

Next-Generation Aerial Wildland Firefighting

The Fire Guardian ISR Capability and Airborne Hotshot Crew Concepts for a Changing Fire Environment

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*This paper proposes two complementary concepts for next-generation aerial wildland firefighting. The **Fire Guardian** is a persistent multi-sensor ISR capability based on a mixed fleet of MQ-9B SkyGuardian and Mojave STOL airframes, providing continuous overhead thermal imagery, atmospheric monitoring, communications relay, and precision dispensing to every fire it flies. Fire Guardian transforms situational awareness, air operations management, and crew safety on every incident, and has significant export potential to international partners facing expanding wildfire threats. The **Airborne Hotshot Crew (AHC)** complements Fire Guardian by providing 20-person IHC-qualified firefighter crews capable of static-line parachute insertion from C-130/C-17/CH-47 platforms, delivering sustained fireline capability to roadless terrain. The paper presents five Courses of Action ranging from Fire Guardian alone (~\$600-850M standup) to a maximum capability package (~\$1.0-1.5B) that includes full AHC buildout, enhanced smokejumper program, tactical UAS, and a C-40F multi-role tanker/transport. Costs reflect post-Epic Fury acquisition reality: the USAF MQ-9A divestment stream this concept originally assumed no longer exists, so the fleet is acquired as new-build MQ-9B (leased for Phase 0) and Mojave STOL. **COA 3** (Fire Guardian plus central AHC plus enhanced smokejumpers) is the recommended path, balancing transformational ISR capability with a proof-of-concept AHC deployment. Climate change is driving unprecedented fire activity across the United States and internationally; this concept addresses the capability gap with scalable, evidence-driven investment.*

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1. The Problem

1.1 Fires in Roadless America

The United States contains approximately 58.5 million acres of designated wilderness and tens of millions of additional acres of roadless or minimally-roaded public land, concentrated in the western states and Alaska. These areas -- including the Frank Church-River of No Return Wilderness (2.3 million acres), the Bob Marshall Wilderness Complex (1.5 million acres), the Selway-Bitterroot Wilderness (1.3 million acres), and Alaska's vast interior -- are among the most fire-prone landscapes in North America.

When lightning ignites a fire in these areas, the firefighting response is severely constrained by access. Ground crews -- even elite Interagency Hotshot Crews (IHCs) -- may require one to three days to hike to a fire's location. Helicopter insertion is limited by available landing zones, aircraft availability, altitude, and the small number of personnel that can be moved per sortie. The current smokejumper force of approximately 450 personnel can insert small teams (2-8 jumpers) rapidly, but lacks the mass to handle fires that escape initial attack.

The result is predictable: fires in roadless areas frequently grow from manageable incidents into campaign-scale conflagrations costing tens or hundreds of millions of dollars to suppress, burning for weeks or months, destroying critical watersheds, and threatening communities when they eventually reach the Wildland-Urban Interface (WUI) -- the zone where development meets wildland vegetation.

There is direct historical precedent for airborne firefighter delivery. In 1945, the U.S. Army's 555th Parachute Infantry Battalion (the "Triple Nickels") conducted Operation Firefly, parachuting from C-47 transport aircraft onto forest fires in the Pacific Northwest. These were conventional Army paratroopers retasked to firefighting -- the same concept this paper proposes, updated with modern equipment, training, and technology.

1.2 Climate Change and the Expanding Fire Environment

Wildland fire activity in the United States has fundamentally changed over the past four decades, driven by rising temperatures, earlier snowmelt, extended drought, fuel accumulation from a century of suppression, and expanded Wildland-Urban Interface development. The resulting fire regime differs significantly from the one federal fire management was designed for.

In the western United States, the fire season has extended from approximately five months in the 1970s to over seven months today. The average burn duration of individual fires has grown from six days in 1973-1982 to 52 days in 2003-2012. Fire weather days (conditions enabling wildfire spread) have increased in every western region, with parts of Southern California, Texas, New Mexico, and Arizona seeing approximately two additional months of fire weather per year since 1973. Of the 10 years with the largest US acreage burned on record, all have occurred since 2004. More than half of the post-1985 increase in western US forest area burned has been attributed to human-caused climate change in peer-reviewed research (Abatzoglou and Williams 2016).

Significant fire risk is no longer confined to the traditional western fire states. The eastern and southeastern United States have experienced approximately a tenfold increase in large wildfire

frequency over the last 40 years, with Texas and the Appalachians seeing the largest increases (Ivey et al. 2024). The 2024 Smokehouse Creek fire in the Texas Panhandle became the largest in Texas history at over 1 million acres. The 2023 Jennings Creek fire on the NJ/NY border and repeated New Jersey Pine Barrens fires demonstrated that eastern fire management systems can be quickly overwhelmed. Nearly 28 million homes in the eastern US are in burn-prone areas, and fire weather days are increasing from Maine through Florida.

Cross-border impacts have become strategically significant. The 2023 Canadian wildfire season burned approximately 37-42 million acres (roughly the size of Ireland), more than double the previous record. Smoke from those fires caused air quality emergencies from Chicago and Detroit to New York and Washington DC for weeks, exposing tens of millions of Americans to hazardous particulate levels. Canada experienced May-October temperatures 4 degrees F above the 1991-2020 average in 2023; continued warming at northern latitudes suggests this scale of fire activity will recur.

1.3 The Capability Gap

These trends have three implications for aerial wildfire response capability design. **First**, the traditional assumption that surge capacity can flow from less-active regions to more-active ones breaks down when multiple regions burn simultaneously, as happens with increasing frequency. USFS declared Preparedness Level 5 (the highest) for a record 68 days in 2020, and multiple subsequent years have approached or exceeded that duration. **Second**, early detection and rapid initial attack become more important as climate-stressed fuels enable smaller fires to escape to catastrophic scales faster than historical norms. **Third**, aerial ISR capability has value across every US region, not just traditional western fire country. A capability designed only for western roadless terrain is under-scoped for the emerging fire environment.

The delivery problem for roadless fires remains, but it is now embedded in a larger capability gap: the federal fire response system lacks the scale of persistent situational awareness, rapid airborne response, and cross-regional mobility that the changing fire environment demands. Solutions must address both the specific roadless-access problem and the broader needs of a national fire response system operating under climate-driven stress.

2. Current Capabilities and Their Limits

2.1 Smokejumpers

The U.S. smokejumper program is operated by two federal agencies: the U.S. Forest Service (USFS), which maintains seven bases, and the Bureau of Land Management (BLM), which maintains two. The total force is approximately 430-450 personnel per fire season. Smokejumpers are highly experienced wildland firefighters who parachute from small fixed-wing STOL aircraft (Twin Otters, CASA 212s, Dornier 228s, Shorts Sherpas) into fires difficult to reach by ground.

The USFS began transitioning from round canopies (the FS-14) to ram-air/square canopies (the CR-360) in 2016; the BLM had adopted ram-air canopies years earlier. Ram-air canopies provide greater maneuverability and the ability to jump in higher winds, but require more extensive training than round canopies. The current smokejumper deployment method uses a static-line-deployed drogue chute for stabilization; the jumper then manually pulls a release handle to deploy the ram-air main canopy after a count. This gives SJs an active deployment decision during a drogue-stabilized descent -- more complex than pure military static line (where the static line deploys the main directly) but not unstabilized military freefall. Exit altitude is approximately 3,000 feet AGL.

Smokejumpers pack and maintain their own parachutes in the loft at each base, working toward FAA-certified Senior Parachute Rigger and Master Rigger qualifications. This organic rigging culture is central to the smokejumper professional identity. Smokejumpers also manufacture much of their own gear -- jump jackets, pants, gear bags, harnesses -- using sewing machines in the loft. This self-sufficiency is a defining characteristic of the program. SJ jump suits are heavily padded with Kevlar/Cordura, and jumpers carry tree letdown ropes, because their small, austere DZs -- selected without overhead ISR -- make unintended tree contact a real possibility despite the ram-air canopy's maneuverability. The protective equipment is risk mitigation for when things go wrong, not a preferred operating mode.

Smokejumpers are optimized for initial attack on small, remote fires. A standard response puts 2-8 jumpers on a fire within hours of detection. The aircraft then delivers paracargo (food, water, tools) by kicking bundles with small round cargo parachutes from low altitude. This model is highly effective for its intended purpose but cannot scale to larger fires.

2.2 Interagency Hotshot Crews

IHCs are 20-person teams of elite wildland firefighters organized by the USFS, BLM, BIA, NPS, and state agencies. Over 100 IHCs operate nationally, making them the primary ground force for sustained firefighting operations on large fires. They are the most highly trained, skilled, and experienced wildland firefighters along with smokejumpers, meeting rigorous standards under the Standards for Interagency Hotshot Crew Operations (SIHCO). IHCs are self-sufficient, physically elite, and capable of operating independently for extended periods in austere conditions.

However, IHCs reach fires by ground vehicle and then hike to the fire line. In roadless areas, this can take one to three days. By the time crews arrive, a fire that was one acre at detection may be hundreds or thousands of acres. IHCs have no organic air insertion capability.

2.3 Aerial Firefighting

The USFS and its partners operate a fleet of contracted airtankers (fixed-wing aircraft that drop fire retardant), helicopters, and lead/air-tactical aircraft. The military contributes through the Modular Airborne Fire Fighting System (MAFFS), in which Air National Guard and Air Force Reserve C-130s are equipped with roll-on retardant tanks and fly retardant drops under USFS direction. Four ANG/AFRC units are MAFFS-designated: the 152nd AW (Reno, NV), the 153rd AW (Cheyenne, WY), the 146th AW (Channel Islands, CA), and the 302nd AW (Peterson SFB, CO).

Current aerial firefighting focuses on retardant delivery and aerial supervision. There is no persistent overhead intelligence, surveillance, and reconnaissance (ISR) capability, no precision cargo delivery system, and no large-scale personnel air insertion capability beyond smokejumpers. The California Air National Guard has demonstrated MQ-9 Reaper ISR support for fire operations, but this remains ad hoc rather than a standing capability.

3. The Fire Guardian (MQ-9) Concept

The MQ-9 Reaper -- designated "**Fire Guardian**" in AHC operations -- is a medium-to-high altitude, long-endurance remotely piloted aircraft with over 27 hours of endurance, a ceiling of 50,000 feet, and a 3,850-lb payload capacity. The USAF is divesting its highest-time Block 5 airframes through 2027, retaining only 140 Reapers through 2035. This paper proposes transferring divesting MQ-9 airframes to the USFS for dedicated wildfire ISR, communications relay, atmospheric monitoring, and aerial ignition.

The California Air National Guard has already demonstrated MQ-9 fire-mapping operations, providing real-time intelligence to incident commanders through heavy smoke and at night. The AHC concept expands this from ad hoc support to a standing, dedicated capability.

Beyond persistent ISR, the Fire Guardian fills two critical roles in AHC airdrop operations. **Pre-drop DZ clearance:** Before giving drop clearance, the Fire Guardian conducts an IR sweep of the DZ and a safety margin around its perimeter, confirming the area is free of fire, hot spots, and other hazards invisible through smoke. Clearance is relayed via aircraft radio to the loadmaster and USFS JM, who gives the green light. **Post-drop canopy tracking:** During AHC descent, the Fire Guardian tracks all canopies on EO/IR and reports anomalies to the ground FTAC or orbiting C-130: "one jumper drifting 200 meters north of DZ, approaching treeline." This information goes to the FTAC managing the DZ, not to individual AHC jumpers under canopy -- corrections to basic airborne jumpers in the air are not operationally realistic. The Fire Guardian can, however, provide real-time guidance to an SJ FTAC during HALO descent, as that individual has the training and equipment to act on it (see Sec 5.4.1).

3.1 Payload Configuration

The MQ-9's nose-mounted Multi-Spectral Targeting System B (MTS-B), providing EO/IR full-motion video, is standard on all fire missions. Wing hardpoints carry 2-3 mission-configurable pods:

Payload	Capability	Mount
MTS-B EO/IR Ball	High-resolution EO/IR full-motion video for detailed fire behavior observation, spot fire detection, and damage assessment.	Nose (standard)
Comms Relay Pod	Retransmits VHF/UHF tactical radio, ATAK/TAK situational awareness data, and cellular service. Eliminates terrain-masked dead zones. Critical for AHC-to-dispatch coordination, JPADS targeting, and blue force tracking.	Wing hardpoint
Wide-Area Staring IR	360-degree persistent infrared sensor monitoring the entire fire perimeter simultaneously. Detects spot fires, tracks rate of spread in all directions.	Wing hardpoint
Atmospheric Sampling	Measures smoke particulate density, wind speed/direction at altitude, temperature, and humidity profiles. Feeds fire behavior prediction models and public health air quality forecasting. Data currently unavailable during active fires.	Wing hardpoint
Precision Dispensing Containers	Fin-stabilized containers dropped from ISR altitude (10,000-15,000 ft), eliminating need to descend near fire. Barometric/GPS fuze disperses payload at preset altitude. Dual-use: incendiary PSD spheres for DZ burnout, OR colored smoke grenades (M18 series) for DZ marking and wind direction visualization. Multiple containers per hardpoint rack. Adapted from military submunition dispenser designs (simplified, non-weapon).	Wing hardpoint (rack of 4-6)

Pod development timeline: Most pods adapt COTS components rather than requiring clean-sheet R&D.; MTS-B is standard (zero development). Comms relay pod uses commercial SDR hardware

(TrellisWare, Silvus/MPU-5): 12-18 months to field. Atmospheric sensors are commercial miniaturized packages (Aeroqual, Alphasense) needing integration for MQ-9 airspeeds/altitudes: 12-18 months. Precision dispensing containers adapt military submunition dispenser engineering (simplified, non-weapon): 12-18 months. Staring IR (adapted from wide-area motion imagery systems like Logos Redkite/BAE): 18-24 months (long pole). Phase 0 launches with MTS-B only; comms relay and dispensing containers by Year 2; full suite by Year 3. Total pod development: ~\$15-30M.

3.2 Basing and LRE Model

MQ-9 operations use line-of-sight (LOS) control from Launch and Recovery Elements (LREs) deployed to airfields near active fire complexes, rather than relying on Automatic Takeoff and Land Capability (ATLC) over SATCOM. LOS provides lower latency, eliminates SATCOM dependency, reduces bandwidth costs, and places a human team on-site to coordinate with local air traffic and the Air Tactical Group Supervisor. Main operating bases (MOBs) provide ground control stations (GCS), primary maintenance, crew quarters, and training. LRE teams (portable GCS, launch/recovery crews, maintenance) deploy forward as needed.

MQ-9 Main Operating Bases (Initial Build)

MOB Location	Init. Orbits	Aircraft	Coverage / Notes
Eielson AFB, AK	2	6	Alaska interior. 26 mi from Wainwright AHC/SJ. BLOS-capable GCS for remote AK fires.
Boise, ID (NIFC)	1	3	National hub. NIFC dispatch tasks ISR. Gt Basin / N Rockies. LOS GCS only; BLOS via March.
March ARB, CA	2	6	CA/Sierra/SW. 163rd ATKW infrastructure. National BLOS hub. MQ-9 FTU.
Peterson SFB, CO	1	3	Central Rockies, Four Corners. Near Ft Carson. LOS GCS only; BLOS via March.

Initial fleet: 18 aircraft (3 per orbit -- viable for fire operations due to seasonal ops, shorter transit than combat, reduced maintenance burden without weapons, and acceptable brief coverage gaps). Target fleet mix: 6-8 MQ-9B SkyGuardian (civil-certified, BLOS, longest endurance) plus 10-12 Mojave STOL (runway-independent, forward-basing from Forest Service infrastructure); see Section 3.8 for the acquisition strategy. Growth path: expand Boise and Peterson to 2 orbits each (24 total) based on operational demand. Aircrew and sensor operators recruited from separating USAF MQ-9 and Army Gray Eagle personnel. For the LOS/BLOS C2 architecture (March BLOS hub, Boise and Peterson LOS-only, Eielson BLOS for Alaska), see Section 8.2.

3.3 Surge Crew Capacity

The mixed MQ-9B/Mojave fleet (Section 3.8) draws surge crews from two parallel Guard pools rather than one. **MQ-9B pool:** the **163rd Attack Wing (CA ANG, March ARB)** remains the designated primary surge wing. The 163rd operates MQ-9As, serves as the MQ-9 Formal Training Unit (FTU), and has demonstrated domestic fire ISR during California wildfires. MQ-9A pilot and sensor-operator skills transfer to MQ-9B via a 2-4 week differences course -- the precedent is the RAF's Reaper-to-Protector RG1 (MQ-9B) conversion, trained through GA-ASI's Flight Test and Training Center at Grand Forks, ND. Critically, the MQ-9B's Automatic Takeoff and Landing Capability (ATLC) removes the most

perishable qualification (LRE hand-flown landings) from the surge equation: a mission-control pilot who has not hand-flown a landing in years can still fly a full MQ-9B sortie. Sensor operators transfer nearly directly (MTS-series operation is common across variants).

GCS caveat: the MQ-9B uses the Certifiable GCS (CGCS), which differs from the ANG's Block 30/50 stations; backward compatibility should not be assumed until confirmed. Planning assumption: USFS procures CGCS stations, and surge crews fly USFS aircraft from USFS ground stations after differences training. Co-location at March makes this practical -- 163rd surge crews walk across the ramp to USFS CGCS stations.

