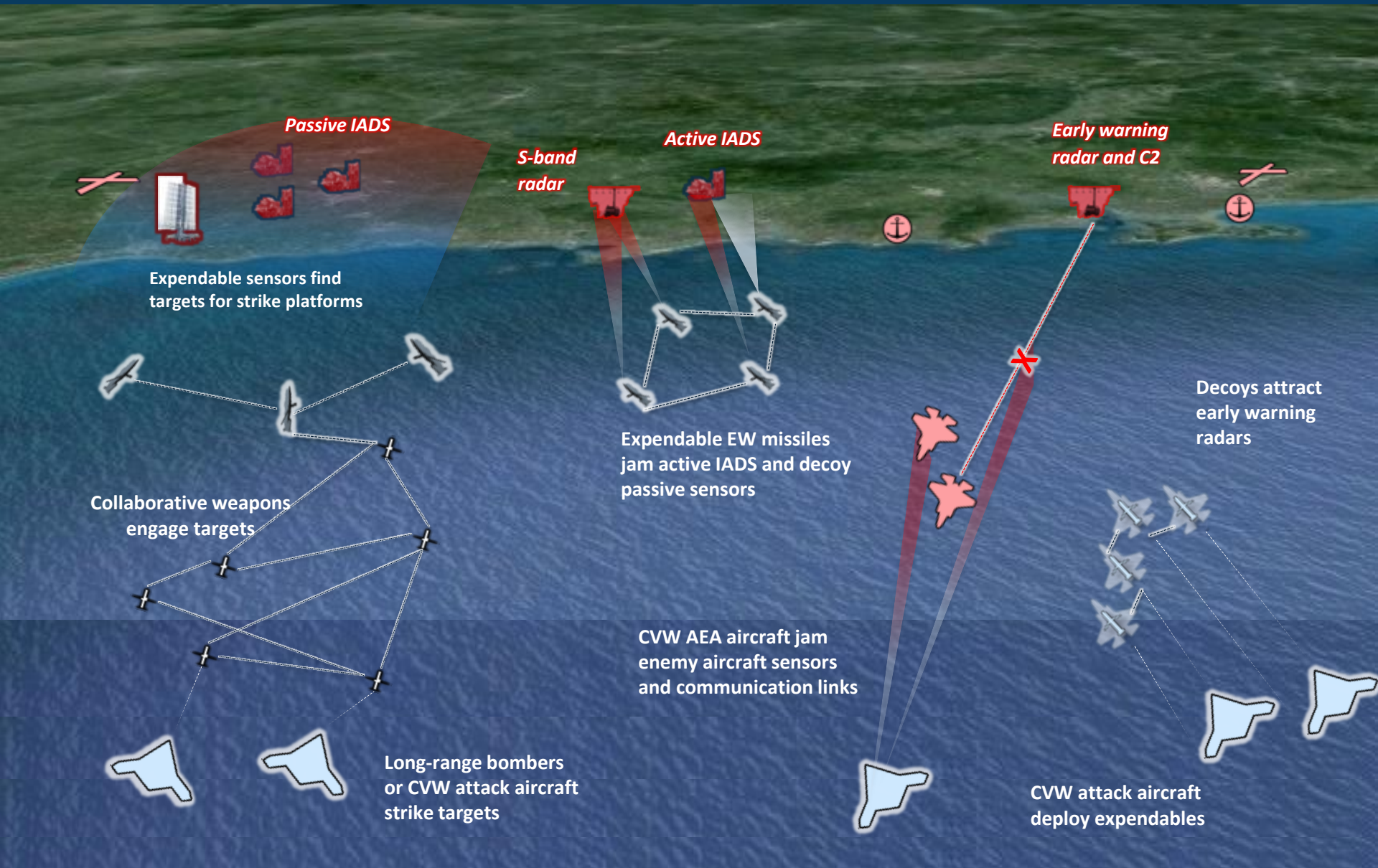

ASW uses distributed unmanned sensors and CVW pouncers

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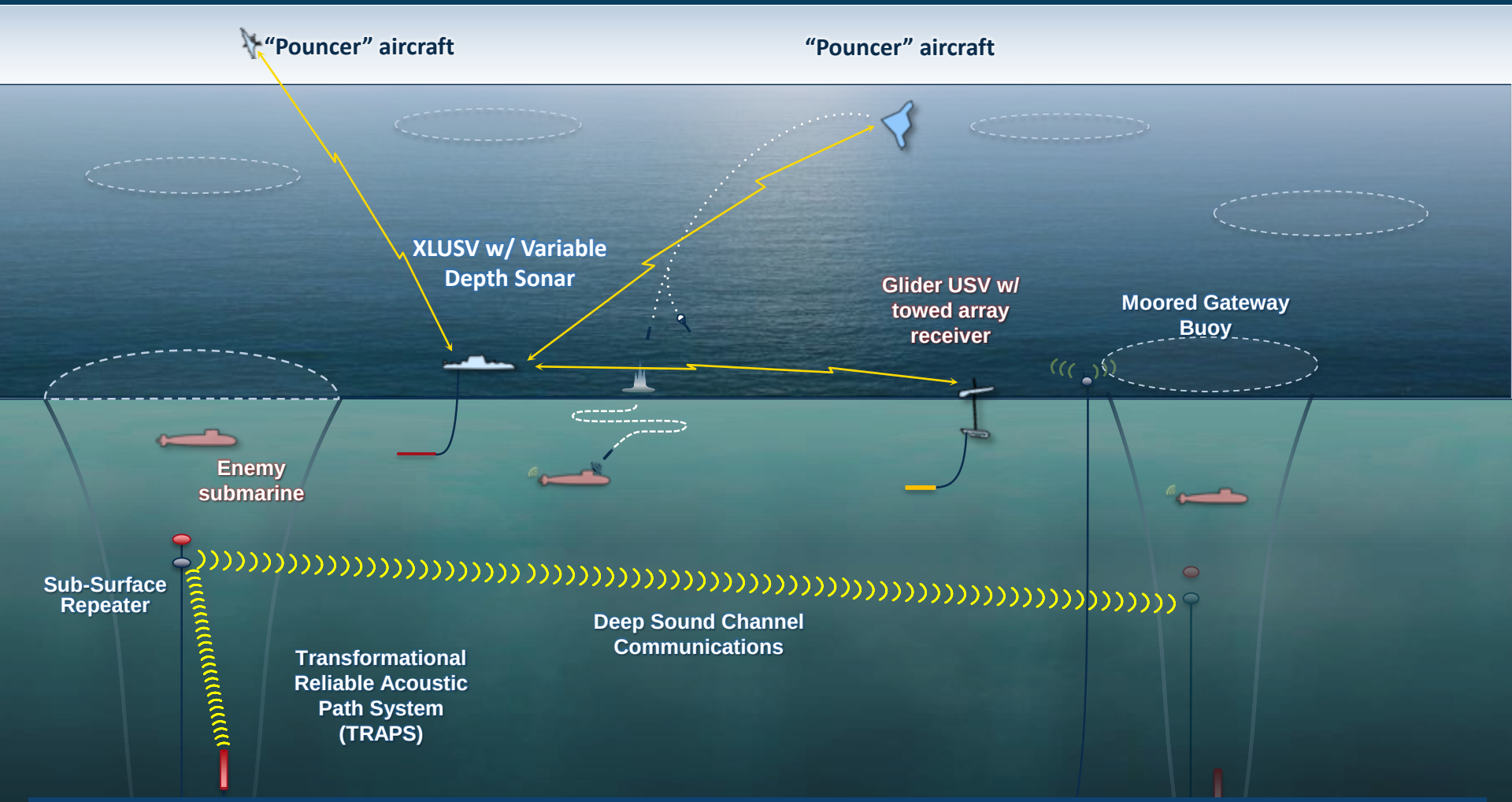