Mojave pool: Mojave/Gray Eagle STOL uses Gray Eagle 25M avionics, data links, and the laptop-based SC2 ground control system -- an Army ecosystem. The **Army National Guard** is fielding Gray Eagle 25M now (congressional FY26 procurement add), and ARNG 25M operators transfer near-directly to Mojave, which is deliberately built on the 25M baseline. USAF MQ-9 crews cannot surge onto Mojave without cross-training that is not worth building; the two pools stay separate. This dual-pool model is messier than single-type surge but diversifies the DOD partnership across both Air and Army Guard.

Post-Epic Fury crew picture: the USAF crew force was sized for a 189+ aircraft fleet that now stands at roughly 135 airframes, so the near-term constraint on USAF MQ-9 operations is aircraft availability, not crews. The surge concept inverts favorably: USFS provides airframes, the Guard provides crew depth. A shrinking MQ-9A fleet also increases the flow of separating MQ-9 pilots and sensor operators available for USFS organic hiring. During the Phase 0 lease period, GA-ASI contractor instructor crews (a standard lease-model feature) provide a third pool while USFS crews train.

3.4 Ground Integration: FBAN at the ICP

Fire Behavior Analysts (FBANs) are organic to the Fire Guardian unit -- USFS employees (S-290/S-390/S-490 qualified) cross-trained on sensor exploitation. At March MOB: 3-4 FBANs (sufficient for 24-hr coverage during peak season). At Boise LRE: 2-3. They are not generic fire analysts borrowed from the incident; they specialize in interpreting multi-sensor Fire Guardian data.

Deployment trigger: When a Type 3 or higher IMT assumes command of an incident where Fire Guardian is providing ISR, a 2-person FBAN team deploys to the ICP (drives from Boise or March, typically 3-8 hours). Before an IMT is ordered (initial attack phase), Fire Guardian operates in investigation mode, feeding data to Boise dispatch or March GCS. No FBAN in the field.

ICP workstation: The FBAN team sets up alongside the operations and plans sections with a ROVER receiver for live video, a ruggedized laptop for ATAK/fire modeling integration, and 2-3 large field-deployable monitors. Display configuration: (1) Live EO/IR feed from MTS-B, slewed on FBAN or IC request. (2) Staring IR composite showing full fire perimeter with spread rate vectors, spot fire detection, and BFT overlay. (3) Atmospheric data and fire behavior model output -- wind profiles from the atmospheric pod feeding into existing tools (FlamMap, FARSITE, WFDSS). Real-time perimeter data transforms these from retrospective tools into near-real-time predictive tools.

ICP Air Operations Manager: On incidents where Fire Guardian is overhead and an FBAN team is at the ICP, an experienced ATGS-qualified individual at the ICP can assume the air operations management function currently performed by the airborne ATGS, using the Fire Guardian feed and

ATAK for superior situational awareness. The ATGS aircraft is released, reducing airspace congestion and cost (~\$3,000/hr). The field FTAC retains DZ airspace control during airdrop operations. The lead plane function continues separately. On incidents without Fire Guardian, the traditional ATGS model continues unchanged. This should be tested during Phase 0 rather than mandated from Day 1.

3.5 Fire Sentinel (RQ-7B) Brief Overview

Section 5.6 introduces a complementary Group 3 tactical UAS, the Fire Sentinel (surplus RQ-7B Shadow), that provides division-level tactical ISR while Fire Guardian handles strategic incident-level ISR. Fire Sentinel is treated as an optional capability included only in COA 5 (see Section 7); it is not central to the Fire Guardian concept. Detailed specifications for the platform, payload, operations, manpower, and international export are in Appendix B. On large fires where both systems are deployed, altitudes deconflict by tier: Fire Guardian above 15,000 ft, Fire Sentinel below 15,000 ft, airtankers and helicopters below 5,000 ft.

3.6 Pod Sharing for Multi-Platform Integration

The Fire Guardian pod architecture creates an opportunity to extend specific sensor capabilities across other manned fire aircraft (lead planes, ATGS King Airs, RC-26 Metroliners, potentially CAL FIRE OV-10s if remaining service life justifies) as a multi-platform fire-ISR ecosystem. This is framed in this paper as a **development opportunity** for Year 3+ once Fire Guardian pods are mature and in production, not as a Phase 0 or Phase 1 commitment.

Two of the Fire Guardian pod types are well-suited to autonomous operation on shared platforms: comms relay and atmospheric sampling. Both operate without requiring host-aircraft operator interaction during flight, and both produce data that can be processed by the FBAN at the ICP rather than the host aircrew. Sensor pods (wide-area staring IR) are intentionally **not** proposed for shared platforms because they require dedicated operator attention for real-time interpretation and significant bandwidth to forward to the FBAN (both problems solved on Fire Guardian by dedicated sensor operators at the BLOS GCS or LRE; neither solution scales easily to shared platforms).

Comms Relay Pod on Shared Platforms

A comms relay pod adds another node to the airborne mesh network alongside Fire Guardian. Lower-altitude manned aircraft fill in coverage gaps where Fire Guardian's high-altitude signal is blocked by terrain. The pod requires only hardpoint mount, power, and minimal cooling -- no operator interaction, no integration with the host aircraft's avionics beyond the basic 'is it powered on' check. Significantly improves comms reliability across rugged terrain where ground crews routinely lose contact with command, while also extending ATAK mesh coverage to previously dark zones.

Atmospheric Sampling Pod (Linked Through Comms Relay)

An atmospheric sampling pod collects wind, humidity, temperature, and particulate data at the host aircraft's flight altitude during normal operations. Critical inputs for fire behavior modeling that Fire Guardian alone cannot provide at all altitudes simultaneously -- especially at the lower altitudes where airtankers operate, where wind shear can make or break a retardant drop. The atmospheric pod transmits through the comms relay pod (paired or co-located on the same aircraft) to avoid requiring separate communications integration on the host. Data flows directly to the FBAN's ICP workstation, alongside Fire Guardian atmospheric data, for integrated fire-weather analysis.

Implementation

Year 3+ development opportunity. Once Fire Guardian comms relay and atmospheric pods are in production for the MQ-9 (per the Section 3.1 pod development timeline, comms relay by Year 2-3 and atmospheric sensing by Year 2-3), adapting them to shared platforms becomes a marginal-cost addition. **Initial deployment scope:** 4-6 lead plane aircraft (USFS / contracted), 2-4 ATGS King Airs (CAL FIRE), 2-3 RC-26 Metroliners (ANG). Combined comms relay + atmospheric pod cost per aircraft after MQ-9 production line is established: ~\$300-500K. FAA Supplemental Type Certificate (STC) integration cost: ~\$500K-1M per aircraft type, amortized across the fleet within that type. Total program: ~\$5-15M for initial multi-platform deployment.

Cost-sharing: Federal pod development is funded through the main Fire Guardian budget. Multi-platform extension can cost-share with state agencies (CAL FIRE), contracted lead plane operators, and ANG (RC-26 already operates in fire ISR role). This makes the extension affordable as a multi-year program rather than a single-year acquisition.

OV-10 caveat: CAL FIRE's OV-10A Broncos are aging 1960s-design aircraft with limited remaining service life. Pod integration on the OV-10 may not be cost-effective given expected fleet replacement timelines. CAL FIRE King Air ATGS aircraft and lead plane King Airs are higher-priority targets due to longer expected service life and more modern electrical/data interfaces.

3.7 Standalone Value: Fire Guardian Without AHC

The Fire Guardian concept has significant standalone value independent of the AHC. Persistent aerial ISR, communications relay, atmospheric monitoring, and real-time fire modeling data integration improve fire management on *every incident* where they are deployed, regardless of whether AHC crews are part of the response. Fire Guardian reduces firefighter fatality risk through persistent overhead thermal imagery detecting spot fires and monitoring fire behavior changes, through communications relay closing dead spots that isolated Granite Mountain Hotshots at Yarnell, and through atmospheric sensing improving fire-weather prediction.

The paper presents Fire Guardian and AHC as complementary concepts, but they can be acquired separately and in sequence. The recommended acquisition strategy (see Section 7) begins with Fire Guardian at full scale (COA 1 baseline) and builds AHC capability through Phase 0 proof-of-concept before committing to multi-base buildout. If Phase 0 evidence suggests AHC is marginal relative to enhanced smokejumper capability, the program can pivot to COA 2 (Fire Guardian + enhanced SJ, no AHC) -- and Fire Guardian still represents a substantial capability transformation. Conversely, if budget constraints prevent pursuing AHC at all, Fire Guardian acquisition alone (COA 1) remains a defensible and valuable investment. **Fire Guardian does not require AHC to justify itself.** Fire Guardian also enables two capabilities that are independently valuable even if every other element of this paper dies: night fixed-wing aerial attack (Section 6.7) and night pathfinder insertion (Sections 5.4 and 8.4).

3.8 Airframe Acquisition Strategy (Post-Epic Fury)

The divestment assumption is dead. Earlier versions of this concept assumed the Fire Guardian fleet would be acquired from divested USAF MQ-9A airframes at transfer cost. Operation Epic Fury (February-April 2026) eliminated that path: 24 MQ-9As were destroyed over Iran, on top of earlier Yemen losses, dropping the USAF fleet from ~231 (start of FY25) to ~135 -- 54 below the service's

189-aircraft operational floor. Congress has directed the Air Force to halt further MQ-9 divestment and rebuild inventory by 2028 (FY27 NDAA), the MQ-9A production line is effectively closed (GA-ASI reports fewer than 10 new airframes available worldwide), and any future surplus will go to USAF and allied combat needs first. The Fire Guardian concept survives; its acquisition path changes.

Phase 0: Leased MQ-9B SkyGuardian

Phase 0 operates 3 **leased MQ-9B SkyGuardian** aircraft (company-owned, government-operated or contractor-supported arrangements GA-ASI already offers). Leasing avoids upfront acquisition cost during the proof-of-concept, provides aircraft immediately from an active production line, and includes GA-ASI instructor crews while USFS builds its own cadre. The MQ-9B's advantages are substantial for the fire mission independent of availability: it is type-certifiable to STANAG 4671 civil-airworthiness standards and recently completed flight-into-known-icing qualification, meaning it can realistically operate in the National Airspace System alongside civilian traffic without the segregated-airspace waivers the MQ-9A requires. For an ISR mission that lives inside civilian airspace and TFRs, this is arguably the single most important discriminator and partially justifies the higher unit cost. MQ-9B also offers 40+ hour endurance (vs. 27 for MQ-9A), ATLC, weather radar, and lightning protection.

Target Fleet: Owned MQ-9B + Mojave STOL

The full-program fleet transitions from leased to owned aircraft: **6-8 new-build MQ-9B** (~\$30-40M each) for BLOS strategic orbits, NAS-integrated operations, and the longest-endurance missions, plus **10-12 Mojave STOL** (Gray Eagle STOL production variant) as the numerical bulk of the fleet. Mojave's attributes map remarkably well onto the fire mission: takeoff in as little as 586 ft and landing in 335 ft on dirt; operation from unimproved surfaces including Forest Service airstrips and graded roads; ground support equipment transportable by a single UH-60; C-130 transportability for rapid repositioning between fire regions; 3,600-lb payload preserving the full Fire Guardian pod suite; 25+ hr endurance; and Modular Open Systems Approach avionics simplifying USFS-specific pod integration. Where the MQ-9B flies from the four MOBs, Mojave can forward-base at federal fire infrastructure near the fire itself, shortening transit and increasing on-station time.

Optional Bridge: Divested Army Gray Eagle

The Army Transformation Initiative halts Gray Eagle procurement and retires older MQ-1C variants around FY28 while newer 25Ms continue in ARNG service. If MQ-9B lease costs or availability constrain the bridge period (2028-2031), 6-10 divested Gray Eagles at near-zero airframe cost provide interim orbits. Trade-offs: ~500-800 lb payload (a subset of the pod suite per aircraft), 29,000-ft ceiling, no civil certification. Because Gray Eagle shares the 25M/SC2 ecosystem with Mojave, a Gray Eagle bridge partially pre-builds the Mojave training and logistics pipeline rather than adding an orphan third type. It is presented here as a fallback option, not a committed fleet element; a three-type fleet, even temporarily, is a real O&M; burden for a program this size.

Vendor Reality

No realistic US competitor exists at the Fire Guardian capability level. The current attritable/CCA platforms (Kratos XQ-58 Valkyrie, Anduril Fury, Boeing MQ-28) are the wrong tools: jet-powered (2-3 hr loiter vs. the 24+ hr the mission requires), weapons-centric, and designed to be lost in contested airspace -- an expensive attribute the fire mission does not need. Northrop's MQ-4C/RQ-4 class is strategic-recce overkill at \$100M+ per tail. Foreign MALE platforms (Bayraktar Akinci, IAI Heron) face

industrial-base and political barriers to US federal acquisition. GA-ASI is, as a practical matter, the vendor; the program should acknowledge this openly and structure the lease-to-own path to preserve negotiating leverage (lease terms, option quantities, pod development as severable contracts).

4. The Airborne Hotshot Crew Concept

The Airborne Hotshot Crew (AHC) is a proposed new USFS resource type: teams of 20 experienced wildland firefighters who meet all Interagency Hotshot Crew standards under SIHCO and are additionally qualified for static-line parachute insertion from C-130, C-17, and CH-47 military aircraft. AHCs complement existing smokejumper and IHC capabilities, filling the gap between the smokejumper program's small-team rapid response and the IHC's large-team ground-access model. The explicit requirement to meet full IHC standards ensures AHCs are IHC-plus, not a separate-but-equal category. AHCs undergo the same annual IHC certification review as any other hotshot crew, with the airborne piece as an additional qualification layer.

4.1 Unit Design and Personnel

Each AHC mirrors IHC structure: one superintendent, two assistant superintendents, three squad leaders, and fourteen crew members. All personnel are static-line parachute qualified and carry personal fire shelters, identical to those carried by smokejumpers and IHC personnel. Leadership positions hold advanced wildfire qualifications (Incident Commander Type 4, Division Group Supervisor) consistent with IHC standards.

At the two designated heavy-equipment (HE) bases (Fort Wainwright, AK and Boise, ID), each AHC includes an additional 4-6 personnel trained in heavy-drop rigging, vehicle recovery, and bulldozer operation. These augmented crews deploy with vehicles and heavy equipment when the mission requires mechanized capability. All AHCs, regardless of base assignment, train with and are capable of deploying MRZRs and ISVs. Each AHC maintains at least one Pathfinder-qualified member to manage DZ operations for follow-on heavy-equipment and JPADS deliveries (see Section 5.2).

4.2 Parachute Systems: MC-6 and the FS-14 Heritage

AHCs use the MC-6 parachute, a static-line-deployed, steerable round canopy currently used by U.S. Army Special Operations Forces. Its lineage is directly relevant: the MC-6 is derived from the USFS FS-14 smokejumper parachute. In the late 1990s, the Army's 10th Special Forces Group at Fort Carson, CO adopted the FS-14 as the SF-10A to address high-altitude jump challenges at their garrison elevation of over 5,800 feet. The SF-10A canopy was subsequently integrated with the T-11 parachute harness to become the MC-6. The technology transfer went civilian-to-military, not the other way around.

The MC-6 provides several advantages for the AHC mission. It is static-line deployed, meaning the aircraft automatically deploys the parachute -- no drogue release or manual deployment action by the jumper, unlike the SJ drogue-stabilized method where the jumper actively deploys the main after a count. It has a descent rate of 14.5-18.5 feet per second (the lowest of any military parachute, significantly lower than the T-11's 19 fps), a forward speed of approximately 10 knots for steering, and supports exit weights up to 400 pounds from altitudes as low as 500 feet AGL. It is already in the DOD supply system with over 27,000 procured. The fact that it originated from the USFS smokejumper program provides institutional credibility for its use in a wildfire context.

Unlike smokejumpers, AHC personnel do not pack their own parachutes -- chutes are packed by military riggers and issued to jumpers before each operation (see Section 5.1). This distinction is

deliberate: it keeps AHC training focused on firefighting and reinforces the smokejumper program's elite status as the tier where personnel master both fire and parachute skills.

Personnel exit via the aircraft ramp at approximately one per second, with 10 jumpers per pass. A full 20-person crew requires two passes. The ramp exit method is simpler to train, consistent with the visual picture familiar from USFS smokejumper aircraft, and integrates naturally with follow-on JPADS deployment from the same ramp on subsequent passes.

4.3 Jumpmasters

The USFS will develop an organic jumpmaster (JM) capability. AHC superintendents, assistant superintendents, and selected senior squad leaders attend U.S. Army Jumpmaster School at Fort Moore, GA (2 weeks). They maintain currency through quarterly proficiency jumps. Each AHC base maintains 4-6 qualified JMs, ensuring at least one is always available for alert launches. Army JMs support initial program standup and provide periodic evaluation to ensure USFS JM standards remain equivalent to Army standards. The JM qualification serves as a leadership marker within the AHC career ladder, similar to the spotter qualification for smokejumpers.

4.4 Training Pipeline and Career Progression

AHC candidates require a minimum of two seasons as a qualified wildland firefighter (engine, IHC, helitack, or equivalent) before applying. Selectees attend the U.S. Army Basic Airborne Course (BAC) at Fort Moore, GA (3 weeks). Selected personnel additionally attend U.S. Army Pathfinder school (Fort Moore, 2-3 weeks) for DZ/LZ establishment, marking, and ground-to-air coordination, particularly for follow-on heavy-equipment drops. Senior leaders attend Army Jumpmaster school (2 weeks).

The AHC creates a structured career progression within the wildfire community:

Tier	Qualification	Training	Role
1. Ground	FFT1/FFT2, ICT5	Agency basic fire training	Engine, hand crew
2. IHC	ICT4, CRWB	IHC standards (SIHCO)	20-person elite hand crew
3. Airborne Hotshot	All IHC stds + ABN; optional Pathfinder, JM	BAC (3 wks) + Pathfinder (2-3 wks) + JM (2 wks)	20-person ABN crew; DZ mgmt; jumpmastering
4. Smoke-jumper	Drogue-stabilized ram-air + optional FTAC, HALO/MFF	SJ rookie training + modified CCT + MFF (Yuma, selected)	2-8 person elite teams; airspace control; pathfinder

This progression mirrors the military's tier system, where conventional airborne infantry (82nd Airborne) personnel look up to Special Forces military freefall jumpers. AHC personnel who advance to the smokejumper program arrive already jump-current with hundreds of static-line jumps, needing only the ram-air canopy transition and drogue-release deployment technique. This expands the smokejumper recruiting pool and reduces the time and cost of smokejumper rookie training. At the apex, a small number of smokejumpers (~15-25 nationally) hold the FTAC + HALO combination, representing the pinnacle of the wildfire profession (see Section 5.4).

4.5 Alert Posture

During fire season, each AHC base maintains a tiered readiness posture:

Status	Personnel	Readiness	Duty
Immediate Alert (Boise / Wainwright)	1 AHC (20 pax) + 2 C-130s strip alert	30-minute launch; chutes pre-issued	Crew staged. C-130s from rotation pool on ramp.
Standby (Reno / Peterson)	1 AHC + co-located C-130 (152nd/302nd)	1-3 hours	AHC at base. Non-MAFFS C-130 available.
Regular Duty	Remaining AHCs (all bases)	12-24 hour recall	Rx fire, fuels, training; recallable

The immediate alert crew rotates daily or per the superintendent's jump list. Chutes are pre-issued from storage, inspected, and staged in the ready room by the on-site rigger team.

FTAC Alert Element at MAFFS Operating Locations

During fire season, when MAFFS is activated, a 2-jumper FTAC element (Section 5.4) attaches to the MAFFS Air Expeditionary Group (AEG) -- the command-and-control umbrella that consolidates the participating wings at a single operating location for the duration of a NORTHCOM activation. The element converts a co-located tanker from a passive retardant asset into an initial-attack package: on a confirmed remote start, the element loads the MAFFS ship already on the ramp, inserts over the aft ramp onto a Fire Guardian-surveyed DZ, controls the retardant runs of the aircraft that delivered it, and then holds the fire and controls follow-on tankers until a larger response arrives (Section 6.7). Because MAFFS wings deploy to and operate from the AEG's consolidated location when activated, the element co-locates with the aircraft wherever the AEG operates rather than being tied to a home station.

Sequencing is deliberately incremental. Begin at the co-located MAFFS/SJ bases -- Reno (152nd AW) and Peterson (302nd AW), where the element is drawn from resident jumpers at near-zero marginal cost -- and in daylight. Expand to night operations as the night program clears its crawl-walk-run ladder (Sections 5.4, 6.7). Extend later to the non-co-located MAFFS wings (146th AW Channel Islands, 153rd AW Cheyenne) as cost and scheduling allow, since those require forward-deploying jumpers with lodging, currency, and rotation overhead. Throughout, the concept is gated on MAFFS activation: it is an opportunistic accelerator during high-tempo periods -- which is precisely when overnight starts matter most -- not a standing overnight response guarantee.

4.6 Vehicles and Heavy Equipment

AHC vehicle packages are scaled to mission profile. The **standard package** covers the majority of AHC missions; an **augmented package** adds capability for specific mission profiles (long-distance road movement, mass casualty potential, sustained operations); and **heavy-equipment** packages are reserved for HE bases (Wainwright and Boise under COA 3+, plus Reno and Peterson under COA 4).

Standard Vehicle Package

2x Polaris MRZR D4 (military diesel, JP-8 compatible) with type-3 wildland fire skid units (300-500 gallon tank, pump, hose) + **1-2 tactical trailers** for casevac and equipment recovery + **JPADS supply bundles** (rations, water, chainsaw fuel, hand tools, medical kit, spare parts). Total fits in one C-130 sortie via multiple JPADS loads released from a single high-altitude pass:

Element	System	Weight	Notes
2x MRZR D4 + skids	JPADS-10K (DragonFly)	~7,500 lbs	Type V 24-ft platform, both vehicles nose-to-tail. 5,000-10,000 lb capacity.
1-2 tactical trailers	JPADS-2K (FireFly)	~700-1,200 lbs ea	SOF Light Tactical trailers. 2-inch receiver hitch matches MRZR. Litter-capable; can carry UPRBs for chute recovery.
Supply bundles (2-3 per drop)	JPADS-2K	~1,500-2,000 lbs ea	Rations, water, fuel, tools, medical.

JPADS benefits for fire ops: High-altitude release (up to 24,500 ft MSL) with 8-25 km offset lets the C-130 stay clear of the smoke plume and thermal turbulence. 250-meter accuracy on a Fire Guardian-marked DZ. Multiple loads from a single release point land on the same DZ in one pass. The combat-survivability case (drop beyond AAA range) does not apply to fire ops, but the smoke-avoidance case is genuine. BLM Alaska smokejumpers already use JPADS-2K for routine resupply, establishing the operational pattern.

Augmented Vehicle Package (Selective)

Standard package + 1x flatbed ISV (5-passenger variant) + additional supply bundles. Deployed selectively when mission profile calls for greater road speed, longer-range transport, or mass casualty potential. The **GM Defense flatbed ISV variant** is production-available with 2- or 5-person crew and a flatbed cargo area replacing the rear seats; this is preferred over standard 9-passenger ISV for AHC use because cargo capacity is more useful than additional seats for an inserted crew already on the ground. Same C-130/C-17 LVAD certification as standard ISV.

Augmented package requires **C-130J-30** (55-ft cargo bay) for single-sortie delivery, or two standard C-130 sorties (40-ft cargo bay). The standard C-130 cargo bay cannot accommodate 2x MRZR + 1x ISV on Type V platforms in a single load (~44 ft of platform needed).

Vehicle Roster

Platform	Role / Specifications	Allocation
Polaris MRZR D4	Lightweight UTV, ~2,100 lb curb, 1,500 lb tow rating, JP-8 capable. SOF airdrop-certified. Type-3 wildland skid (tank/pump/hose). Standard AHC package.	All AHC bases (2 packages × 2 = 4-6 each)
Tactical trailer	SOF Light Tactical or equivalent, 700-1,200 lbs empty, ~800 lb cargo. Litter-capable. UPRB recovery hauler.	All AHC bases (4-6 each)
GM Defense flatbed ISV (5-pax variant)	Modified 5-passenger ISV with flatbed cargo area. Same Duramax 2.8L diesel, 275 hp, ~5,000 lb curb. C-130/C-17 LVAD certified. Augmented package.	Limited (1-2 per AHC base, plus HE base logistics)
Cat D3 Dozer (primary)	~17,000 lbs. LVAD from C-130 (separate sortie from pax) or C-17. Extractable by CH-47 at most western fire elevations.	HE bases only
Cat D4 Dozer (limited)	~19,000-22,000 lbs. C-17 LVAD only. Greater capability but extraction limited to partial disassembly for CH-47, CH-53K, or write-off (~\$150-200K).	HE bases (1-2 limited)
Portable pumps (Mark 3 / WHIPPS)	~60 lbs. Mounted on MRZR skids or carried separate via JPADS-2K.	All bases via JPADS

Note on novelty: Current Interagency Hotshot Crews (IHCs) do not operate dozers; dozers are a separate fire resource type, operated by state forestry agencies (CAL FIRE, USFS regional dozer modules), county and rural fire departments, and contracted operators. They reach fires by driving from a road head or by lowboy trailer. The AHC concept of parachute-delivering dozers into roadless terrain is therefore a novel capability filling a gap that the current IHC + smokejumper system does not address.

Dozer crew composition (4-6 personnel, parallel to AHC): The dozer crew is organizationally distinct from the AHC firefighter crew but co-deployed on AHC missions where heavy equipment is warranted. All dozer crew personnel are BAC graduates and jump-current. The crew lead additionally holds Pathfinder qualification (standard Army PF School, ~3 weeks; existing curriculum already includes sling-load operations) to enable LZ management for CH-47 sling-load extraction. The dozer crew owns organic vehicle maintenance for their dozers (and supports MRZR/ISV maintenance at HE bases when not on fire deployment). Vehicle *recovery* after fire operations is the responsibility of the Ground Recovery Detachment (Section 4.7), not the dozer crew.

Dozer extraction priority (after fire operations):

(1) Drive to road head (preferred when feasible): If a road network is reachable from the fire area, the dozer drives itself out. Lowest cost, lowest complexity. **(2) Cut own road to nearest road network:** If the fire area is genuinely roadless but a reasonable cut path exists, the dozer cuts its own road during the demobilization phase. The cut road may have residual benefit for future fire access. **(3) CH-47 sling-load to a road head, where the Ground Recovery Detachment meets it with a lowboy:** Most likely AHC-specific extraction mode. Cat D3 at ~17,000 lbs is within CH-47F sling-load capacity at most western fire elevations (capacity decreases ~20-30% at 5,000-8,000 ft altitude due to thin air; uncomfortable margin above 10,000 ft). The dozer crew lead's Pathfinder qualification covers LZ marking, sling-load hookup, and ground-air coordination. USFS may need to develop or adopt standardized rigging and sling-load procedures for the Cat D3 (the Army may have prior dozer airdrop/sling-load procedures from 1960s-70s programs; if not, USFS develops them with Army rigger support). **(4) Disassembly + multi-load CH-47 extraction:** Required for Cat D4 (19,000-22,000 lbs) at altitude, or D3 above 10,000 ft. Adds operational complexity and time. **(5) USMC CH-53K King Stallion (36,000 lb external capacity):** Available via DOD support if Marine Corps assets are in-region; not assumed in baseline planning. **(6) Planned attrition / write-off (~\$150-200K for D3):** Last resort. May still be cheaper than the suppression costs the dozer prevented by enabling early mechanized line construction.

Helicopter sling-load extraction is currently uncommon in civilian fire operations because civilian dozers reach fires by ground (driving or lowboy). Under AHC operations, where dozers are inserted by parachute into deeply roadless terrain, helicopter sling-load becomes a more frequent extraction mode. This is an expected evolution of the operational pattern.

4.7 Ground Recovery Detachment

Each AHC base maintains a **Ground Recovery Detachment (GR Det)** for post-fire personnel and equipment recovery, forward supply runs during sustained operations, and general logistics support. The GR Det also serves as the primary entry-level workforce pipeline into AHC, providing 1-2 fire seasons of operational experience for prospective AHC candidates before they enter the BAC/Pathfinder/JM training pipeline.

Mission and Composition

GR Det missions: vehicle recovery (driving F-550 with trailer to road heads or lowboy extraction points to retrieve MRZRs, ISVs, and meeting helicopter-extracted dozers); personnel recovery (driving 15-pax vans to road heads to retrieve AHC crews after fire demobilization); forward supply runs during sustained operations (hauling water, fuel, rations, tools, and replacement equipment to staging areas accessible by ground); base maintenance and vehicle servicing between deployments.

Per AHC base composition (8-12 personnel for standard AHC bases; 10-15 at HE bases):

Position	Grade	Quantity	Qualifications
Detachment Lead	GS-9	1	Often a former AHC member transitioning out of jumping; fire qualifications, supervisory experience.
Drivers/Operators	GS-5 to GS-7	4-6	CDL Class A (with air brake and tanker endorsements); FFT2-qualified; AHC trainee track.
Vehicle Maintainers	GS-7 to GS-9	2-3	Heavy equipment mechanic experience; off-road vehicle familiarity; some with CDL.
Logistics/Dispatch Coordinator	GS-7	1	Logistics planning; ICS coordination; equipment inventory management.
Heavy Truck Operator (HE bases only)	GS-9	1	CDL Class A with heavy/oversize endorsements; operates Class 8 truck for dozer recovery.

Vehicle Fleet

Per AHC base: **2x Ford F-550** chassis cab with flatbed body and gooseneck hitch (for vehicle/equipment recovery; ~\$80-120K each) + **3x 15-passenger vans** (for personnel transport between base and forward staging areas; ~1 van per AHC crew, scaling with crew count at larger bases). Total per AHC base: ~\$400-600K.

HE bases additionally: 1x Class 8 commercial truck (Peterbilt 567, Kenworth T880, or equivalent; ~\$200-350K) with **detachable gooseneck/lowboy trailer** for dozer recovery (~\$50-100K). The Class 8 truck is required because Cat D3 dozer plus heavy lowboy (~27,000-32,000 lbs combined) approaches F-550 gooseneck capacity (~31,300 lbs) and Cat D4 (19,000-22,000 lbs) plus lowboy exceeds it. Total at HE bases: ~\$700-900K vehicle fleet.

F-550 towing analysis: F-550 chassis cab provides 18,500 lb conventional towing and 31,300-34,500 lb gooseneck towing (depending on configuration). Within these limits: 2x MRZR D4 with skids on a tandem-axle 20-ft flatbed (~8,000-13,000 lbs combined) and 1x ISV M1301 on a similar trailer (~8,500-13,200 lbs combined) are both well within conventional towing capability. F-550 with gooseneck handles single Cat D3 + lowboy at the upper margin; D4 + lowboy needs the Class 8 truck.

Trainee Pathway to AHC

The GR Det's GS-5 to GS-7 driver/operator positions are explicitly structured as a trainee pathway into AHC. Personnel typically spend 1-2 fire seasons in the GR Det, gaining operational experience supporting AHC missions, before applying for AHC selection in subsequent years. This addresses the federal wildland fire workforce pipeline problem (limited entry pathways, high attrition at higher GS levels) by creating a structured progression: GR Det operator (GS-5/6) -> AHC trainee (BAC, Pathfinder, JM courses) -> AHC firefighter (GS-9 to GS-11 in year-round positions under COA 3+). GR

Det personnel who do not pursue AHC may transition to other federal fire roles (engine, helitack, dispatch) with the experience and certifications they accumulated.

4.8 HE Base Support Personnel

Each heavy-equipment base (Wainwright, Boise) maintains 6-8 logistics specialists. These personnel are **airborne-qualified and jump-current** (BAC graduates maintaining quarterly proficiency), because they jump in with heavy equipment on the second aircraft or with JPADS fuel loads. They are FFT2-qualified firefighters (basic fireline safety, fire shelter training, LCES awareness) whose primary duties are vehicle mechanics (ISV/MRZR maintenance and repair), aerial delivery support for heavy equipment and hazmat cargo (diesel/gasoline), and heavy-equipment platform de-rigging on the DZ. When ground or helicopter access is available, they may deploy by those means instead of parachute.

4.9 Equipment and Uniforms

AHC equipment is designed for DZ landings on prepared, Fire Guardian-surveyed surfaces -- meadows, burned-over ground, ridge tops -- not the small, austere, unsurveyed openings where SJs operate. AHC also has minutes-to-hours preparation time before a jump (not the SJ's rapid-response model), allowing jump gear to be donned over standard wildland PPE. This drives a simpler, lighter gear set than the heavily padded Kevlar/Cordura SJ jump suit:

Jump coverall (worn over wildland PPE): Modified US Army Combat Vehicle Crewman (CVC) coverall in XXL sizing, sourced from existing Army supply (OCP multicam pattern current issue, or surplus UCP/ACU pattern if available at lower cost). The CVC coverall is Nomex-rated for flash protection (ASTM F1506 equivalent), durable, simple zip-front design that fits over full wildland PPE. Velcro pad pockets added at four PLF impact points -- knees, elbows, hips/coccyx, shoulder blades -- accepting issued closed-cell foam inserts. This provides impact protection matched to PLF landings on prepared DZs without the weight of full Kevlar. The coverall is doffed after landing; AHC fights fire in standard wildland PPE underneath. Nomex flash rating provides brief fire-proximity protection during jump and landing phases but is not a substitute for wildland PPE during actual firefighting.

Helmet: Ops-Core FAST Bump (non-ballistic) or equivalent jump-rated helmet. Eye protection via ANSI Z87.1-rated ballistic goggles (ESS ICE or equivalent, standard Army issue, interchangeable tinted/clear lenses) OR Gentex clip-on visor integrated with the FAST shell -- both provide adequate impact and debris protection for the jump phase. NVG mount compatibility for leadership elements who may operate at night. No fire-rated face shield: AHC does not fight fire in jump gear, so fire-face protection is handled by standard wildland PPE during actual firefighting.

Tree landing contingency: AHC does not carry the SJ's full tree gear (150-ft letdown rope, climbing spurs, tree tape). Instead, each jumper carries a basic 50-ft lowering line with friction device on the harness (~2 lbs), sufficient to self-lower from a medium tree when combined with standard Army airborne reserve-parachute tie-off technique. For more complex tree rescues, a tree rescue kit (throw bag, 200 ft rope, ascending gear) is included in the standard JPADS manifest and is available on the DZ within 30-60 minutes of landing.

Pack and web gear: Standard USFS fireline pack (Mystery Ranch Hot Shot or equivalent) sized for 2-3 days of supplies, hand tools, and chainsaw fuel. Attachment points for MC-6 lowering line -- jumpers lower their packs on a static line before landing so they PLF without 40 lbs on their back, standard

military airborne technique. Fire shelter carried on web gear, identical to all wildland firefighters.