Distributed sensors could be deployed by CVW attack aircraft, unmanned surface or undersea vessels, or submarines

ASW efforts can succeed by suppressing sub ops, vice killing them

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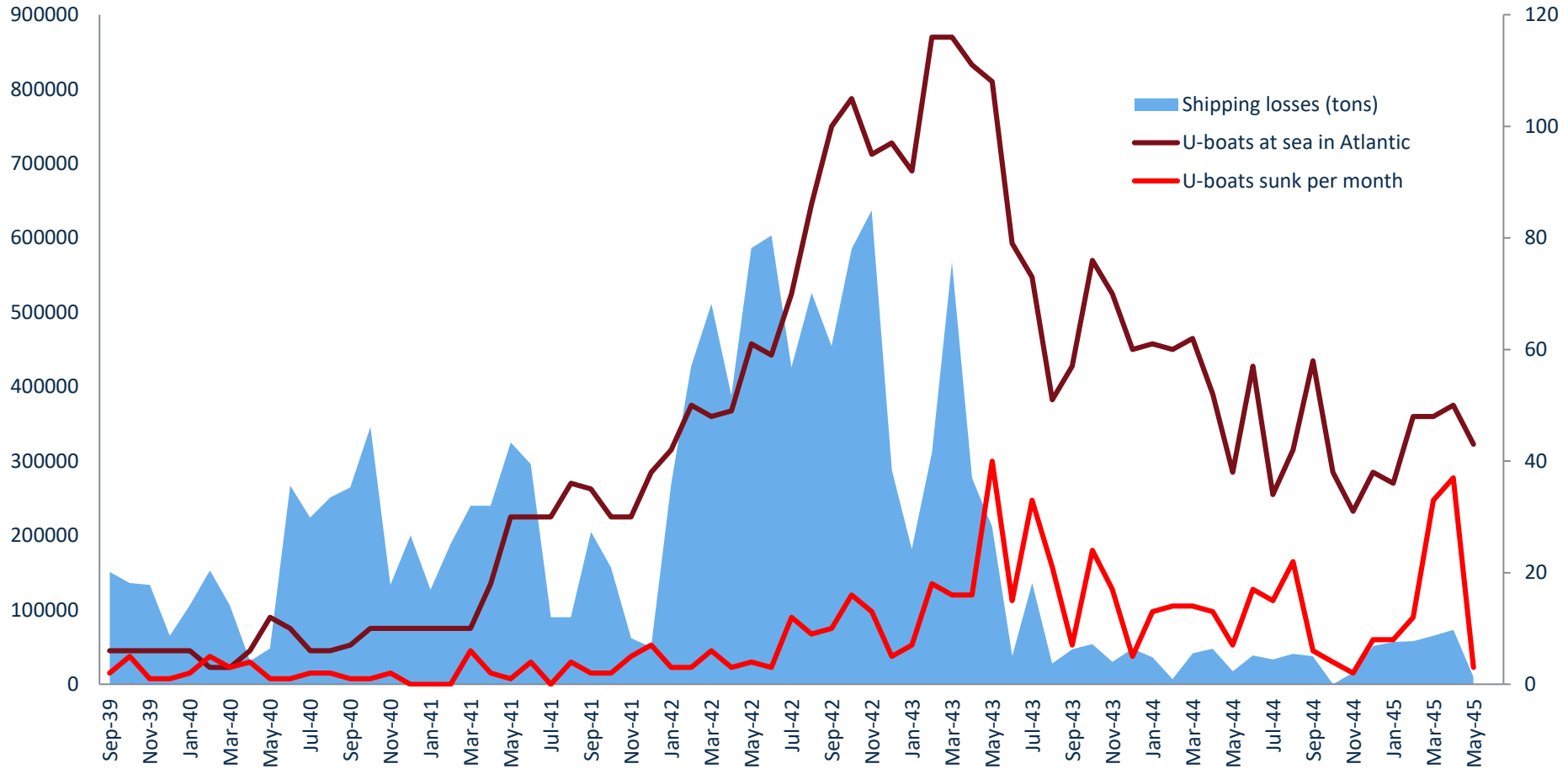

CVW attack aircraft could use inexpensive weapons to alert enemy submarine to that is was detected and compel it to break of operations and evade

SUW, ASW by surface combatants and CAPs; C3 & targeting by ISR&T CAPs

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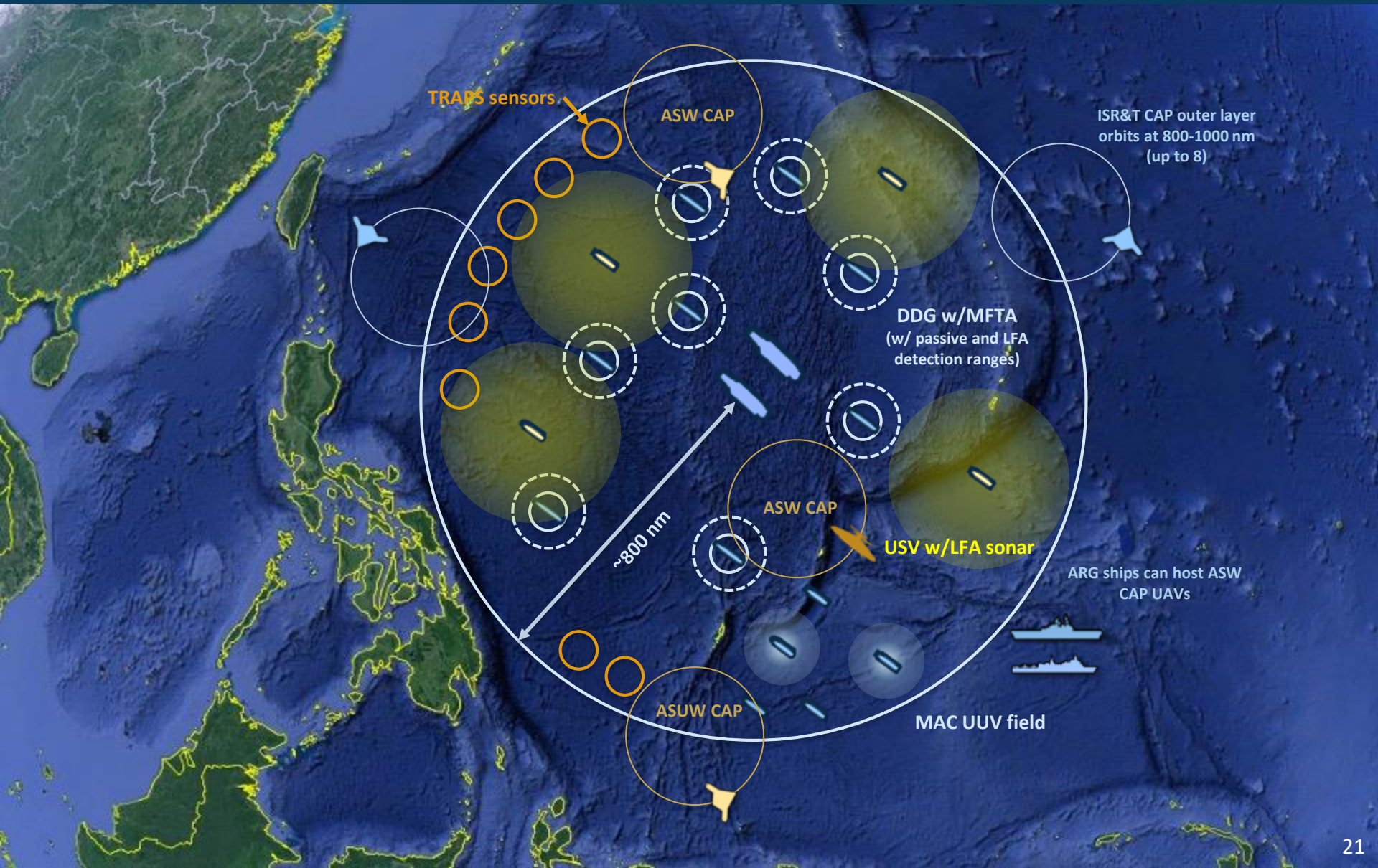