Commercial/standard issue: All AHC equipment is commercially available, standardized, or sourced from existing Army supply at scale for 100-320 personnel (depending on COA). This is a deliberate cultural and logistical choice reinforcing the tier distinction: SJs handcraft their gear as artisans in the loft; AHCs use issued equipment as professionals. Both are valid identities, but they are different.

5. Supporting Capabilities

The Fire Guardian and Airborne Hotshot Crew concepts integrate with, and depend on, a range of supporting capabilities: parachute rigging infrastructure, military airlift, enhanced smokejumper integration, airspace and crew safety architecture, opportunistic prescribed fire, and small-UAS integration. These elements are discussed in this section in the order they are most likely to be encountered by a reader evaluating operational feasibility.

5.1 Parachute Rigging and Logistics

A key distinction between AHCs and smokejumpers is the rigging model. Smokejumpers pack their own parachutes as part of their professional culture and FAA rigger certification pathway. AHCs operate on the conventional military airborne model: parachutes are packed by qualified riggers and issued to jumpers before each operation. This keeps AHC training focused on firefighting and reduces the overhead of maintaining a rigger certification program within a much larger force.

Home Station Packing

MC-6 personnel parachutes and JPADS cargo systems are packed at existing ARNG/USAR rigger unit home station facilities -- primarily the **USAR 346th TADC** at Bell, CA, the largest Reserve Component aerial delivery unit in the western United States. The smaller CA ARNG 128th QM Detachment (Aerial Delivery) at JFTB Los Alamitos can supplement. Packed chutes are transported to AHC bases by box truck, identical to how rigger units support Reserve Component airborne operations (Civil Affairs, PSYOP, etc.). AHC bases require climate-controlled chute storage but do not need full packing facilities, avoiding significant infrastructure costs.

Fire-Season Issue Teams

During fire season (approximately June-October), 4-6 ARNG/USAR riggers serve on USFS-funded Additional Duty Operational Support (ADOS) orders at each AHC base. Their duties include: pre-issue inspection of packed chutes from storage; issue of correctly sized and configured MC-6 systems to individual AHC members; correction of malfunctions found during issue and buddy checks; recovery accounting for chutes after proficiency jumps and fire operations; and staging the immediate alert crew's chutes in the ready room daily.

Additional riggers at home station maintain packing throughput. **Recovery model:** AHCs pack out their own canopies after fire operations (the same crew who jumped them retrieves and bags them). The crew transports used canopies via ground or helicopter to the road head, then back to base. At base, AHCs conduct a chute shake in a warehouse, parking lot, or hangar (unfolding to remove dirt, foreign objects, and moisture, then loosely re-rolling), and store the canopies and reserves in their Universal Parachute Recovery Bags (UPRBs). The base rigger team coordinates periodic bulk transport of used UPRBs to a home rigging station (346th TADC at Bell, CA, primary; or other supporting unit) via box truck for inspection and repack, returning new packed chutes on the same vehicle. This eliminates the need for rigger TDY teams to travel to fire areas and reduces logistical complexity. Turnaround time (fire to repack to base storage) is approximately one to two weeks, which drives inventory requirements.

HE Base Permanent Rigger Detachments

Wainwright and Boise, as heavy-equipment bases, require on-site rigger capability for Type V platform rigging (bulldozers, vehicles), extraction parachute configuration, and fire-specific JPADS bundle preparation (including hazmat cargo like fuel drums). Small permanent detachments (4-6 riggers each), supplemented by ADOS surge personnel during fire season, provide this capability. Heavy-drop loads must be rigged at or near the departure airfield and cannot be trucked from a distant packing facility.

At Wainwright, geographic remoteness precludes routine trucking from CONUS rigger units. Primary support comes from the **241st Quartermaster Company (Brigade Aerial Delivery)(Airborne)** at JBER, the 11th Airborne Division's organic rigger unit. Rigger teams can also fly in from JBER or CONUS via military airlift or commercial airlines -- packed parachutes are treated as sensitive items and can be transported by commercial air when military airlift is unavailable.

Additional rigger resources: Beyond the primary California units (346th TADC, 128th QM Det), the **1161st Quartermaster Detachment (Aerial Delivery)** (WA ARNG, JBLM) provides an additional rigger source approximately 430 miles from Boise, co-located with the 62nd AW (C-17 heavy-drop partner). The Oregon ANG at Portland ANGB maintains Aircrew Flight Equipment (AFE) billets and facilities supporting the 125th STS; USAF 1P0X1 AFE personnel can qualify as airdrop load inspectors after completing Phase 1 of the 92R Parachute Rigger Course, providing a potential supplementary rigging capability for PNW operations.

Peterson SFB gap -- potential solution: The **19th Special Forces Group (Airborne)** (UT ARNG) maintains its Group Support Battalion (GSB) in Ogden, UT (~500 miles from Peterson, ~300 miles from Boise) and the **5th Battalion, 19th SFG** at Watkins, CO (~75 miles from Peterson). SF Groups require organic aerial delivery capability to support their jump operations, and the GSB likely maintains 92R rigger capacity. If confirmed, the 5th Battalion at Watkins would effectively close the Peterson rigger gap, and the GSB at Ogden could supplement both Boise and Peterson. This requires confirmation via the 19th SFG S4 or GSB commander.

Inventory Model

Each AHC member requires one MC-6 per jump. A base with 4 AHCs (80 jumpers) needs approximately 90-100 packed chutes per proficiency event (accounting for ~5-10% rejection during issue inspection). For fire-season alert posture, 200-250 packed chutes in storage per 4-AHC base supports 2-3 consecutive operations without waiting for repacks. Continuous resupply from home station maintains the pipeline as used chutes cycle through repack.

Long-Term USFS Organic Rigger Capability

As the program matures, the USFS should establish a permanent organic parachute rigging capability at Boise (NIFC), serving all four AHC bases. This consolidates parachute infrastructure investment in one location: a single pack shed, inspection facility, and chute storage complex, staffed by permanent USFS-employed or USFS-funded riggers who attend the 92R Parachute Rigger Course at Fort Lee. Boise is the natural location as the national AHC hub and HE base.

Under this model, Army/USAF rigger support transitions from the primary packing role to a surge-only role during peak fire season. Packed chutes are shipped securely from Boise to Reno and Peterson as needed, but would naturally move to those bases when rigger teams rotate out for quarterly proficiency training and during fire-season issue team deployments. This reduces long-term dependence on ADOS orders and RC unit availability while maintaining the Army relationship for heavy-drop rigging, JPADS,

and surge capacity. The 241st QM Co at JBER continues as the primary rigger resource for Wainwright given geographic isolation.

5.2 Airlift Integration

The concept employs a tiered airlift model using different platforms for different mission profiles. USFS-qualified jumpmasters manage personnel exits; USFS spotters advise on drop zone selection in fire environments; and FTAC-qualified smokejumpers or embedded USAF Combat Controllers manage airspace deconfliction (see Section 5.4).

C-130 Standard Operations

The C-130 Hercules is the standard AHC delivery platform, handling approximately 90% of missions. A single C-130 can carry a full 20-person AHC plus several JPADS bundles, well within its 64-paratrooper / 42,000-lb cargo capacity. For heavy-equipment missions, a two-ship C-130 package is used: one aircraft for the 20-person crew, a second for a bulldozer or vehicles via low-velocity airdrop (LVAD). Personnel and heavy equipment cannot share the same aircraft on a drop pass.

Each MAFFS-designated wing has only 2 of its 6-9 total C-130 airframes committed to MAFFS retardant systems (8 MAFFS units total across 4 wings). This leaves ample non-MAFFS aircraft available for AHC airdrop tasking without competing with the retardant mission. Contractor C-130s (e.g., Coulson, Neptune) are not used for AHC personnel airdrop -- they lack static-line anchor cable systems, their pilots are not airdrop-trained, and the regulatory framework for military parachutists exiting civilian aircraft is problematic. Contractor C-130s remain focused on their primary retardant delivery role.

C-17 Heavy/Surge Operations

The C-17 Globemaster III provides surge capacity for larger or combined insertions. A single C-17 can carry two full AHCs (40 personnel), multiple vehicles (ISVs, MRZRs), a bulldozer, and a large JPADS package. CONUS C-17 heavy-drop support comes from the **62nd Airlift Wing** at Joint Base Lewis-McChord (JBLM), WA, the primary West Coast C-17 unit with deep airdrop proficiency supporting the 82nd Airborne for Joint Forcible Entry exercises. For Alaska, the **517th Airlift Squadron** and **144th Airlift Squadron (AK ANG)** at JBER provide organic C-17 airdrop capability, already supporting 2/11 IBCT(A) jump requirements.

JPADS Precision Resupply

The Joint Precision Airdrop System (JPADS) is a GPS-guided, ram-air parachute system that autonomously steers cargo bundles to programmed coordinates. JPADS enables precision resupply through smoke, clouds, or darkness -- conditions that frequently ground conventional paracargo operations. BLM Alaska smokejumpers have operationally deployed JPADS (including the upgraded JPADS-2K variant in 2024), providing a proof of concept for wildfire logistics.

A C-17 can carry up to 11 JPADS pallets, each delivering up to 10,000 lbs -- over 100,000 lbs of precision-guided resupply from a single sortie. JPADS delivers fuel, water, food, firefighting tools, chainsaw consumables, foam concentrate, and replacement equipment to coordinates provided by the AHC on the ground.

CH-47 Airborne Operations

The CH-47F Chinook provides a secondary airborne insertion capability that fills a niche between fixed-wing C-130 operations and conventional helitack. The CH-47 is certified for parachute operations

via ramp exit and can carry approximately 20 jumpers -- one full AHC. It can also sling-load MRZRs and potentially deploy JPADS bundles from the ramp.

When CH-47 airborne is preferred over helitack: The key scenario is when a suitable parachute DZ exists near the fire but no suitable helicopter LZ does. A helicopter LZ requires relatively flat, clear ground large enough for the rotor disc with clear approach/departure paths. A parachute DZ can be a burned-over area, ridge top, or meadow with obstructions that prevent helicopter landing but are manageable for parachute descent. A 200-meter meadow surrounded by 100-foot timber is unusable by helicopter but jumpable.

Second, smoke and turbulence. Low-level helicopter operations in smoky, thermally active air near a fire are extremely dangerous. A CH-47 at 1,500+ ft AGL for parachute deployment stays above the worst smoke and turbulence. Third, most helicopters available for fire operations are not CH-47s but smaller Type 1-3 helicopters (UH-60, Bell 212, etc.) carrying 8-12 passengers, requiring multiple shuttle trips to deliver 20. A CH-47 airborne pass delivers the full crew in one sortie without needing a suitable LZ. Fourth, Army National Guard CH-47 units exist in several western states, and Guard CH-47s already support fire operations for sling loads during fire season.

When helitack is still better: When a good LZ exists near the fire (landing is simpler and safer than jumping). When equipment must be delivered by sling that can't be parachute-dropped. When winds are too high for safe parachute operations. When only a partial crew (8-10 via one helicopter) is needed.

Drop methodology for CH-47: Unlike C-130/C-17, the CH-47 has no onboard CARP computer. CH-47 airborne operations use VIRS (Verbally Initiated Release System), with the JM directing the drop visually. This requires a smokejumper pathfinder on the ground first -- inserted from a Twin Otter or separate pass -- to establish the DZ, set wind indicators, and run the drop via radio with the JM aboard the helicopter. An SJ pathfinder is therefore effectively mandatory for CH-47 airborne operations, unlike C-130/C-17 CARP drops where pathfinders are optional (see Section 5.2).

Airlift Partnerships

Each AHC base has a primary C-130 partner and access to supplementary airlift, distributing the load so no single ANG unit is overtasked during peak fire. The aircraft variant matters operationally: the **C-130J-30** ("stretched") variant has a 55-ft cargo bay (15 ft longer than standard C-130E/H/J), allowing single-sortie delivery of larger vehicle packages (see Section 4.6 augmented vehicle package). Standard C-130E/H/J have a 40-ft cargo bay:

AHC Base	Primary C-130	Supplementary Airlift
Ft. Wainwright, AK	517th/144th AS (C-17, JBER) -- primary is C-17 not C-130	146th AW (C-130J-30, Channel Is.) 120th AW (C-130H, Great Falls; planned J transition) 211th RQS HC-130J (AK ANG, JBER)
Boise, ID	153rd AW (C-130H/H-3, Cheyenne WY; planned J transition)	62nd AW (C-17, JBLM) 120th AW (C-130H, Great Falls; planned J transition)
Reno, NV	152nd AW (C-130H/H-3 MAFFS, co-located; J transition requested 2019, not yet effective)	146th AW (C-130J-30, Channel Is.) 129th RQW HC-130J (CA ANG, Moffett; ~220 mi)

AHC Base	Primary C-130	Supplementary Airlift
Peterson SFB, CO	302nd AW (C-130H/H-3 MAFFS, co-located, AFRC)	153rd AW (C-130H/H-3, Cheyenne) 136th AW (C-130H, Ft Worth) 317th AW (C-130J, Dyess, active)

Confirmed C-130J-30 operators relevant to AHC: 146th AW (CA ANG, Channel Islands; 8 aircraft, MAFFS-equipped); 130th AW (WV ANG, Charleston); 165th AW (GA ANG, Savannah); 143rd AW (RI ANG, Quonset). The 146th AW is the most operationally relevant for AHC western fire support. **Planned C-130J transitions** (variant J vs. J-30 not yet specified for all): 103rd AW (CT ANG), 120th AW (MT ANG, Great Falls), 133rd AW (MN ANG, MSP), 182nd AW (IL ANG). The 153rd AW (Cheyenne) C-130H-to-J transition was previously programmed; status should be confirmed during program planning. Augmented vehicle package missions (see Section 4.6) preferentially task J-30 operators when available; otherwise, two C-130 sorties are required.

The Alaska ANG's **211th Rescue Squadron** HC-130Js at JBER are an additional resource: C-130 variants with airdrop-qualified crews who routinely deploy pararescuemen. They can supplement C-17s for smaller AHC insertions or SJ pathfinder delivery in Alaska.

Training Frequency

AHC crews conduct quarterly proficiency jumps from partner ANG C-130 (or C-17/CH-47) units, scheduled outside fire season where possible. During fire season, scheduled proficiency events proceed with the understanding they may be cancelled and superseded by actual fire operations. See Section 9.3 for the full exercise model.

Drop Methodology

AHC insertions use two complementary drop methods, selected based on conditions:

CARP (Computed Air Release Point) -- Primary Method: The C-130 or C-17 mission computer calculates the optimal exit point based on forecast winds, aircraft ground speed, altitude, jumper exit weight, and MC-6 ballistic data (already in USAF airdrop computation tables). The pilot flies to the computed point and the green light goes on. CARP works through smoke, does not require ground visibility, and is the standard method for every USAF airdrop. Accuracy is typically within 100-200 meters of the intended point of impact, adequate for meadows and burned-over DZs identified by MQ-9.

VIRS (Verbally Initiated Release System) -- Backup Method: A spotter drops streamers to assess wind drift, visually identifies the exit point based on streamer trajectory, and verbally commands the jump. Entirely human-judgment-based, requires ground visibility, and is the traditional smokejumper method. Used when CARP data is unreliable (gusty/variable winds), when the DZ is very small and requires visual precision beyond CARP accuracy, or when an SJ pathfinder on the ground is directing the drop. VIRS is the only method available for CH-47 operations, which lack onboard CARP computers (see Section 5.2).

MQ-9 CARP Refinement: The MQ-9's atmospheric sampling pod provides real-time wind data at the DZ -- far more accurate than forecast winds used in standard CARP computation. The MQ-9 transmits wind speed, direction, and turbulence data to the C-130 for CARP update immediately before the drop pass. The MQ-9 can also observe the first pass and radio corrections to the aircraft for subsequent passes ("first stick landed 100 meters north, adjust"). This is functionally what a ground-based

CCT/FTAC does, but from the air.

DZ Marking and Wind Visualization: MC-6 jumpers have approximately 10 knots of forward drive and can steer under canopy, but they need to see the DZ and understand the wind during the 30-60 seconds of descent. Before the main AHC pass, the MQ-9's PSD or the JM on an initial aircraft pass drops colored smoke on the DZ. The smoke serves dual purposes: it marks the landing target visually, and its drift direction and speed show jumpers the wind at ground level in real time. This is particularly important when smoke from the fire obscures the broader landscape -- the colored smoke stands out against gray/brown fire smoke.

AHC Pathfinder and Heavy Equipment Sequencing: The AHC drops first (personnel pass). The Pathfinder-qualified member in the AHC then manages the DZ for follow-on deliveries: marking the heavy-equipment impact area, setting wind indicators, and communicating with the C-130/C-17 pilot for the LVAD heavy-drop pass. For JPADS deliveries of smaller loads (supplies, pumps, fuel drums), no Pathfinder is required -- JPADS navigates autonomously to GPS coordinates. The JPADS-2K variant is limited to approximately 10,000 lbs per bundle, which accommodates most fire supplies but is insufficient for a Cat D3 dozer (~17,000 lbs). Larger JPADS variants (JPADS-25K/Screamer) could potentially guide a dozer platform but are less mature systems. Conventional LVAD with a Pathfinder on the ground remains the primary method for heavy-equipment delivery.

Smokejumper Pathfinder -- When Required: SJ pathfinders are not required for every insertion. For routine AHC drops onto MQ-9-surveyed DZs with good CARP data, the AHC drops without a pathfinder. SJ pathfinders add value in three scenarios: (1) complex or marginal DZs requiring ground-truth assessment that remote sensing cannot provide; (2) when MQ-9 is unavailable or sensors degraded; and (3) CH-47 operations, where the pathfinder on the ground is effectively mandatory to run the VIRS drop. For heavy-equipment drops, the AHC's own Pathfinder-qualified member (already on the ground from the personnel pass) manages the DZ.

CARP Through Smoke -- Program Development Objective: The combination of FTAC on the ground, Fire Guardian overhead, and CARP computation enables AHC insertion in exactly the conditions that ground helicopters: heavy smoke obscuring the DZ from visual acquisition. The C-130 flies IFR through the smoke layer; CARP computes the release point from wind data (Fire Guardian atmospheric pod), DZ coordinates (confirmed by FTAC on ground), and MC-6 ballistic data (already in USAF tables). The Fire Guardian conducts a final IR sweep of the DZ and perimeter margin, relays clearance via aircraft radio to the JM, and tracks canopies during descent. An airtanker orbits on standby for emergency retardant if needed. This capability requires ABNSOTD certification of smoke-environment airdrop procedures (minimum DZ visibility as reported by ground FTAC, MC-6 performance in particulate, jumper orientation procedures under canopy in reduced visibility). At IOC, AHC drops in smoke would be limited to conditions where the DZ beneath the smoke layer meets standard weather minimums. By Year 3-4, with testing complete, CARP drops through smoke become a validated capability -- one of the concept's unique advantages over rotary-wing insertion.

5.3 Enhanced Smokejumper Integration

Under COAs 2, 3, and 5, the existing USFS and BLM smokejumper programs are expanded significantly to address coverage gaps and increase rapid-response firefighter capacity. This subsection describes the expansion concept; see Section 7 (Courses of Action) for scale decisions.

New SJ Bases at Reno and Peterson

Two new smokejumper bases are proposed to close major coverage gaps and leverage existing military airlift infrastructure: **Reno, NV** (across the airfield from the NV ANG 152nd AW at Reno-Tahoe International, or at Reno-Stead general aviation airport 10 mi north) addressing the Great Basin and eastern Sierra Nevada; and **Peterson SFB, CO** (co-located with AFRC 302nd AW) addressing the Central Rockies and Four Corners region. Both locations co-locate SJs with resident ANG/AFRC C-130 units, providing a critical operational advantage: for large-fire response requiring 30-40 jumpers via C-130, the aircraft does not need to transit empty to pick up the crew, reducing response time by 1.5-3 hours compared to requesting airlift from a distant base. On fires where SJs catch spot fires at 0.1 acre versus allowing escape to 10+ acres, these hours matter.

Expanded Per-Base Personnel

Increase personnel at existing SJ bases by 25-50%, growing the total USFS/BLM smokejumper force from approximately 430-450 to 600-700. This increased mass enables SJ response to larger fires without depleting coverage elsewhere and provides the personnel baseline for C-130 mass deployment missions.

C-130 Integration for Large SJ Operations

Develop organic SJ capability for deployment from C-130 aircraft in groups of 30-40 jumpers for larger fires, supplementing the traditional chartered Twin Otter/CASA-212 model for small SJ sticks. This requires Army jumpmaster support initially, transitioning to SJ-organic JM capability over 4-5 years. C-130 integration builds on the AHC model (see Section 4) while preserving the SJ tactical identity and small-fire initial attack mission.

Expanded HALO/MFF and FTAC Qualification

Build a unified SJ specialist tier of approximately 15-25 personnel nationally (2-3 per major SJ base), each holding the full qualification stack: Fire Tactical Air Controller (FTAC, via modified CCT curriculum), Military Free-Fall (MFFPC at Yuma), and the Military Free-Fall Advanced Tactical Infiltration Course (ATIC; see Section 5.4). This tier provides smoke-penetration, high-altitude, and night insertion capability. The multiple currency requirements (FTAC, MFF, night) drive the transition of the broader SJ specialist cadre (approximately 55-85 personnel nationally including FTAC-only and support roles) to year-round federal firefighter employment, while the base SJ force remains seasonal.

MRZR and Selective Heavy Equipment

Add MRZR ultralight vehicles at major SJ bases for ground mobility after insertion. Add selective dozer capability via JPADS or conventional LVAD at HE-capable bases (Missoula, Boise/NIFC). These capabilities match AHC concepts (see Section 4) but at smaller scale appropriate to SJ operations.

Seasonal Eastern SJ Detachment

Establish a seasonal smokejumper detachment capability for the emerging eastern fire regions (Southeast, Appalachians, Great Lakes). The BLM already deploys Alaska smokejumpers to the Lower 48 seasonally; a similar model could deploy crews to eastern fire regions during their peak season (typically March-May for southeast, October-November for mid-Atlantic). This tests whether airborne firefighter capability has value in non-traditional fire geographies before committing to permanent eastern bases.

5.4 Airspace Management and Crew Safety

FTAC, CCT, STS, and Pararescue Integration

A fire with airtankers, helicopters, an MQ-9, an air tactical platform, and a C-130 conducting parachute drops and JPADS deliveries is an extraordinarily complex airspace environment. The USFS Air Tactical Group Supervisor (ATGS) manages fire airspace but is not trained for the kind of deconfliction involved in simultaneous airdrop operations and close-proximity retardant delivery.

This paper proposes a new USFS qualification: the **Fire Tactical Air Controller (FTAC)**. The FTAC is responsible for terminal control of airdrop operations (personnel, JPADS, heavy equipment), airspace deconfliction among all fire aircraft, and directing emergency retardant drops on threatened crews. The FTAC sits above the ATGS in the air operations hierarchy for missions involving airdrop.

FTAC is a smokejumper-only qualification, reflecting their higher operational autonomy and experience. Selected SJs attend a modified USAF Combat Controller (CCT) training curriculum covering airfield/DZ management and terminal air control, with combat-specific blocks (combat water survival, HALO insertion, etc.) replaced by fire-specific content. USAF CCT/JTAC personnel embed with AHC operations during the initial program years while organic USFS FTAC capability builds.

Key CCT/STS partners for building and sustaining the FTAC capability include:

Unit	Location	Role
24th Special Operations Wing	Various (Hurlburt Field home station)	Institutional CCT relationship. Permanent LNO at NIFC. FTAC curriculum development.
125th Special Tactics Sqn (Oregon ANG)	Portland ANGB, OR	Regional PNW CCT partner (~350 mi from Reno, ~430 from Boise). Annual exercise participation.
22nd Special Tactics Sqn	JBLM, WA	PNW CCT partner. Complements 125th STS. Near 62nd AW (C-17 heavy-drop partner).
212th Rescue Sqn (AK ANG, 176th Wing)	JBER, AK	PJs: freefall-qualified paramedics who jump AK backcountry from HC-130Js. FTAC training partners, medical embeds, austere insertion.
129th Rescue Wing (CA ANG)	Moffett Federal Airfield, Mountain View, CA	HC-130J and HH-60 rescue with PJ capability. CA fire region medical/insertion support.

A permanent LNO from the Special Tactics community (24th SOW) at NIFC maintains long-term doctrinal alignment even after organic USFS FTAC capability matures, because military airspace management doctrine, equipment, and training standards will continue to evolve.

The FTAC-qualified smokejumpers (~15-25 nationally, ideally 2-3 per major SJ base) form a unified specialist tier holding the complete qualification stack: FTAC plus HALO (High Altitude, Low Opening) qualification via the U.S. Army Military Free-Fall Parachutist Course (MFFPC) at Yuma Proving

Ground, AZ, plus the Military Free-Fall Advanced Tactical Infiltration Course (ATIC). Smokejumpers' existing ram-air canopy proficiency and manual deployment decision-making during drogue-stabilized descent transfer directly to HALO canopy skills; the delta is unstabilized freefall body position (no drogue), extended freefall navigation via altimeter/GPS/ATAK, high-altitude physiology, and supplemental oxygen procedures -- a real but manageable increment given SJs' hundreds of ram-air jumps. Critically, the MFFPC curriculum already includes night jumps with supplemental oxygen and combat equipment among its minimum 30 freefall jumps (9,500-25,000 ft), so the tier is night-introduced at graduation at zero added course cost. ATIC, a 3-week follow-on at Yuma, then trains exactly the night-pathfinder skillset: NVG rigging and freefall, night oxygen HAHO from 25,000 ft in complete blackout onto unmarked and unfamiliar DZs, and employment of GPS-guided precision airdrop bundles during night standoff operations -- meaning ATIC graduates are trained to bring their own JPADS resupply into a blacked-out DZ. Total Army schooling per specialist is roughly seven weeks (MFFPC plus ATIC) against a tier of about two dozen people; NVG sets run roughly \$10-40K per jumper depending on tube class. Three currencies to maintain (FTAC, MFF, night) further strengthen the year-round employment argument for this tier.

Supplemental oxygen: Per FAA regulation (14 CFR 91.211) and military doctrine, operations above approximately 12,500 ft AGL require supplemental oxygen for crew, and above 14,000 ft require continuous use. HALO insertions above 15,000 ft -- the typical operational regime for smoke-penetration jumps -- mandate jump-rated O2 systems (small bottle bailout systems, similar to those used by USAF freefall pararescuemen) and pre-oxygenation procedures (breathing 100% O2 for 30+ minutes prior to jump to denitrogenate tissues and reduce decompression sickness risk). This drives an O2 supply, regulator, and training infrastructure footprint at every base hosting HALO-qualified personnel. The MFF training pipeline at Yuma already covers all of this; no additional training development is required, only equipment standardization.

Oxygen as smoke protection: The same O2 equipment serves a second function independent of altitude physiology: breathing clean air during descent through smoke. The exposure math concentrates the risk under canopy, not in freefall -- freefall through even a 2,000-ft smoke layer lasts roughly ten seconds at terminal velocity, but canopy descent at 15-25 ft/s vertical means a jumper penetrating or maneuvering within a smoke layer can spend minutes breathing it, at CO and particulate concentrations that degrade judgment and vision during the highest-workload phase of the jump (terrain avoidance, DZ acquisition, landing pattern). Doctrine is therefore mask-on to the deck on smoke-penetration jumps regardless of altitude. The smoke-penetration insertion concept thus rests on three layered enablers, each defeating a different denial mechanism: Fire Guardian LWIR sees the DZ through smoke, ATAK/GPS navigation replaces visual references, and 100% O2 replaces contaminated air. Two honest caveats: the mask protects breathing, not eyes -- standard jump goggles are not gas-tight, and sealed (ski-type or over-the-glasses) designs mitigate but do not eliminate eye irritation as a residual hazard; and bailout bottle duration is sized in tens of minutes, adequate for HALO and most HAHO profiles but a planning factor, not unlimited.

Night Pathfinder Insertion (Named Phase 1 Objective)

Night pathfinder insertion is a named Phase 1 development objective, peer to night fixed-wing aerial attack (Section 6.7) and CARP-through-smoke: all three are the same idea -- Fire Guardian enabling flight operations in degraded visual environments -- pointed at different aircraft and payloads. The military baseline is already substantially a night capability: night mass tactical jumps are routine Army

practice, the era's real combat jumps (Panama, the Ranger jumps into Afghanistan) were at night, and SOF night MFF under NVGs is doctrinally mature. The fire adaptation is deliberately scoped to the smallest, most controllable version of that heritage.

Concept: 2-4 jumpers from the specialist tier conduct a night HAHO or HALO insertion onto a Fire Guardian-surveyed DZ. A ram-air jumper wearing helmet-mounted NVGs can see and steer precisely to a spot -- the exact failure mode that rules out night static-line jumps does not apply. HAHO standoff has two fire-specific virtues: the delivery aircraft never descends near the fire, and the insertion is nearly silent over communities. On the ground, the pathfinders mark and clear a DZ or helispot, provide FTAC airspace control, conduct initial size-up, and receive JPADS bundles (GPS-guided and darkness-agnostic, so night resupply comes essentially free). This enables either night helicopter follow-on -- via the operationally mature civilian NVG helicopter model (Section 6.7) -- or a first-light mass insertion onto an already-prepared DZ. The scenario that motivates it: a lightning bust at 2200 on a remote fire two days from ground access. Fires grow slowly overnight, but that is precisely the point -- the burning lull is when line-building works, and what stops at sunset today is aerial insertion, not firefighting. A 0100 pathfinder insertion recovers six to eight hours of the best working conditions at pathfinder scale, using people and training this paper already buys.

Gates: Adapting the CAL FIRE night model (Section 6.7), night insertion launches only against a ground- or sensor-confirmed fire (Fire Guardian IR confirmation qualifies), not a raw lightning-detection plot; Fire Guardian must be on station with a current DZ survey; and the capability matures crawl-walk-run, from instrumented training DZs to moderate terrain to complex terrain across seasons.

Explicitly deferred: night AHC mass tactical insertion is not a program objective, indefinitely. Military night mass jumps go onto surveyed, cleared DZs and still carry elevated injury rates; a static-line jumper under an MC-6 cannot steer around an obstacle he cannot see, and a fire DZ is a mountain meadow with snags, rocks, and slope. Twenty jumpers into that in darkness combines the least controllable insertion mode with the least forgiving terrain. This is stated plainly to preempt the criticism that the night concept is reckless: it is scoped to the 2-4 jumper specialist insertion where every enabling technology and precedent genuinely applies, and mass insertion waits for first light onto the DZ the pathfinders prepared.

HALO as dual-use capability: HALO-qualified SJs have value independent of AHC operations. A 2-person SJ/FTAC HALO team can deploy through smoke with Fire Guardian support to any fire where conventional SJ jumps from 3,000 ft AGL are impossible due to smoke or low ceilings -- extending the SJ program's operational envelope into conditions that currently ground it entirely. They jump from any SJ aircraft that can climb to 15,000+ ft (Twin Otter, CASA 212), conduct initial attack as a standard 2-person SJ team, and can serve as pathfinders for conventional SJ or AHC follow-on. This makes HALO a smokejumper capability enhancement, not just an AHC enabler.

HALO insertion through smoke -- operational sequence: (1) The Fire Guardian surveys the DZ thermally through the smoke, confirming it is clear and providing GPS coordinates. This thermal survey is a prerequisite -- without it, the SJ has no confirmed DZ to navigate to. (2) The FTAC/HALO SJ exits above the smoke layer with supplemental O2. (3) During unstabilized freefall, the SJ navigates to DZ coordinates using wrist-mounted GPS and ATAK, positioning over the opening point. The Fire Guardian can provide guidance via radio during this phase. (4) The SJ opens below the smoke layer (or at its base) where some visual reference becomes available. (5) Under canopy, the SJ uses NVG combined with helmet-mounted thermal imaging (e.g., ENVG-B or FLIR Breach monocular) for best

visibility -- thermal cuts through residual haze and shows hot spots, while image intensification shows terrain and obstacles. (6) The SJ lands, establishes comms, confirms ground conditions via both visual and thermal assessment, and assumes airspace control for the AHC main body or begins initial attack independently. This combination represents the pinnacle of the wildfire profession.

Layered DZ Preparation

Inserting personnel by parachute near an active fire requires deliberate DZ preparation. The concept employs up to four layers, applied as conditions require:

Layer 1 -- MQ-9 PSD Burnout: The MQ-9, already on station for ISR, uses its Plastic Sphere Dispenser to burn out the DZ and immediate surroundings before insertion. IR sensors guide the burnout precisely. The AHC lands on "black" (already-burned ground), eliminating fire risk at the landing site. This is elegant because it uses an asset already in the concept for a function that directly enables the insertion.

Layer 2 -- C-40F/Airtanker Retardant: If fire threatens the DZ perimeter, an airtanker or C-40F delivers retardant around the DZ, creating a chemical firebreak. The ATGS or FTAC sequences this before the C-130's drop pass. The DZ is now both burned out (center) and retardant-protected (perimeter).

Layer 3 -- Smokejumper Pathfinders: For high-risk or complex insertions, 2-4 smokejumpers jump the DZ first from their own organic aircraft (Twin Otter/CASA), conduct a hasty ground survey (surface conditions, obstacles, wind at ground level, fire proximity), and radio a ground report to the C-130 before the AHC commits. Smokejumpers use ram-air canopies with greater maneuverability than the MC-6, allowing them to insert into smaller openings with greater precision than the static-line AHC.

Layer 4 -- Emergency Retardant on DZ: If conditions deteriorate after commitment, an orbiting airtanker can deliver retardant directly on the DZ to protect landed AHC personnel. An FTAC or CCT-trained individual on the ground or in the air-tactical aircraft can vector this emergency delivery in seconds, rather than routing through multiple dispatch relays.

Before the main AHC pass, colored smoke is deployed on the DZ (by MQ-9 PSD or JM on an initial aircraft pass) to mark the landing target and show wind direction to jumpers under canopy. See Section 5.2 for full drop methodology including CARP, VIRS, and MQ-9 integration.

Airtanker standby during insertion: Depending on wind speed, fire proximity, and other threat indicators assessed by the Fire Guardian, an airtanker or C-40F can orbit on standby during the AHC insertion, ready to deliver retardant to protect the crew on the DZ or any jumper who lands off-DZ and closer to the fire than intended. The FTAC on the ground (or the ATGS in the air-tactical aircraft) vectors the emergency drop. This provides a continuous safety net from the moment the first jumper exits until the entire crew is assembled and LCES is established.

Blue Force Tracking and Lessons from Yarnell Hill

On June 30, 2013, nineteen members of the Granite Mountain Hotshots were killed on the Yarnell Hill Fire in Arizona when they were overrun by a fast-moving fire. The investigation identified several contributing factors: the crew lost awareness of the fire's movement, communications were degraded by terrain, their decision to leave a safe position was based on incomplete information, and no one with an overhead view could provide timely warning.