Today's CVW poorly suited for operating environment & U.S. strategy

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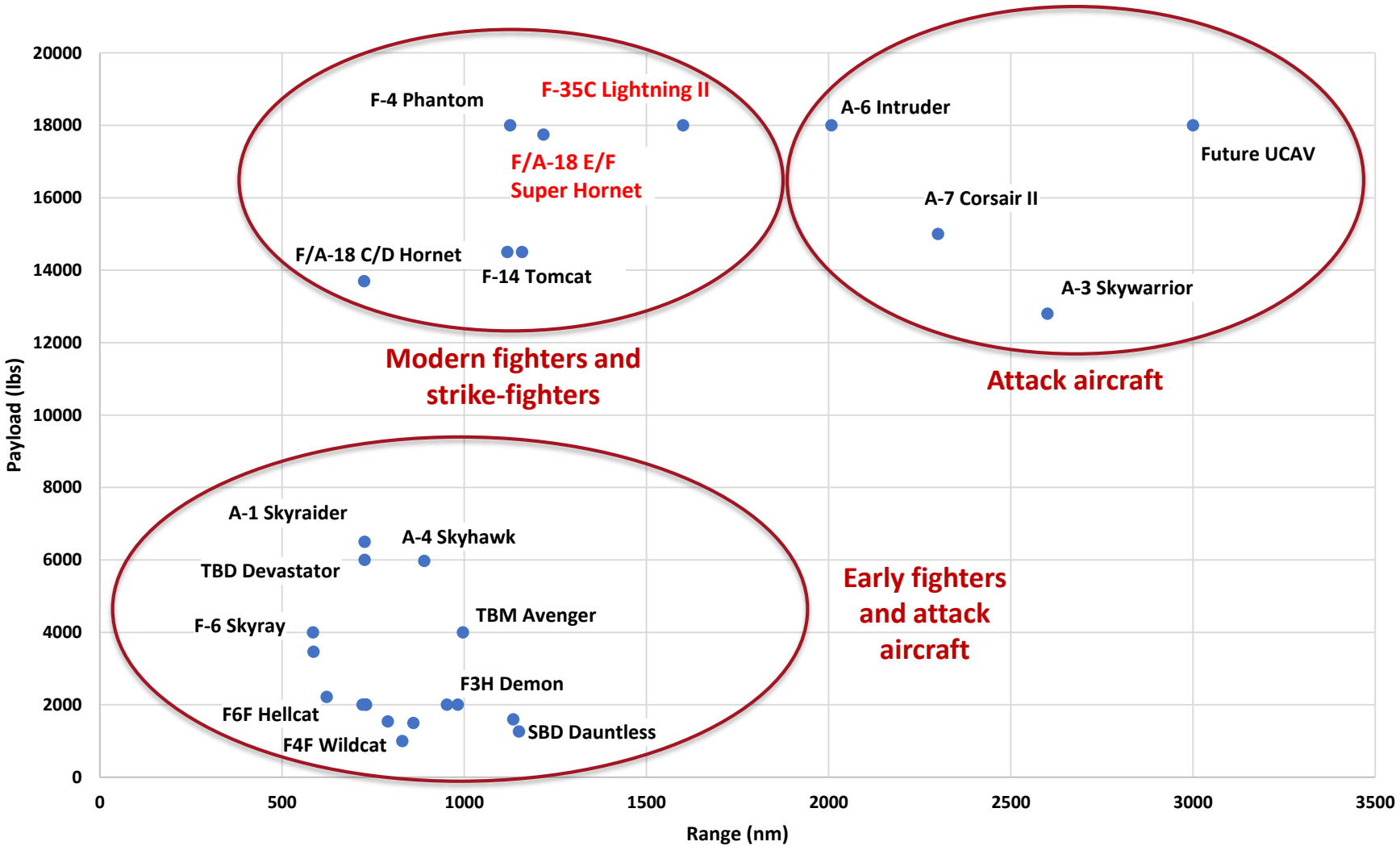

Proposed CVW Aircraft and Composition

New aircraft proposed for 2040 Navy CVWs

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- UCAV
  - Survivable
  - 3000 nm range
  - UCAV AEA aircraft



- Refueling Aircraft
  - MQ-25 to start
  - Multi-mission capability needed
  - UCAV-based in future

- FA-XX
  - Derivative of existing aircraft
  - Survivable
  - Longer range than today's strike-fighters



Proposed 2040 CVW

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Three V(U)AE squadrons:
Each with 6 long-range, unmanned multi-mission attack aircraft (strike, SUW, ASW, EW)

One V(F)A squadron:
10 x F-35 aircraft

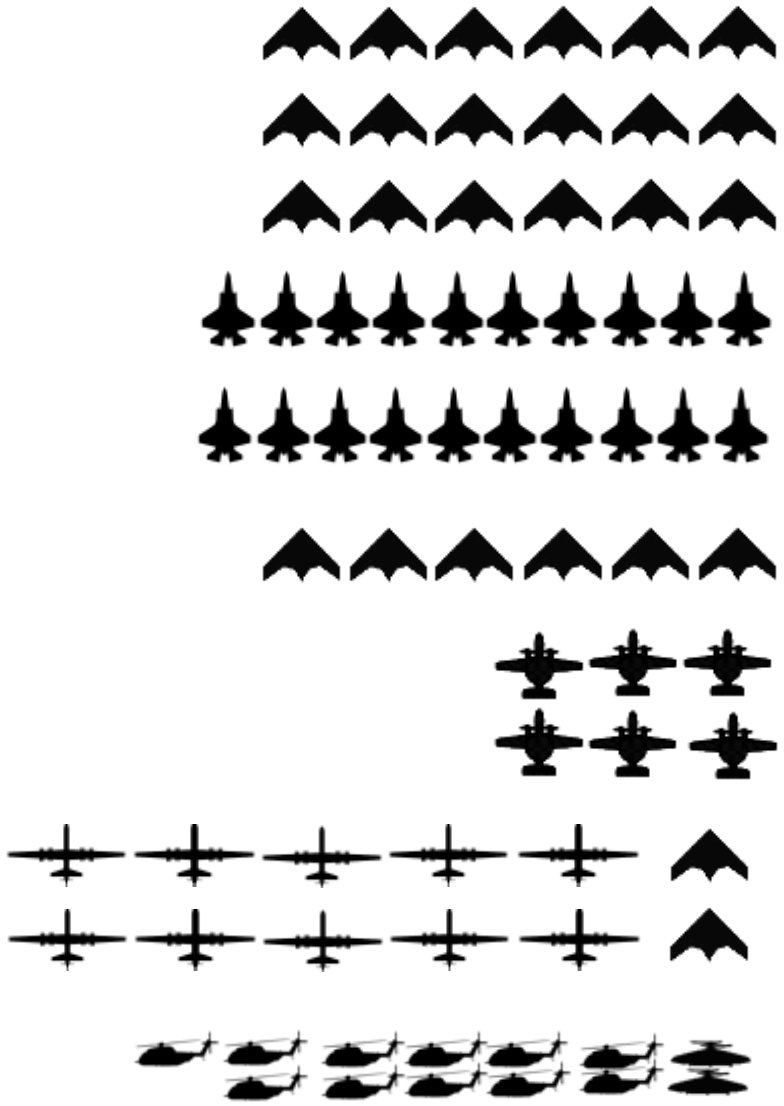
One VF squadron:
10 F/A-XX

One V(U)AQ squadron:
6 EMW UCAVs

One VAW squadron:
6 E-2D AEW/C2 aircraft

Two VRC squadrons:
Each with 6 unmanned multi-mission refueling aircraft

Two HSM/HSC squadrons:
11 MH-60R/S helicopters
2 MUX UAVs



Strike-fighter focused 2040 CVW

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One V(F)A squadron:
8 F/A-18 E/F aircraft

Two V(F)A squadrons:
Each with 10 F-35C aircraft

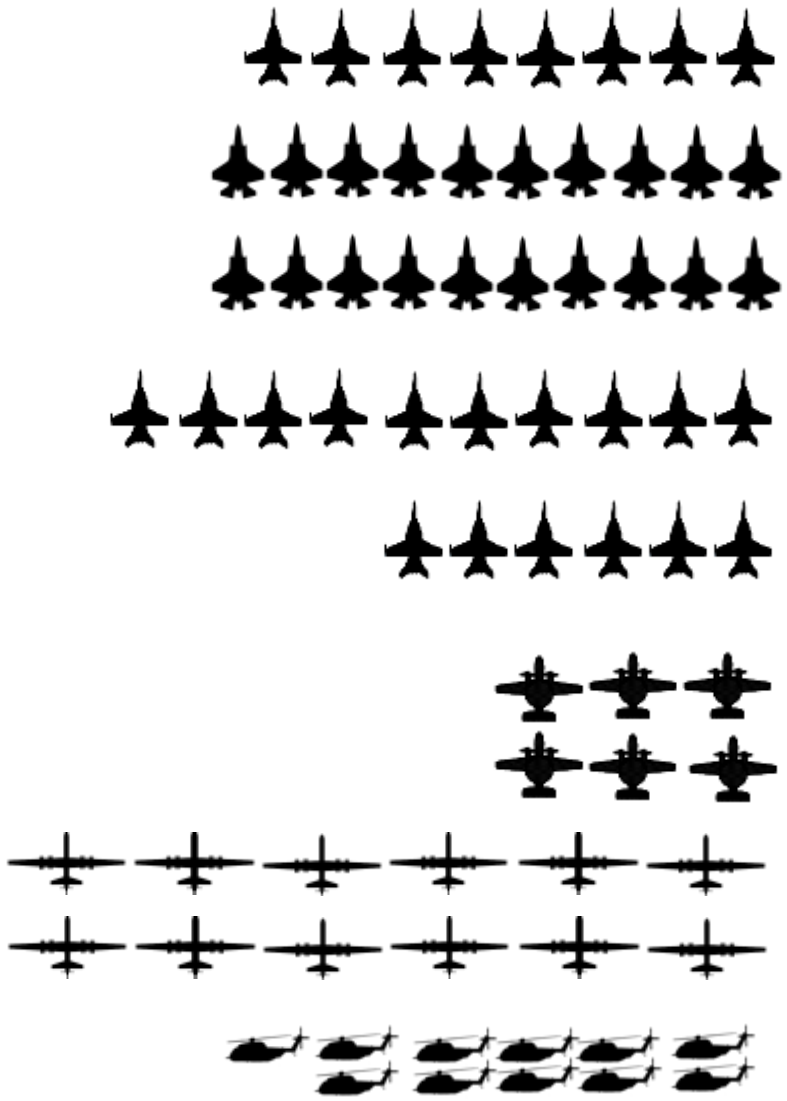
One VF squadron:
10 FA-XX aircraft

One VAQ squadron:
6 E/A-18G aircraft

One VAW squadron:
6 E-2D AEW&C aircraft

Two VRC detachments:
Each with 6 unmanned utility/tanker aircraft

Two HSM/HSC squadrons:
11 MH-60R/S helicopters



Balanced 2040 CVW

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One VF squadron:
6 FA-XX or F/A-18 E/F aircraft

Two V(U)AE squadrons:
Each with 6 long-range, unmanned multi-mission attack aircraft (strike, SUW, ASW)

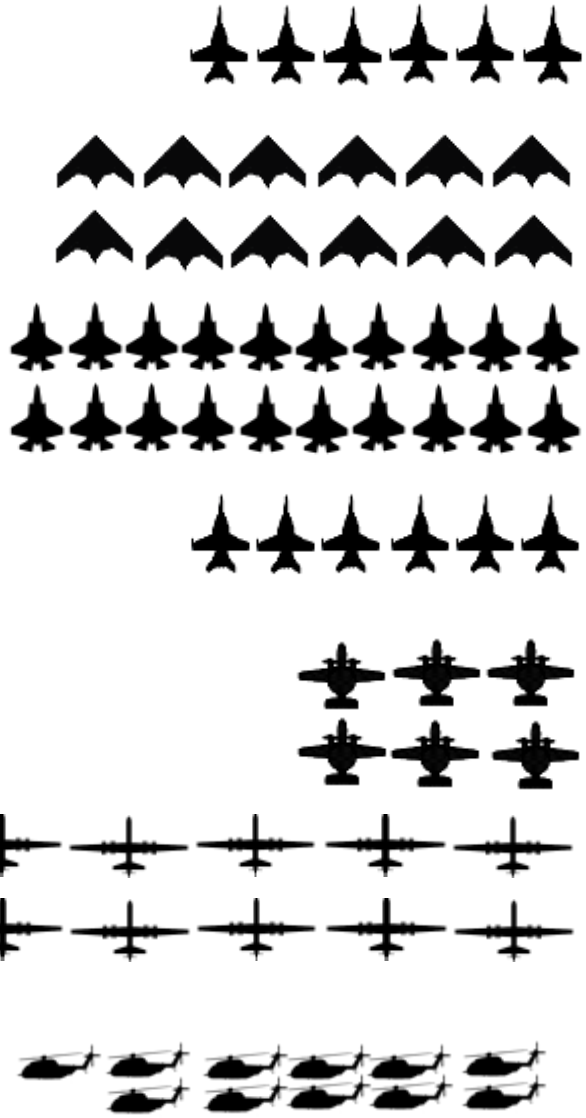
Two VFA squadrons:
Each with 10 x F-35C aircraft