The AHC/MQ-9 architecture systematically addresses each failure mode that contributed to that tragedy:

Continuous fire perimeter awareness: The MQ-9's staring IR sensor monitors the entire perimeter simultaneously, detecting changes in rate of spread, direction shifts, and spot fires in real time. No more reliance on intermittent lookout reports or periodic IR mapping flights.

Unbroken communications: The comms relay pod eliminates terrain-masked radio dead zones. Every crew on the fire maintains continuous contact regardless of ridgelines or canyon terrain.

Blue force tracking (tiered ATAK): AHC leadership (superintendent, 2 assistant superintendents, 3 squad leaders -- 6 personnel) carry ATAK-equipped devices linked to MPU-5 or equivalent mesh radios. They see the full common operating picture: fire perimeter from the Fire Guardian, crew positions, JPADS delivery coordinates, and airtanker hold patterns. The remaining 14 crew members carry GPS beacon/trackers that report position to the mesh network automatically. Their positions appear on every leadership ATAK screen and on the Fire Guardian's feed, but the individual crew member is not managing a screen -- they are cutting fireline. The mesh network operates without infrastructure: nodes relay through each other and through the Fire Guardian's comms relay pod, providing coverage in terrain-masked canyons where no other communications system works. Incident commanders see in real time if a crew is moving toward the fire's projected path -- a capability that did not exist at Yarnell Hill.

Rapid air support vectoring: An FTAC-trained smokejumper or embedded CCT airman can vector an airtanker for emergency retardant on a threatened crew's position in seconds, rather than routing through multiple dispatch relays.

Atmospheric early warning: The atmospheric sampling pod detects wind shifts (such as thunderstorm outflow winds, which contributed to the Yarnell Hill tragedy) before they manifest as changes in fire behavior on the ground, providing minutes of advance warning for crews to reposition.

Fire shelters remain the last-ditch emergency backup, which is what they should be -- equipment you never want to deploy. The entire architecture above exists to ensure crews never reach the point where fire shelters are the only option. Critically, these safety systems benefit all firefighters on an incident, not just AHC personnel -- any crew within the MQ-9's coverage area gains the same situational awareness and communications improvements.

Medical Contingency: Pararescue Integration

AHC members carry Wilderness First Responder or EMT-Basic certification, adequate for most fireline injuries but insufficient for serious trauma: broken femurs from bad PLFs, spinal injuries from rock landings, or fall injuries from unintended tree landings. USAF Pararescuemen (PJs) are Special Operations paramedics who can jump from virtually any aircraft -- HC-130J, Twin Otter, CASA 212, or any helitack helicopter at a hover.

Under a standing MOU with USAF Rescue, 2-4 PJs from the nearest Rescue Squadron are activated and forward-staged at the incident as part of pre-mission planning for complex AHC operations (Type 1 incidents with AHC deployment, or operations involving multiple AHC drops). PJs travel to the incident by the fastest available means (commercial, C-40F, military airlift, or ground) and stage at the nearest airfield or fire camp. They are on standby for the duration of airborne operations. If a DZ injury occurs,

they insert by whatever aircraft is available on scene -- they do not require their own airframes. This is proactive staging, not emergency scramble: if PJs are not already activated and in the vicinity of the fire, response from home station is unlikely to be timely for serious trauma.

Regional RQS partners: **212th RQS** (AK ANG, JBER) for Alaska operations; **129th RQW** (CA ANG, Moffett) for California/Sierra/Great Basin; **304th RQS** (AFRC, Portland) for PNW operations. The annual per-base exercise (Section 9.3) should include a simulated DZ injury scenario with PJ activation and response to validate the MOU and build the interagency relationship. Over time, PJs who regularly embed on fire operations develop specialized wildfire medical expertise -- burns, smoke inhalation, heat injury, crush injuries from falling timber -- that does not currently exist in the military medical community.

5.5 Opportunistic Prescribed Fire During Active Incidents

Decades of fire suppression have created dangerously high fuel loads across western forests. Prescribed fire is the most effective treatment, but is nearly impossible to conduct in wilderness areas due to access limitations. An AHC that has just contained a wildfire is uniquely positioned to address this:

The crew has 20 firefighters on the ground with tools, water handling equipment, and MQ-9 overwatch. The fire has created a burned perimeter serving as a control line. Adjacent unburned fuel is exactly what will carry the next fire. Instead of mopping up and leaving, the AHC conducts a managed burnout within an expanded containment area -- using the wildfire's own control lines to enable a prescribed fire that would otherwise be impossible to execute.

The MQ-9 makes this dramatically safer than traditional burnout operations: staring IR monitors the entire burn perimeter continuously, the atmospheric pod tracks wind shifts, comms relay keeps the crew connected to dispatch, and the FTAC can vector airtankers for immediate retardant if needed. The MQ-9's PSD can assist with precision ignition in areas too dangerous for ground crews to enter.

This converts the AHC from a purely suppression tool into a landscape-scale fuels management capability. Each managed burn reduces the probability and severity of future fires for years or decades. This aligns with the USFS Cohesive Wildland Fire Management Strategy and provides a long-term programmatic justification beyond suppression cost avoidance.

5.6 Small UAS Integration

Unmanned aircraft systems are commonly categorized by DoD size groups. For wildland fire applications, three groups matter:

Group	Examples	Operating Altitude	Fire Role
Group 1 Small UAS	Commercial quadcopters (DJI Mavic, Skydio), RQ-11 Raven	Below 2,000 ft AGL	Squad-level tactical ISR. Operated by division supervisors, helitack crews, engine crews.
Group 3 Tactical UAS	Fire Sentinel (RQ-7B), ScanEagle, Jump 20	5,000-15,000 ft AGL	Division-level tactical ISR with persistent coverage and organic payload (sensors + relay).
Group 5 Strategic UAS	Fire Guardian (MQ-9), MQ-9B SkyGuardian	20,000+ ft MSL	Incident-level strategic ISR with multi-sensor suite and BLOS C2.

Group 1: Commercial Small UAS (Existing Capability)

Group 1 small UAS are already widespread in federal and state fire operations. DJI Mavic, Skydio, and Anzu platforms are standard equipment for division supervisors, helitack crews, and many engine companies. Fire agencies have developed mature procedures for TFR integration, pilot certification, and data dissemination. This paper does not propose a new federal program for Group 1 small UAS because existing programs and commercial technology already address the squad-level tactical ISR need. However, Group 1 small UAS data should flow into the same ATAK/TAK ecosystem used by Fire Guardian and Fire Sentinel, so that the FBAN at the ICP can see a consolidated aerial picture.

Group 3: Fire Sentinel (RQ-7B)

The Fire Sentinel concept uses surplus US Army RQ-7B Shadow airframes (Army retired the RQ-7B on 19 March 2024 after 1.3 million flight hours) to provide division-level tactical ISR complementing the strategic Fire Guardian. Fire Sentinel deploys by truck to within 60 nmi of a fire, launches from a pneumatic catapult, and recovers via arresting wire on a Forest Service road or meadow. See **Appendix B** for detailed payload, operations, and manpower specifications, and for international export framework (Mediterranean focus).

Fire Sentinel is treated in this paper as an optional capability included in COA 5 (Maximum Capability). Its value proposition is debated: it adds tactical ISR depth at moderate cost (4-6 aircraft at Boise for COA 5 baseline, potentially expanded to Reno and Peterson) but represents a second federal UAS program with its own personnel, training, and logistics requirements. See Section 7 for COA-level decisions.

Group 5: Fire Guardian (Detailed in Section 3)

The Fire Guardian concept is developed in Section 3.

6. C-40F Multi-Role Tanker/Transport

6.1 Aircraft Configuration

The C-40F is a Boeing 737 in the -700C (Convertible) configuration with a forward cargo door (identical to the Navy C-40A), equipped with a Coulson Aviation RADS-XXL roll-on/roll-off retardant delivery system, based on the proven Fireliner concept. The forward cargo door is required for loading and unloading the RADS-XXL tank. The tank (4,000+ gallons) can be installed or removed in under 30 minutes, enabling rapid reconfiguration between roles. The C-40F has no airdrop capability and does not deploy parachutists.

While the RADS-XXL tank is roll-on/roll-off, the aircraft requires permanent structural modification: a belly discharge port (door/valve assembly with actuators cut into the fuselage underside), structural reinforcement around the opening, plumbing runs from tank connection points to the discharge port, electrical wiring for discharge control, and aerodynamic fairing. These modifications are the primary conversion cost per airframe; the tank itself is modular.

Minimal military modification: The C-40F retains commercial avionics and should avoid unnecessary military additions. No countermeasures (CMDS, DIRCM) -- irrelevant for CONUS fire operations and adds weight, maintenance, and cost. No structural provisions for future countermeasure installation. No aerial refueling receptacle. Essential additions: military radios (UHF/VHF), IFF transponder (Mode 4/5), ATAK-compatible cockpit display for digital retardant drop lines (see Section 6.6 and Section 8 for ATAK retardant integration). Role parallels the Navy C-40A (logistics transport) plus retardant delivery.

6.2 Operating Modes

Tanker mode: 4,000+ gallons of water or retardant, functioning as a Large Air Tanker (LAT). Retains 66 seats even with tank installed. Can fly at maximum speeds and unrestricted altitudes with a retardant load. Supplements the existing contracted LAT fleet and MAFFS C-130s. Participates in DZ preparation by laying retardant on the DZ perimeter before AHC insertion.

Transport mode: Full passenger seating for crew repositioning between bases and to forward airfields where crews transfer to C-130s for parachute insertion. The 737-700C's convertible configuration allows simultaneous carriage of passengers and palletized cargo, enabling a single sortie to move an AHC crew and their fire cache supplies together. Faster and more efficient than C-130 for non-airdrop personnel movement across the national fire system.

Aeromedical evacuation mode: Configured for patient transport from fires producing mass casualties or from remote communities threatened by fire. Dual-use ANG mission that builds readiness for wartime aeromedical roles.

6.3 Host Unit Considerations

The C-40F is treated in this paper as a **separate, optional COA element** (see Section 7.6) that can be added to any main Course of Action. It is not imposed as a cost on any core COA. Multiple host unit candidates exist across the ANG and AFRC. A detailed list of candidate units (151st Wing UT ANG, 302nd AW Peterson, 133rd AW MSP, 153rd AW Cheyenne, Beale AFB, 120th AW Great Falls), the

124th FW (ID ANG, Gowen Field) forward option following the April 2026 A-10 service life extension, and the factors for evaluating each is presented in Section 7.6.

Conversion airframes (for any host unit selected) would be drawn from the commercial secondary market of retired 737-700/800 aircraft, at a fraction of new-build military aircraft cost.

6.4 MAFFS Integration and Funding

The C-40F unit would be included in the MAFFS activation framework but with a different funding model reflecting its primary fire mission. Current MAFFS activations are 100% DOD-funded during activation (DOD pays flight hours and crew costs; USFS pays for retardant). The C-40F, as an ANG unit whose primary mission is fire support rather than a collateral duty, would operate on an approximately 50/50 funding split:

During fire activations: USFS reimburses operational costs (fuel, retardant, maintenance hours).

During non-fire periods: ANG funds training, aircrew proficiency, aeromedical readiness, and transport missions. This arrangement provides the ANG with a dedicated, funded mission justifying the unit's existence -- significant in a force structure environment where units without clear missions face cuts.

An expanded MAFFS identity: MAFFS is today doctrinally a last-resort surge asset, activated only when the National Multi-Agency Coordinating Group determines the commercial airtanker fleet is fully committed. The roles this paper assigns MAFFS -- night-development test bed (Section 6.7) and FTAC-insertion platform (Sections 4.5, 6.7) -- do not fit inside that gate: night procedures, NVG currency, and insertion qualification require regular, scheduled activity through the season, not episodic surge. The paper therefore proposes, and names openly, a second MAFFS identity alongside surge: a seasonal baseline capability flying scheduled night-development and FTAC-insertion missions during fire season regardless of commercial-fleet saturation. This is a real doctrinal shift requiring Air Force buy-in (crew hours, aircraft availability) and a rethink of the commercial-competition activation gate for these specific mission sets. It is defensible because night fixed-wing delivery and FTAC insertion are capabilities the commercial fleet does not provide at all -- there is no competition to displace.

Sweetening the deal -- one additional C-130 per MAFFS wing (later phase): Contingent on MAFFS assuming this expanded seasonal role -- not in Phase 0 -- the plan should include programmed procurement of one additional C-130 (J or J-30) for each participating MAFFS wing, funded through the fire program. Under a constant MAFFS system count, the added seasonal tempo is a duration problem rather than a peak-capacity problem: the commitment stretches across a fire season now running 4-6 months (Section 1.2), and what each wing needs is airframe margin to sustain one continuous seasonal commitment without cannibalizing primary airlift readiness. A single additional tail per wing covers that while deliberately limiting the added personnel and infrastructure footprint: one aircraft folds into the wing's existing organization as dual-use depth for its primary mission the other six to eight months, where two would begin to look like a de facto fire squadron the wing must stand up. The trade is what makes the expanded ask politically viable -- the fire program funds airframes the Air Force uses for its own mission most of the year. This is a multi-year acquisition (new-build C-130Js carry \$100M-class unit costs and multi-year lead times), sequenced after the expanded MAFFS role is demonstrated rather than assumed, with the J-30 stretch preferred where it aligns with a wing's own transition path (Section 5.2).

6.5 Additional Missions

Beyond fire season, the C-40F fleet supports: ANG aeromedical evacuation training and certification; USFS/interagency personnel and cargo transport (moving crews, equipment, and fire cache supplies between bases nationally); international fire deployments (transport to Canada, Australia, or Mediterranean partners); and DSCA disaster response transport (hurricane, earthquake evacuation).

6.6 Integration with Fire Guardian and AHC

The C-40F integrates with both primary concepts. **With Fire Guardian:** C-40F carries the ATAK cockpit display specified in Section 6.1, enabling digital retardant drop coordination with the FBAN at the ICP and with the Fire Guardian sensor operator. During Phase 0 (Section 8), ATAK retardant drops are piloted on MAFFS C-130s before C-40F conversion; lessons learned inform C-40F cockpit integration. **With AHC:** C-40F provides rapid transport for crew and palletized equipment in the transport mode, supplementing C-130/C-17 airlift for non-airdrop movements (crew repositioning between bases, resupply runs, personnel rotation). The multi-role configuration is particularly valuable during Southern Hemisphere fire season (Nov-Mar), when year-round AHC personnel (COA 3+) can rotate internationally for Australian or Mediterranean deployments.

6.7 The Broader Airtanker Fleet and Night Aerial Attack

The largest existing element of aerial fire response is the contracted retardant fleet, and any paper arguing that the aerial response system is under-scoped for the emerging fire environment (Section 1.2) owes the reader a position on it. The federal large airtanker (LAT) fleet is entirely contractor-owned and operated: RJ-85s, MD-87s, BAe-146s, CV-580s, B-737s, and C-130s under exclusive-use and call-when-needed contracts, with DC-10 very large airtankers (VLATs) above them. It is built almost entirely on aging airliner conversions with finite feedstock -- there will be no more DC-10s or MD-87s to convert -- and its fragility is not hypothetical: the FAA grounded the entire DC-10 tanker fleet in November 2025 (extending the MD-11 grounding order) and did not unground it until May 2026, removing every VLAT from availability for half a year. On the military side, only eight MAFFS systems exist in the United States. Fleet recapitalization, exclusive-use contract reform, scooper acquisition, and the question of federal LAT ownership are real issues that deserve their own dedicated analysis; this paper deliberately does not develop them. What it does develop are the two fleet-wide modernization levers that this paper's concepts directly enable.

Lever One: Fleet-Wide ATAK Digital Drop Integration

The ATAK digital drop line concept piloted on MAFFS C-130s during Phase 0 (Section 8) and specified natively for the C-40F (Section 6.1) is airframe-agnostic and cheap: a tablet, a radio gateway, and procedures. Extended across the contracted fleet, it puts every tanker, the FBAN, the Fire Guardian sensor operator, and the ICP on one digital picture, and it is the prerequisite infrastructure for everything in Lever Two.

Lever Two: Night Aerial Attack (Named Phase 1 Objective)

Night is when winds lay down, humidity recovers, retardant holds best, and line-building ahead of the next burning period actually works -- and fixed-wing retardant delivery is today a daylight-only activity. Night aerial attack is therefore a named Phase 1 development objective of this paper, peer to CARP-through-smoke and night pathfinder insertion (Section 5.4), and independently valuable even if

every other element of this paper dies: one MQ-9B orbit plus MAFFS night procedures is a usable national capability on its own.

The precedent state: rotary-wing night firebombing is operationally mature; fixed-wing night retardant delivery has never been operational anywhere -- it is the unclaimed capability. Victoria's Night Fire Aviation Programme (Coulson S-61 helitanker with an S-76 intelligence ship, Kestrel Bell 412) received its first NVG operating approval for the 2015-16 season, ran trial implementation in 2017-18, gained operational firebombing approval for 2018-19, flew the first NVG initial attack in 2019-20, and CASA approved Coulson's CH-47 for night operations in February 2022. In Southern California, LA County dropped water at night as early as 1974, halted the program after a fatal 1977 midair, and restarted it in 2001 with the Firehawks; today the Quick Reaction Force (Coulson CH-47s, S-61, and an S-76 intelligence ship, funded in partnership with Southern California Edison and LA, Orange, and Ventura Counties) operates 24/7/365 with roughly 60 percent of its hours flown at night on NVGs -- a utility-cost-share funding model with obvious read-across to Fire Guardian-era programs. CAL FIRE's Firehawk night program gates night dispatch on a ground-confirmed fire, augments to a four-person NVG crew, and admits bases to NVG work only after a year on type. The marquee case is the January 2025 Palisades Fire, where night NVG helicopter operations in Mandeville Canyon dropped over 375,000 gallons and were credited with stopping the fire's run toward the 405 corridor. Australian officials have publicly framed fixed-wing night tankers as the next step, and Coulson has announced a multi-million-dollar NVG investment covering its C-130 fleet: the industry is already tooling toward exactly the gap this objective closes. The QRF's S-76 flying overwatch of every night drop is, functionally, a rotary-wing Fire Guardian -- five years of observed proof that persistent overhead ISR is the enabling layer for night aerial work.