One VAQ squadron:
6 E/A-18G aircraft

One VAW squadron:
6 E-2D AEW&C aircraft

Two VRC squadrons:
Each with 6 unmanned utility/tanker aircraft

Two HSM/HSC squadrons:
11 MH-60R/S helicopters



Capacity of CVWs decrease and diverge with increasing range

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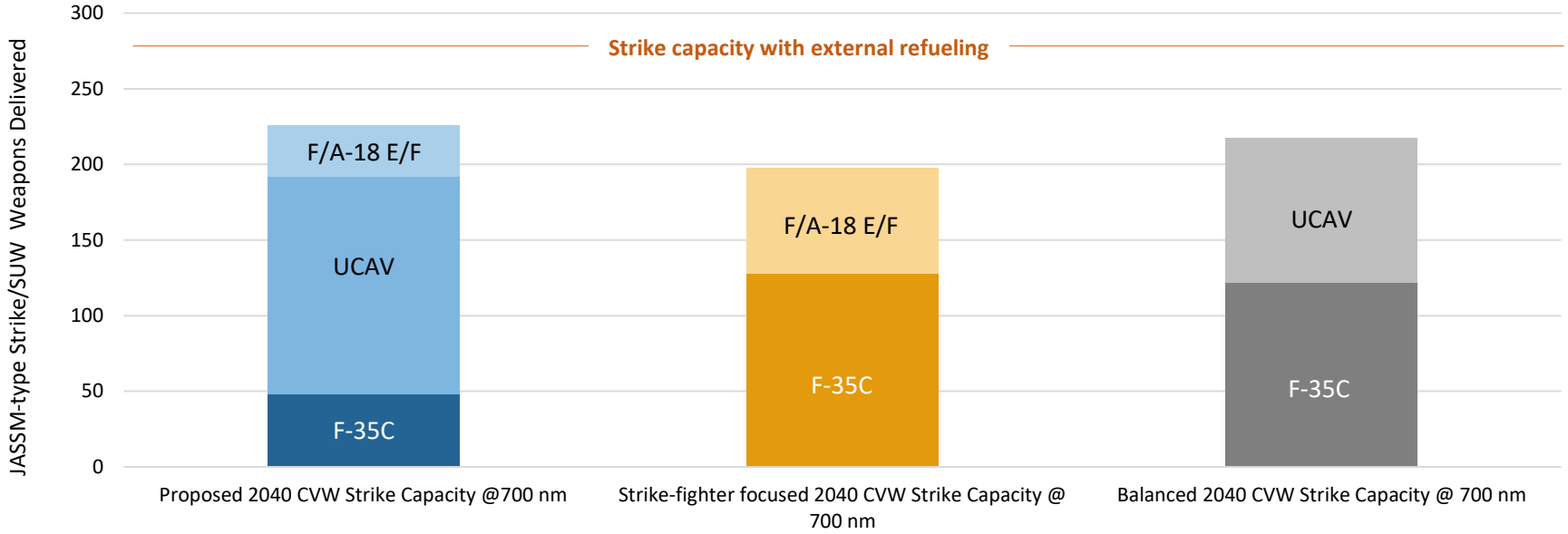

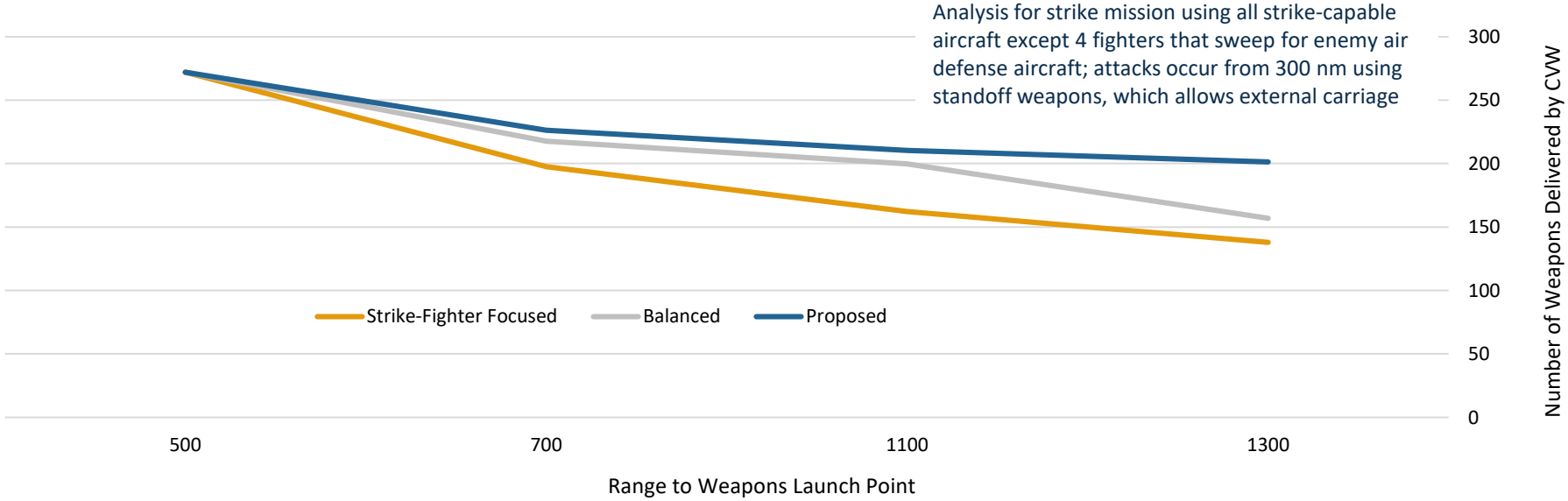

Beyond 700 nm, all available F/A-18 E/Fs or FA-XX are needed for tanking

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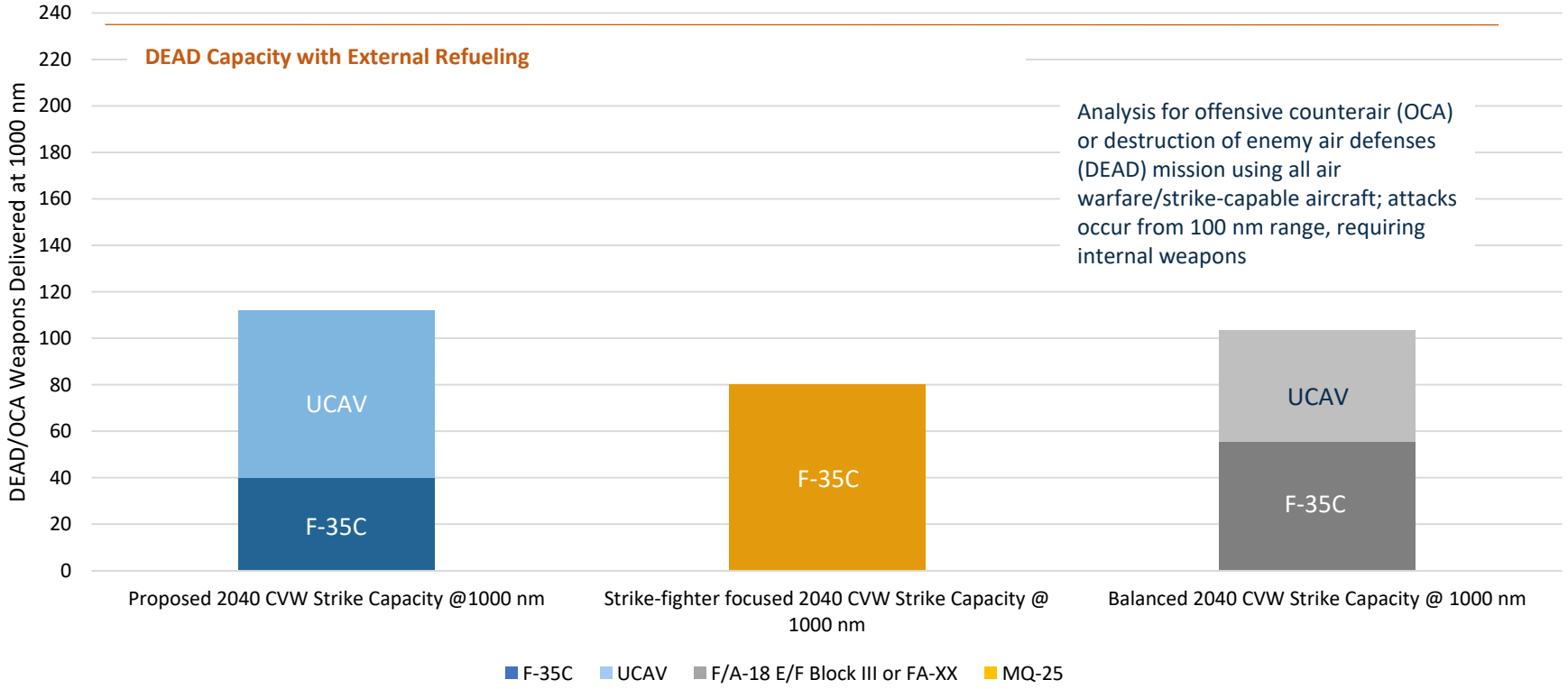

Although F/A-18 does not have internal weapons needed for this mission (yet), its use as a tanker enables CVWs to fully employ their stealthy strike capacity

CVWs include more specialized aircraft when threat environment worsens

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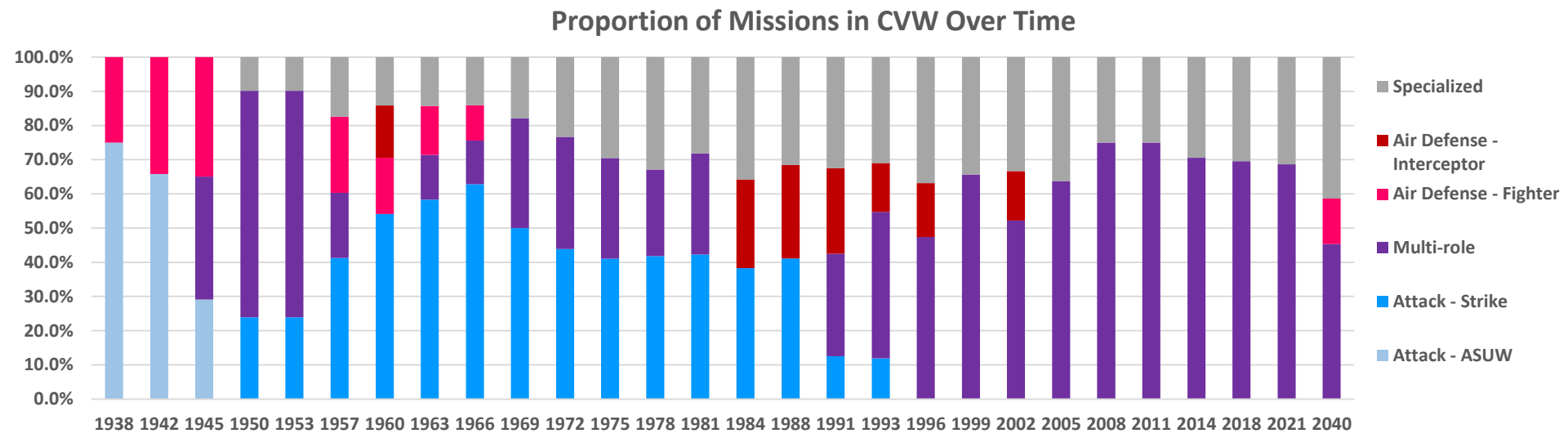