Design principle -- no terrain-following radar: TFR is deliberately designed out of this objective. TFR solves reactive low-level flight over unplanned routes in zero visibility (the MC-130/MH-47 defended-airspace penetration profile). A retardant drop is a different problem: a pre-planned run on a specific line with a defined run-in, release point, and escape route over terrain that can be surveyed minutes beforehand. Civil aviation already flies that profile at night in mountains without TFR -- RNP AR approaches thread canyons on GPS/INS guidance against terrain databases. The night retardant run is conceived the same way: a dynamically generated drop corridor built against DTED/lidar terrain and obstacle data, validated in real time by Fire Guardian IR, delivered to the cockpit as an ATAK digital drop line, and flown on HUD, enhanced vision (EVS), and synthetic vision (SVS) with radar-altimeter discipline. Writing the requirement this way is what keeps MAFFS viable as the test bed and keeps a contractor pathway alive at all: conventional C-130s have no TFR and never will, and a TFR requirement would collapse the mission into a bespoke special-operations capability. The C-40F is therefore specified with a head-up display (Collins HGS class, a standard 737 option), EVS, SVS, and NVG-compatible cockpit lighting at conversion -- the first purpose-designed night-capable large tanker, for roughly 2-3 percent of what TFR integration would cost.

Go/no-go chain: Fire Guardian on station with a current corridor survey (the hard gate -- no persistent IR overwatch, no night drops); a digitally validated corridor with defined clearance margins and automatic abort criteria; a raised night drop floor (approximately 300 ft AGL versus 150 by day, with calmer night winds partially offsetting the drift penalty); sensor minima rather than illumination minima -- night inversions pool smoke in exactly the drainages being dropped into, and smoke defeats light-amplifying NVGs while long-wave IR sees through it, so the run is flown on EVS/HUD with NVGs as general situational awareness and minima written around sensor performance; exclusive block time

in the fire traffic area owned by the ICP Air Operations Manager; night-drop and NVG crew currency; terrain-class gating (moderate terrain first, complex terrain only after a validation season); and surface winds from the Fire Guardian atmospheric pod or a ground team, with tighter limits than day. Night work is also the forgiving end of the mission -- mostly line-building ahead of the next burning period rather than maximum-precision structure defense -- which is what makes the raised floor an acceptable trade. Wires and towers remain the residual hazard IR cannot reliably see; obstacle databases and the raised floor are the mitigation.

Test ladder: (1) partner with the QRF and CAL FIRE night programs to absorb a decade of civilian night-drop institutional knowledge (drop clearance, target marking, crew coordination under NVGs) rather than rediscovering it; (2) MAFFS water drops at raised floors over instrumented, benign terrain -- MAFFS crews are NVG-qualified military aviators, making MAFFS the natural night-drop pilot program exactly as it is for ATAK; (3) graduated terrain complexity; (4) C-40F native night capability from conversion; (5) extension to one or two premium night-contracted LATs on modern airframes only -- a 737-class Fireliner or RJ85 can take a HUD, an MD-87 realistically cannot -- at a plausible 30-50 percent exclusive-use rate premium, building directly on the ATAK integration those operators already adopted. Each rung borrows the previous rung's institutional knowledge. The end state is not fleet-wide night capability; it is a small night-capable element selected by airframe.

MAFFS as a Dual-Role Platform

One further capability is unique to the military tanker fleet: a MAFFS ship can deliver both a retardant load and a small smokejumper stick in the same sortie. The MAFFS II system discharges through a nozzle plug that replaces the left paratroop door, leaving the right paratroop door uncommitted -- and the aft cargo ramp, the standard exit for HALO/HAHO operations, remains available: two specialist-tier jumpers with equipment exit over the ramp without difficulty even with the MAFFS tank loaded. The operational sequencing is what makes this valuable: on a remote initial-attack dispatch, the aircraft arrives high, drops a 2-jumper FTAC stick over the Fire Guardian-surveyed DZ, climbs out while the jumpers get down and up on comms, then flies its retardant runs under control of the FTAC it just delivered -- who then controls every subsequent tanker. This collapses a two-aircraft, two-dispatch problem into one sortie and puts a trained controller on scene before the first drop rather than after; for night operations, the pathfinder inserts from the same aircraft whose drops he then clears. Weight-and-balance with a full load plus jumpers, egress clearance around the MAFFS plumbing, and personnel-drop certification with MAFFS installed are unvalidated -- this is a named Phase 0 test objective (Section 8.1), not an assumed capability. It is also exclusive to the C-130: the C-40F and the contracted LATs have no jump doors, no anchor-line infrastructure, and no personnel-drop heritage, and are explicitly excluded.

The C-40F (Sections 6.1-6.6) is this paper's contribution to fleet modernization, not a substitute for the recapitalization analysis the broader fleet deserves. The full layered structure of DOD support to the fire mission -- MAFFS, C-40F, airlift, rescue, and Army contributions -- is synthesized in Section 9.5.

7. Courses of Action

This paper proposes two primary capability concepts -- the Fire Guardian persistent ISR system and the Airborne Hotshot Crew -- along with supporting capabilities (enhanced smokejumper integration, C-40F multi-role tanker/transport, tactical UAS, small UAS integration). These elements can be combined at different scales to match budget, risk tolerance, and evidence from proof-of-concept operations.

The following Courses of Action are presented in order of increasing investment. They are not mutually exclusive over time: starting with a lower-scale COA and expanding based on demonstrated results is the recommended path. All COAs assume Phase 0 (Section 3) is executed first to inform the scale-up decision. **COA 3 (Fire Guardian + Central AHC + Enhanced Smokejumpers) is the recommended approach**, balancing transformational ISR capability with a single-base AHC proof-of-concept deployment.

7.1 COA 1: Fire Guardian Baseline

Scope: Full Fire Guardian buildout with no AHC and no SJ expansion beyond current programs. 18-24 Fire Guardian aircraft (mixed 6-8 MQ-9B + 10-12 Mojave STOL fleet, Section 3.8) across 4 main operating bases (March ARB, Boise, Eielson, Peterson), full multi-sensor pod suite, LOS/BLOS hybrid C2, FBAN teams at MOBs/LREs, ATAK retardant drop integration with MAFFS and contracted tankers.

Cost (ROM): ~\$600-850M standup, ~\$85-125M/yr recurring. Reflects post-Epic Fury new-build acquisition (Section 3.8); the pre-Epic-Fury divestment-based estimate was \$180-260M standup.

What it provides: Fire Guardian transforms situational awareness, communications, and air operations management on every fire it flies. Reduces firefighter fatality risk through persistent overhead thermal ISR and comms relay. Enables ATAK digital retardant drops. Has significant export potential to international partners (FMS/DCS to Canada, Australia, Chile, Argentina).

What it doesn't do: Doesn't add ground firefighter capacity. Doesn't address the roadless-area rapid insertion problem. For fires requiring large sustained crews, existing IHCs still must travel by ground.

7.2 COA 2: Fire Guardian + Enhanced Smokejumpers

Scope: COA 1 plus significant expansion of the smokejumper program. New SJ bases at Reno NV (across runway from NV ANG 152nd AW at Reno-Tahoe or nearby at Reno-Stead) and Peterson SFB CO (co-located with AFRC 302nd AW), closing Great Basin/Sierra and Central Rockies gaps. Increased personnel at existing SJ bases (target ~600-700 total SJs vs. current ~430-450). C-130 integration for SJ operations on larger fires (30-40 jumpers from a single C-130). MRZRs at major SJ bases for ground mobility. HALO/MFF qualification expanded to 3-5 per major base. FTAC qualification expanded. Seasonal eastern SJ detachment capability for emerging eastern fire regions.

Key operational advantage: SJ bases at Reno and Peterson co-locate jumpers with resident ANG/AFRC C-130s (152nd AW at Reno, 302nd AW at Peterson), eliminating C-130 deadhead transit time to pick up crew. For large-fire response requiring 30-40 jumpers from a C-130, deployment time from alert to over-DZ is reduced by 1.5-3 hours compared to requesting airlift from a distant base.

Year-round employment: Base SJ force remains seasonal, but the specialist tier (FTAC-qualified, HALO/MFF-qualified) transitions to year-round employment due to currency maintenance requirements and training support roles. Approximately 55-85 year-round federal firefighter positions under COA 2 (up from informal current year-round roles).

The degraded-visibility value proposition: COA 2 deserves plain statement of something the cost table obscures: it is the cheapest COA that buys *both* degraded-visibility capabilities. Night pathfinder insertion (Section 5.4) rides on the specialist tier COA 2 already funds year-round -- the delta is ATIC course slots, NVG sets at roughly \$10-40K per jumper, and currency jumps the year-round employment argument already justifies -- and night fixed-wing aerial attack (Section 6.7) rides on Fire Guardian plus MAFFS, both inside COA 2's boundary. COA 2 is therefore the entire 24-hour aerial fire response transformation, minus only the 20-person sustained crews. In a constrained budget year, decision-makers will land here, and this paper regards that as a defensible landing spot rather than a failure mode. Night currency is also one more reason the specialist tier cannot be seasonal.

Cost (ROM): ~\$720-1,030M standup, ~\$135-200M/yr recurring (additive to COA 1 baseline).

7.3 COA 3: Fire Guardian + Central AHC + Enhanced SJ (Recommended)

Scope: COA 2 plus a single AHC base at Boise/NIFC (5-6 AHC crews, ~100-120 firefighters) providing the 20-person parachute-insertable hotshot capability. HE capability (dozers, JPADS heavy-drop). Army JM/PF support transitioning to organic USFS JM/PF over 3-5 years. Permanent USFS rigger infrastructure at Boise. Fire Guardian integration with AHC operations (CARP through smoke, airtanker standby, FBAN coordination).

Why recommended: Tests AHC concept at single-base scale without committing to 4-base buildout. Central location at NIFC leverages existing infrastructure and national dispatch integration. Can scale to multi-base AHC (COA 4) later if operational evidence supports it, or pivot back to pure COA 2 if AHC proves marginal. Combines the transformational Fire Guardian ISR capability with a 100-120 person year-round AHC workforce and the enhanced SJ program's broader coverage improvements.

Year-round employment: Adds ~100-120 year-round AHC positions at Boise. Combined with the COA 2 specialist SJ tier, total year-round federal airborne firefighter positions reach ~160-200 under COA 3.

Cost (ROM): ~\$820-1,170M standup, ~\$170-250M/yr recurring.

What it doesn't do: Limited AHC regional coverage. Crews deploying from Boise to California, Colorado, or Alaska fires lose time versus a regional AHC distribution.

7.4 COA 4: Fire Guardian + Full AHC Buildout

Scope: Full 4-base AHC buildout (Wainwright, Boise, Reno, Peterson) with Fire Guardian and basic SJ program integration, but without the full SJ expansion of COA 2. 4 AHC bases with 15-16 total crews (~300-320 AHC firefighters). HE bases at Wainwright and Boise. Regional distribution enables faster response to any western fire. Supports international deployments (Canada, Australia, Mediterranean) during Southern Hemisphere or off-peak seasons.

Year-round employment: ~300-350 year-round AHC positions plus ~25-40 FTAC/HALO specialist SJ positions.

Cost (ROM): ~\$920-1,320M standup, ~\$235-350M/yr recurring.

Trade-off vs. COA 3: Gains regional AHC distribution and international deployment capability. Loses the enhanced SJ program's coverage expansion (Reno/Peterson SJ bases, increased per-base SJ staffing). Larger commitment without the proof-of-concept intermediate step that COA 3 provides.

7.5 COA 5: Maximum Capability

Scope: Full Fire Guardian, full 4-base AHC, enhanced smokejumper program (Reno/Peterson + expanded per-base staffing), Fire Sentinel (RQ-7B) tactical ISR, C-40F multi-role tanker/transport. All capabilities discussed in this paper deployed at program-of-record scale.

Cost (ROM): ~\$1,020-1,490M standup, ~\$260-370M/yr recurring.

What it provides: Comprehensive transformation of aerial wildfire response. Addresses every dimension of the capability gap. Positions the US as global leader in wildfire response technology, with significant export potential (Fire Guardian to large countries, Fire Sentinel to compact fire-prone nations, C-40F technology transfer).

What it doesn't do: Largest investment; political and budgetary risk highest. May be more capability than operational demand justifies in the near term.

Fire Sentinel low-marginal-cost note: Phase 0 develops Fire Sentinel as an export-primary program for Mediterranean fire-prone partners (see Sections 8.3 and 9.4). By the time COA 5 is being considered for adoption, US Phase 0 has already produced the fire-configured pods, deployable ground station, training curriculum, and FAA certification. Adding domestic Fire Sentinel under COA 5 therefore requires only additional airframe procurement (~\$2-4M each FMS-rate for surplus RQ-7B) and personnel - the development cost is sunk during Phase 0 and partially recovered through earlier export sales.

7.6 C-40F as Separate Optional Element

The C-40F multi-role tanker/transport (Section 6) is an independent capability that can be added to any of COAs 2-5 as a separate acquisition decision. It is NOT imposed as a required element of any main COA. Primary value is multi-role utility (retardant + pax/cargo + USAF airlift) at jet speed with modern avionics suitable for ATAK integration.

C-40F host unit candidates:

Candidate Unit	Location	Current Aircraft	Considerations
151st Wing (UT ANG)	Salt Lake City	KC-135R	Existing tanker unit culture; central Intermountain West position; trade-off is reduced strategic tanker capacity.
302nd AW (AFRC)	Peterson SFB CO	C-130H (MAFFS)	Trades conventional C-130H airlift for jet-speed retardant; collocates with Fire Guardian MOB if COA 3+.

Candidate Unit	Location	Current Aircraft	Considerations
133rd AW (MN ANG)	Minneapolis-St Paul	C-130H	Midwest positioning for eastern fire response and Canadian border mutual aid; eastern fire expansion fit.
153rd AW (WY ANG)	Cheyenne	C-130H -> J	Western position; could convert to C-40F instead of C-130J conversion already programmed.
Beale AFB	California	KC-135 (AFRC) / U-2	California positioning; active/reserve mix complicates ANG standup.
120th AW (MT ANG)	Great Falls	C-130H	Northwest/Plains position; close to Canadian border for mutual aid. (Note: Malmstrom AFB has no active runway -- ICBM mission only.)

124th FW (ID ANG, Gowen Field) forward option: The 124th FW currently flies A-10Cs. Following the April 2026 SecAF announcement extending A-10 service life to 2030, 124th FW conversion timelines are uncertain. If/when the 124th eventually converts from A-10, Boise's centrality to AHC operations (under COA 3+) and to wildland aerial firefighting generally makes either the C-40F mission or a conventional C-130 assumption logical. Until that conversion decision is made, no 124th FW conversion cost is imposed on any main COA. AHC under COA 3+ operates with existing ANG/AFRC C-130 rotation support at Boise (see Section 5.2).

C-40F incremental cost: ~\$400-600M standup (aircraft acquisition, conversion, belly plumbing, RADS-XXL systems), ~\$40-60M/yr recurring. Most valuable when paired with AHC (COAs 3-5) for rapid crew/cargo transport alongside retardant delivery.

7.7 COA Comparison

Capability	COA 1	COA 2	COA 3	COA 4	COA 5
Fire Guardian (full)	Y	Y	Y	Y	Y
Enhanced SJ program		Y	Y		Y
Central AHC (Boise)			Y	Y	Y
Full AHC (4 bases)				Y	Y
Fire Sentinel					Y
C-40F (optional add)	N/A	opt	opt	opt	Y
Year-round FTE	~20	~55-85	~160-200	~325-390	~400-480
Standup ROM	\$600-850M	\$720-1,030M	\$820-1,170M	\$920-1,320M	\$1,020-1,490M
Annual ROM	\$85-125M	\$135-200M	\$170-250M	\$235-350M	\$260-370M

Scaling over time: Starting at COA 1 or 2 and expanding based on Phase 0 evidence is the recommended acquisition strategy. COA 3 represents the balance point where Fire Guardian is fully deployed, smokejumpers are expanded, and AHC is proven at single-base scale before full commitment. Moving from COA 3 to COA 4 or 5 based on demonstrated AHC value is a straightforward scale decision once Boise AHC operations are mature.

8. Phase 0: Proof of Concept

The full program (\$790M-1.13B standup across 4 bases, reflecting post-Epic Fury new-build aircraft acquisition per Section 3.8) is a large commitment. Before requesting full authorization, a Phase 0 proof of concept demonstrates the core value proposition at approximately 10% of full cost, producing evaluable results within 2-3 fire seasons.