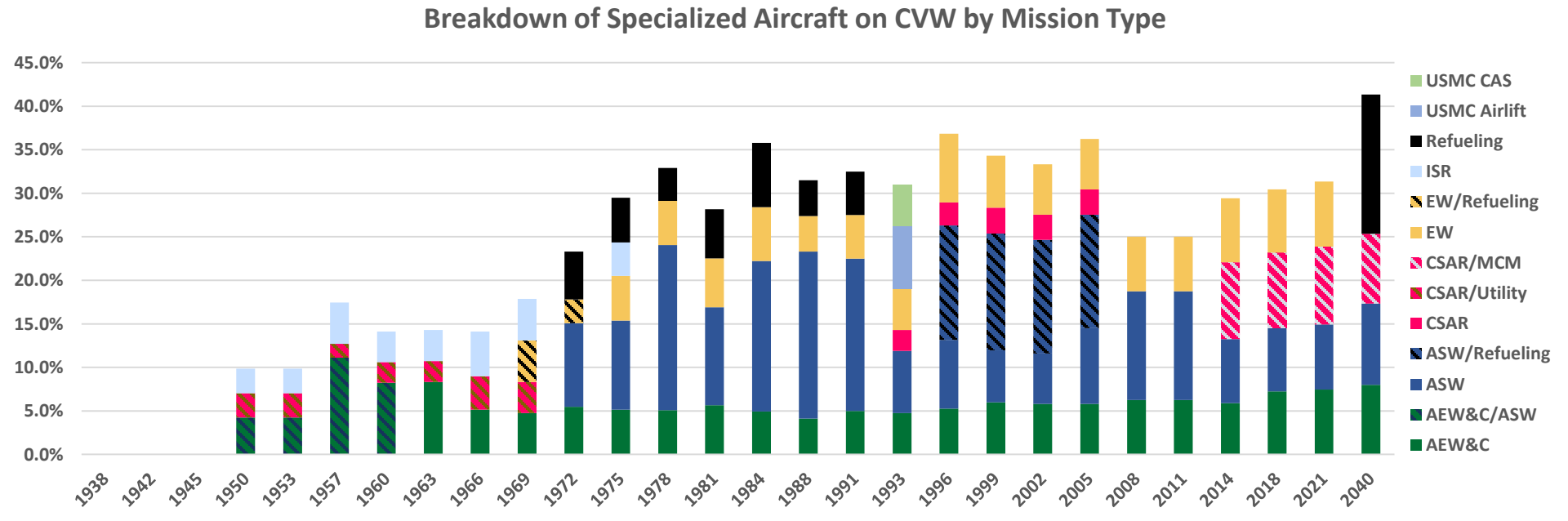

Proposed CVW significantly increases strike efficiency

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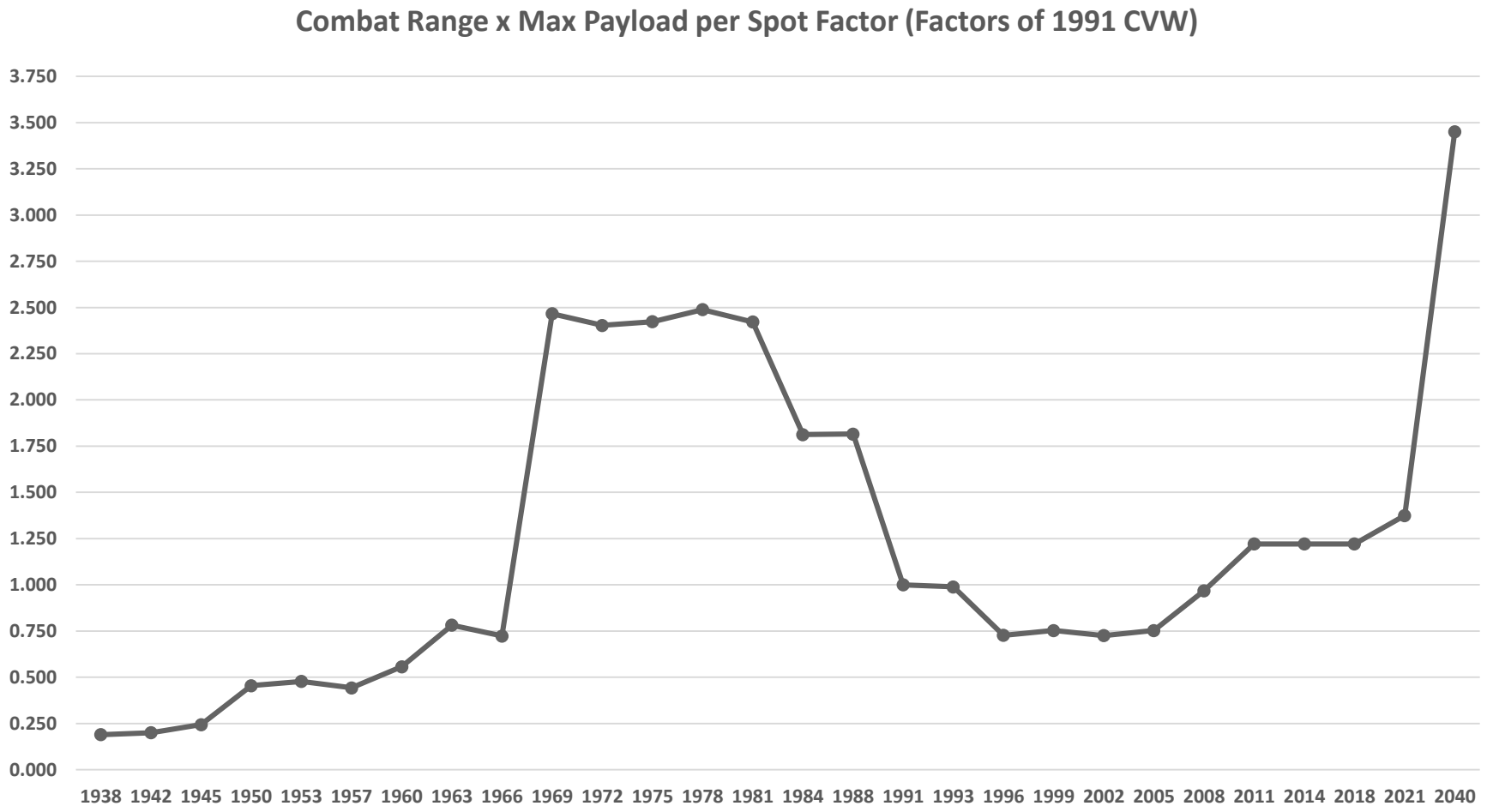

UCAV could provide longer range with similar payload to F-35C in a more efficient form factor; enables increases to CVW size without changing CVN

Implementation

Recommendations

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- **Sustain procurement of F/A-18 E/Fs as planned through 2023**
- **Sustain F-35C procurement as planned through 2024**
  - First half of production, resulting in 10F-35C per CVW
- **Develop the FA-XX fighter during 2020–2024**
  - Derivative of an existing aircraft, with production starting in 2025
- **Develop a low-observable UCAV attack aircraft during 2020–2024**
  - Production starting in 2025
- **Continue development of the MQ-25**
  - Transition program to a UCAV-based refueling aircraft
- **Retire E/A-18Gs as they reach their end of service life starting in the late 2020s**
  - Replacing capability with UCAVs and UAV and missile-expendable EMW payloads
- **Field a MALE rotary-wing UAV**
  - In concert with the U.S. Marine Corps
  - Such as the Tactically Exploitable Reconnaissance Node (TERN)

Although the proposed CVW takes decades, it is a marked transformation

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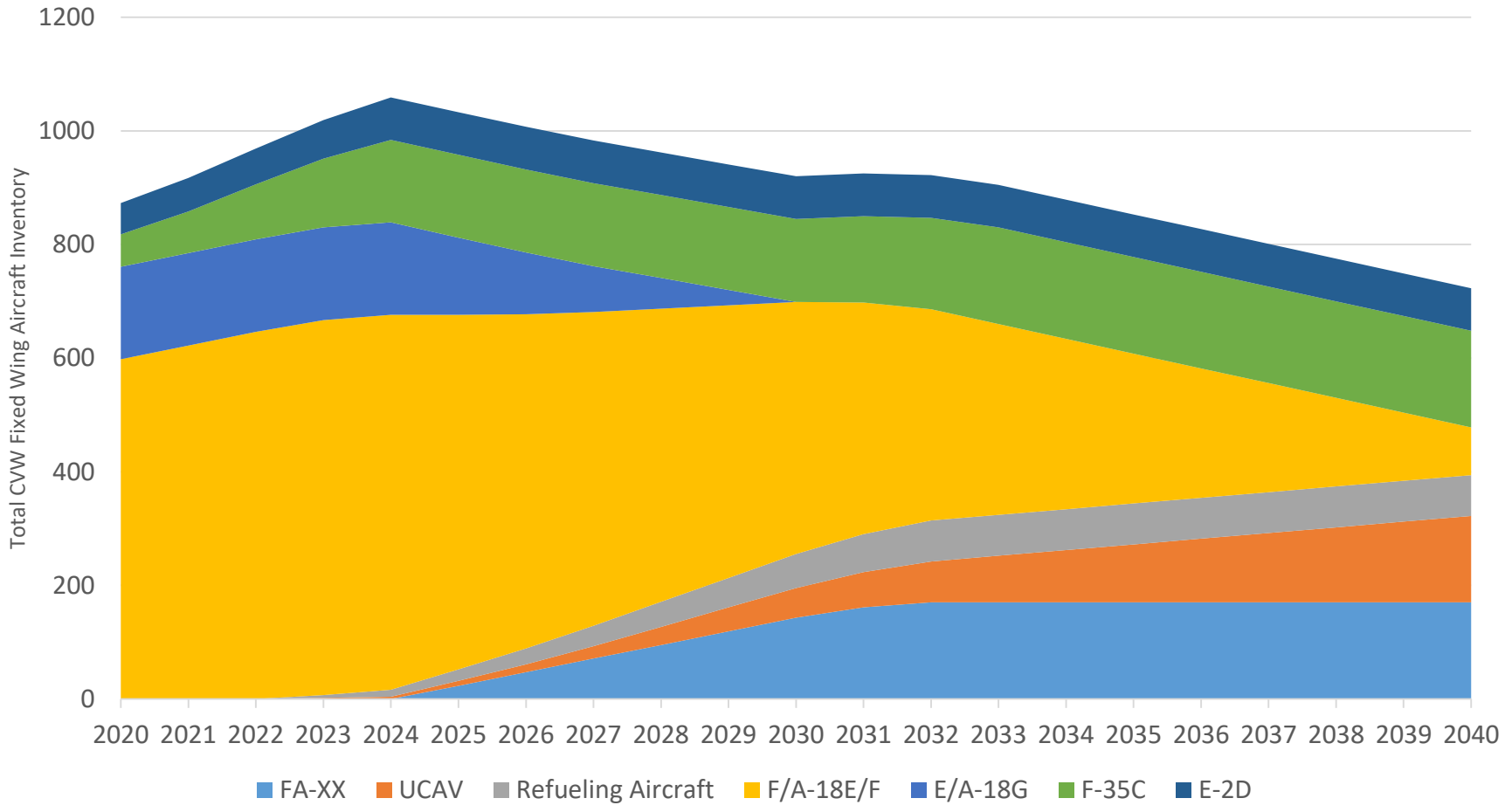

About 1/3 of carrier fixed wing aviation is unmanned when the proposed CVW is implemented; significant implications for organization, personnel, & readiness

Proposed CVW costs less overall than alternative CVWs

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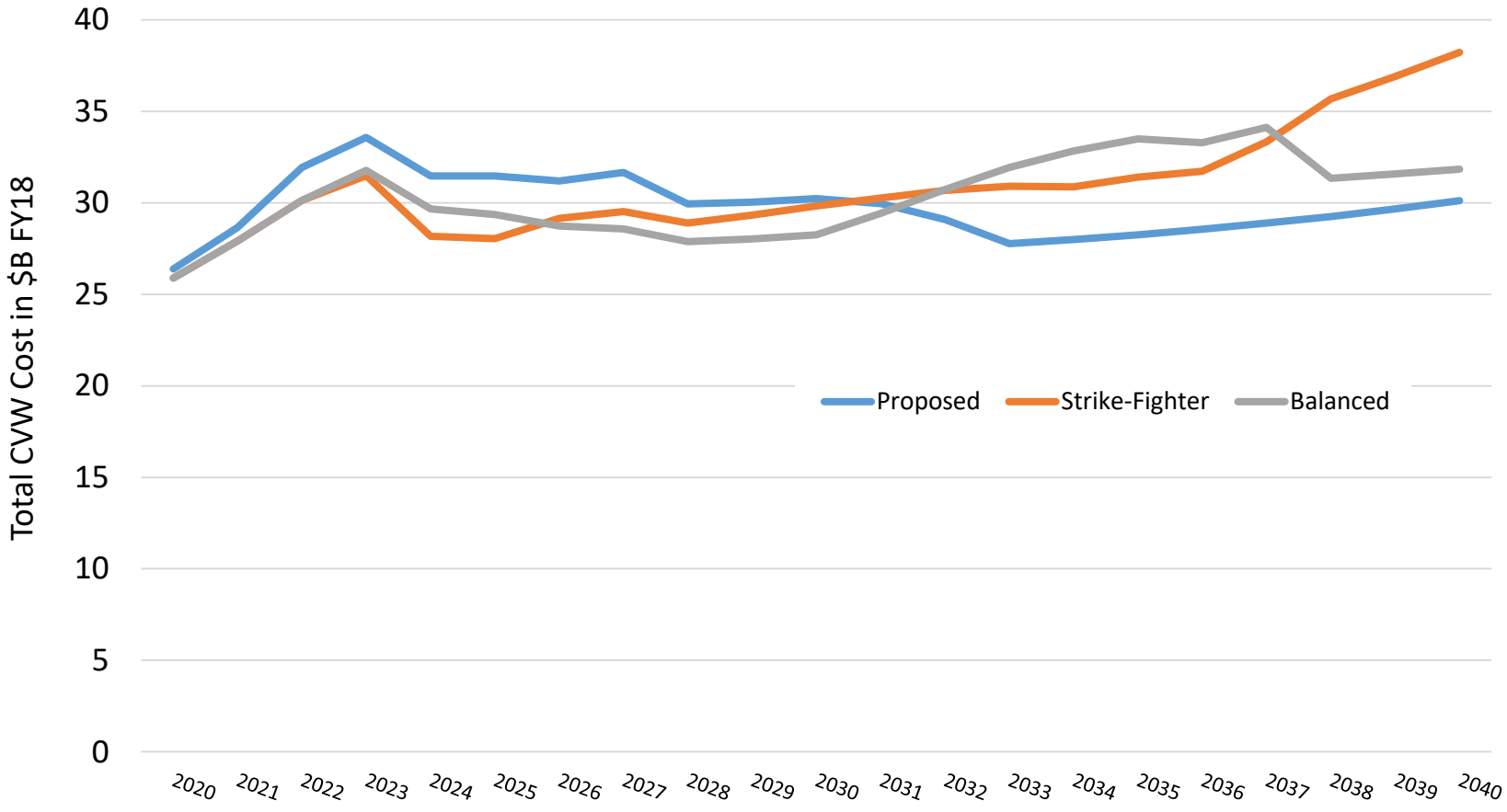

Proposed CVW replaces strike-fighters with smaller number of UCAVs during first 10 years; other CVWs need to recapitalize manned aircraft during 2030s

Questions?