8.1 Phase 0 Force Structure

Element	Phase 0 Scope	Notes
AHC	2-3 crews at Boise (40-60 crew)	Centralized at NIFC. Single base.
Fire Guardian (MQ-9B, LEASED)	3 leased MQ-9B at March ARB (1 orbit, 163rd ATKW infra)	Lease avoids purchase cost; GA-ASI instructor crews included. CGCS at March. LRE at Boise. See Section 3.8.
Fire Sentinel (RQ-7B) [EXPORT -PRIMARY]	4 surplus a/c at Boise	Develops export-ready package for Mediterranean partners. Domestic use is incidental testing. See Section 8.4.
JPADS	Included	BLM AK already operational. Proven technology.
MRZR	4-6 (SOF airdrop-cert)	Standard vehicle package. Defer dozers to Phase 1.
Flatbed ISVs	1-2 (GM Defense 5-pax variant)	Tests augmented vehicle package. Validates flatbed LVAD certification for AHC use.
Tactical Trailers	2-4 (SOF Light Tactical or equivalent)	Casevac, equipment recovery, UPRB chute return. JPADS-2K delivered.
Riggers	Contracted ADOS (346th TADC, 1161st QM Det)	No permanent infrastructure. Home-station packing.
Ground Recovery Detachment	Initial 6-8 personnel at Boise (2x F-550, 2x 15-pax vans)	Smaller than full build. Validates trainee pathway and recovery model.
C-130	Any western ANG/AFRC via NIFC dispatch	No dedicated strip alert. MAFFS activation model.
C-17	62nd AW (JBLM)	MRZR/ISV LVAD testing.
Standup Cadre	4-6 Army JMs + 2-3 PFs (active/RC on rotation or ADOS)	Provide initial operational capability while USFS builds organic JMs (2+ yr timeline). Veteran JM/PF recruitment into USFS simultaneously.
Training	First BAC/PF/JM classes; 1st FTAC to CCT; 1st MFF candidate to Yuma	Pipeline begins flowing.
ATAK Retardant	Tablet integration on MAFFS C-130s	Pilot digital drop line concept before C-40F.
MAFFS Dual-Role Trial	Combined FTAC-insertion + retardant sortie test	Validates W&B; ramp egress with MAFFS loaded. See Section 6.7.

Element	Phase 0 Scope	Notes
Facilities	Chute storage + ready room at NIFC (existing infra)	Modest construction only.

8.2 Phase 0 Fire Guardian C2 Architecture

March MOB (BLOS): The 163rd ATKW provides the GCS infrastructure, maintenance, and SATCOM-capable ground station. Sensor operators at March can fly any Fire Guardian anywhere via satellite. 1 LRE team deploys forward to CA/SW military airfields for launch/recovery and LOS sensor operations on closer fires.

Boise LRE (LOS): 1 fixed portable GCS at Gowen Field for local operations, plus 1 deployable GCS that drives to within ~100 miles of Northern Rockies fires for LOS sensor ops. LOS provides lower latency, better video quality, and no SATCOM bandwidth cost. The operational flow: Fire Guardian launches from March (or a forward FOB) under local LOS. Transitions to BLOS (March GCS takes control via SATCOM). Aircraft flies to fire area. Meanwhile, Boise LRE team drives deployable GCS to a closer military airfield (Mountain Home AFB, Great Falls ANGB, Fairchild AFB, Kingsley Field, or similar). Once set up (4-6 hrs), aircraft transitions back to LOS from forward GCS. BLOS covers transit and the gap before LRE is in position.

Fire Guardian FOBs use military airfields (USAF, ANG, AFRC installations) via base support agreements. Military airfields provide restricted airspace for UAS launch/recovery, ramp security, JP-8 fuel, and hard surfaces for portable GCS. Candidate western FOBs: Mountain Home AFB (ID), Fairchild AFB (WA), Great Falls ANGB (MT), Kingsley Field (OR ANG), Hill AFB (UT), Buckley SFB (CO), Beale AFB (CA), Creech AFB (NV).

Alaska seasonal deployment: During Phase 0+, when 2-3 AHC crews deploy seasonally to Wainwright, Fire Guardian operates from Eielson AFB (26 mi from Wainwright). Eielson provides a semi-permanent GCS for fire season plus 1 deployable GCS for forward positioning closer to remote interior fires. BLOS from March covers fires beyond LOS range.

8.3 Phase 0 Fire Sentinel: Export-Primary Development

Strategic framing: Fire Sentinel appears in COA 5 (Maximum Capability) for US domestic deployment but is **not** in COAs 1-4. Phase 0 nevertheless includes a small Fire Sentinel program because the primary purpose is **export-development for Mediterranean fire-prone partners**, not US domestic adoption. The US Army divested the RQ-7B fleet on 19 March 2024 after 1.3 million flight hours; surplus airframes are available at FMS rates of approximately \$2-4M each. Fire-configured pods, a deployable ground station, training curriculum, and FAA certification work developed during Phase 0 produce an export-ready package suitable for FMS to Greece, Spain, Portugal, Italy, Croatia, and other compact fire-prone allies (see Section 9.4 for the export market framework). The US Army also ran the RQ-7 with positive ROI throughout its service life; extending that capability into the wildfire mission re-uses sunk infrastructure investment.

Phase 0 scope (4 aircraft at Boise): Fire Sentinel launches from a pneumatic catapult and recovers via arresting wire, both deployable to any flat surface (Forest Service road, meadow, dirt strip - no

pavement required). The GCS is a Humvee-portable shelter positioned within ~60 nmi of the fire. A Fire Sentinel team (5-6 personnel: 2 operators, 2 maintainers, 1 FBAN, 1 launch/recovery) deploys with the equipment by truck. Recruited from separating Army 15E UAS operators as the RQ-7 fleet divests.

Payload (developed for export, used during Phase 0 for testing): Fire Sentinel carries its organic EO/IR sensor ball (~25 lbs) plus a miniaturized comms relay (SDR with ATAK gateway, ~5-8 lbs) and basic atmospheric sensors (anemometer, temp/humidity, PM2.5 particulate, ~3-5 lbs) - roughly 35 lbs of the 60-lb payload budget. Data feeds into the same ATAK/TAK ecosystem as Fire Guardian, displayed on the same FBAN monitors at the ICP. Fire Sentinel operates below 10,000-15,000 ft; Fire Guardian above 15,000 ft; airtankers and helicopters below 5,000 ft.

Cost recovery model: US Phase 0 development costs (~\$30-50M for pod adaptation, ground station, training curriculum, FAA certification work, and 4 airframes plus spares) are positioned for partial recovery through FMS to allied nations. Initial export packages are priced for cost recovery rather than significant profit margin, aligning with the strategic objective of building partner capacity. With an addressable market of approximately 5-7 Mediterranean nations purchasing systems valued at \$30-100M each (depending on fleet size and infrastructure), the US can recover Phase 0 development investment within 1-2 export deals while pricing systems competitively (well below new MQ-9 acquisition cost). Domestic deployment under COA 5 becomes a low-marginal-cost option - the US has already done the development, so adding domestic Fire Sentinel capability requires only additional airframe procurement and personnel.

Phase 0 testing rationale: While export-primary, the 4 Phase 0 Fire Sentinel airframes generate operational data that informs both the export package and any future US domestic deployment under COA 5. Testing scenarios include integration with Fire Guardian (BFT, sensor handoff, comms relay), AHC operations support (DZ reconnaissance, DZ wind monitoring), tactical UAS deconfliction with airtankers and helicopters, and small-airfield operations from Forest Service infrastructure. Phase 0 results inform the COA 5 decision and the export package design.

8.4 Phase 0 Costs and Growth Path

Phase 0 ROM: ~\$35-55M standup + ~\$42-65M/yr recurring. Total 3-year proof: ~\$160-250M. This is less than one campaign fire season. The MQ-9B lease (Section 3.8) shifts aircraft cost from standup to recurring: no airframe purchase, but ~\$10-20M/yr in lease and contractor-support cost for 3 aircraft. The standup figure includes 1-2 flatbed ISVs (~\$370-740K) for augmented vehicle package validation and the Fire Sentinel export-development program (~\$30-50M, partially recoverable through subsequent FMS sales).

Phase 0+ Growth: Grow Boise to 5-6 AHCs. Seasonal deployment of 2-3 crews to Wainwright with C-130s and Fire Guardian at Eielson. Test advanced capabilities (CARP through smoke, ATAK retardant drops) at Boise. First organic USFS JMs operational by Year 3. **Three named Phase 1 development objectives** carry forward from Phase 0 testing, each independently valuable and each enabled by Fire Guardian operations in degraded visual environments: CARP-through-smoke insertion, **night fixed-wing aerial attack** (Section 6.7), and **night pathfinder insertion** (Section 5.4).

Phase 1 (contingent on Phase 0 success): Permanent Wainwright base. Reno and Peterson standup. C-40F / 124th FW conversion. Heavy equipment airdrop (dozers). HALO/smoke insertion ABNSOTD certification. Permanent USFS rigger infrastructure. CH-47 airborne. Dedicated strip alert rotation.

International deployments. Full program as described in Sections 5-19.

9. Implementation

This section consolidates the elements required to execute any of the Courses of Action in Section 7 at scale: a Concept of Operations vignette illustrating an integrated response, basing and force structure, training exercises, international operations, institutional framework, ROM cost estimates, implementation timeline, and key risks.

9.1 Concept of Operations: Vignette

Lightning strike detected in the Selway-Bitterroot Wilderness, 30 miles from the nearest road. Fire is 2 acres in heavy fuels, with afternoon winds forecast to increase. Nearest ground crew is two days' hike away.

Time	Phase	Actions
Hour 0	Detection and Tasking	Automated lightning detection triggers dispatch at NIFC. MQ-9 from Boise tasked to fire location. Alert AHC at Boise notified.
Hour 1-2	ISR On Station	MQ-9 arrives, begins fire perimeter mapping with MTS-B and staring IR. Comms relay pod establishes radio/ATAK coverage over fire area. Atmospheric sampling pod profiles winds aloft and smoke density. Assessment transmitted to Boise dispatch.
Hour 2-3	DZ Preparation	MQ-9 uses PSD to burn out a meadow 1 km from fire as DZ. C-40F from Gowen Field lays retardant on DZ perimeter. Two Pathfinder-qualified smokejumpers from Boise jump DZ from Twin Otter, confirm ground conditions by radio.
Hour 2-4	AHC Load and Launch	Dispatch orders one AHC. C-130 from 153rd AW (Cheyenne, pre-positioned at Boise) loads 20 Airborne Hotshots and 3 JPADS bundles. USFS JM, spotter, and embedded CCT/FTAC coordinate DZ approach.
Hour 3-5	Insertion	C-130 arrives over fire area. MQ-9 provides real-time DZ wind assessment. FTAC manages airspace, deconflicting with C-40F and MQ-9. Pass 1: 10 AHC exit ramp. Pass 2: remaining 10 exit. Pass 3+: JPADS bundles deploy to grid coordinates near DZ. Crew assembles, retrieves JPADS cargo (pumps, hose, tools, food/water).
Hour 4-8	Initial Attack	AHC superintendent assumes IC, establishes LCES, begins fireline construction. MQ-9 maintains overwatch, providing continuous fire perimeter updates and early warning of spot fires or wind shifts via comms relay and ATAK.
Hour 8-48	Sustained Operations	Follow-on C-130 JPADS sorties deliver additional supplies (chainsaw fuel, food, foam concentrate) to grids called in by the AHC. If fire exceeds AHC capacity, additional resources ordered through normal dispatch.
Day 2-5	Transition	Fire contained. If conditions allow, AHC conducts opportunistic prescribed burn to treat adjacent fuels (Section 5.1). Demob: packout to nearest road, helicopter LZ, or river bar.

9.2 Basing and Force Structure

The AHC program establishes four bases, each hosting 2-4 AHCs initially, growing to 15-16 crews at full maturity. All AHCs are nationally deployable and routinely reinforce other sectors during peak fire activity, consistent with existing smokejumper and IHC deployment models.

AHC Basing Summary

Location	Init.	Full	HE	Primary Airlift	Army / Rigger	Coverage
Ft. Wainwright, AK	2	4	Yes	517th/144th AS (C-17) + 211th RQS HC-130J	241st QM Co (Bde AD)(ABN), JBER	Alaska interior
Boise, ID (NIFC)	2	5-6	Yes	153rd AW (C-130, Cheyenne) 62nd AW (C-17, JBLM) 120th AW (C-130, Gr. Falls)	Permanent rigger det. (4-6)	Great Basin; N. Rockies
Reno, NV	2	3	No	152nd AW (C-130H MAFFS, co-located) 129th RQW HC-130J	346th TADC (USAR) (Bell CA)	Sierra Nevada; Great Basin
Peterson SFB, CO	2	3	No	302nd AW (C-130H MAFFS, co-located)	19th SFG (potential; see Sec 5.1.3)	Central Rockies; Four Corners

Total at full build: 15-16 AHCs / 300-320 crew + 48-64 HE augmentees at Wainwright and Boise + 12-16 airborne-qualified logistics specialists at HE bases + ~60 support staff = approximately 420-460 USFS positions. Combined with ~450 smokejumpers, the nation would have approximately 870-910 parachute-qualified wildland firefighters.

Each base hosts Army National Guard or Army Reserve rigger support. For initial rollout, this is achieved through ADOS orders and TDY funding to existing units (USAR 346th TADC at Bell, CA; CA ARNG 128th QM Detachment (AD) at JFTB Los Alamitos; 241st QM Co at JBER for Alaska), rather than creating new detachments. Permanent rigger positions at HE bases would be established in Year 2-3. The Peterson rigger gap would be reassessed based on operational tempo.

Off-Season Utilization: During the non-fire period (approximately November-May), AHC personnel conduct prescribed fire operations, fuels reduction projects, training, and equipment maintenance. AHC and smokejumper crews may deploy to foreign wildfires under mutual aid agreements -- particularly to Australia and Canada, whose fire seasons are offset from the U.S. season. International deployments maintain crew proficiency and build interoperability. AHC crews meet all SIHCO standards and undergo annual IHC certification review.

9.3 Training Exercises

Quarterly Proficiency Jumps

Each AHC base conducts quarterly jump proficiency events with its partner ANG C-130 unit (or C-17/CH-47 as appropriate). Scheduled outside fire season where possible; during fire season, events proceed with the understanding they may be cancelled by actual fire operations.

Annual Per-Base Exercise

Each AHC base conducts an annual full-scale exercise during its partner ANG unit's Annual Training (AT) period. The exercise integrates: AHC insertion (personnel drop + JPADS), MQ-9 overwatch and comms relay, C-40F retardant support and DZ preparation, SJ pathfinder insertion, FTAC/CCT airspace management, and (at HE bases) heavy-equipment airdrop. These exercises build the specific bilateral relationship at each location, with terrain and scenarios tailored to the regional fire environment (e.g., Arctic/tundra at Wainwright, high-altitude mountain DZs at Peterson). Each exercise provides airborne proficiency hours for ANG loadmasters and pilots while building the interagency relationship.

Biennial National Exercise

Every two years, one base hosts a national-scale exercise bringing elements from all bases for a multi-day scenario testing cross-sector reinforcement, surge operations, and full-system integration. The host base rotates. This tests the national deployment model -- moving a Boise AHC to a simulated fire in Montana using a different ANG unit than they normally train with -- exercises the NIFC dispatch integration, and provides a venue for international observers and potential partner-nation participants (Canadian BC Wildfire Service, Australian fire agencies). The biennial cadence avoids the impossible scheduling burden of coordinating all partner units annually while still providing periodic national-scale integration testing.

USAF Crew Supplemental Training

USAF C-130/C-17 crews with standard airdrop qualification can execute AHC insertions without additional certification -- the MC-6 is already in USAF airdrop computation tables. However, fire-environment flying introduces specific considerations that require a short supplemental familiarization (2-3 days, not a new qualification):

Wildfire airspace procedures: TFR management, ATGS coordination, airtanker deconfliction. MAFFS crews already have this training; non-MAFFS crews in the AHC strip alert rotation need it. **Fire weather awareness:** Fire-generated convective columns, thermal turbulence, inversions, and smoke effects on aircraft performance and CARP accuracy. **MQ-9 coordination:** Receiving and using real-time wind data from MQ-9 for CARP refinement; deconflicting with an RPA in the same airspace. This training can be administered during each unit's pre-season preparation, similar to annual MAFFS certification.

9.4 International Operations and Interoperability

Reciprocal Mutual Aid Framework

AHC and smokejumper international deployments can operate using host-nation airlift, without requiring USAF aircraft to deploy:

Country	SJ Program	Airlift Available	Notes
Canada	Yes (BC Wildfire Service, ~60 SJs, 2 bases in BC)	5x C-17 (429 Sqn, CFB Trenton); CC-130J Hercules	RFFFA 1982 treaty framework. BC interior vast roadless fire country. Partially overlapping fire season.
Australia	No	8x C-17A (36 Sqn, RAAF Amberley); 12x C-130J (37 Sqn, RAAF Richmond)	No native SJ capability but has expressed interest. Opposite fire season (Nov-Mar) ideal for off-season deployment of year-round AHC personnel.
Mediterranean (Greece, Portugal, Spain, Italy, Croatia)	No	C-130 variants (multiple nations); A400M (FR, DE, ES, UK, TR)	Growing Mediterranean fire problem. ISV already certified for A400M LVAD. Compact geography fits Fire Sentinel range constraints.

US-Canada Mutual Benefit

The 2023 Canadian wildfire season (~37-42 million acres, roughly the size of Ireland) sent smoke across the eastern United States for weeks, triggering air quality emergencies from Chicago to Boston to Washington DC. Tens of millions of Americans were exposed to hazardous particulate levels with measurable health impacts. During the season, approximately 2,000 US federal firefighters rotated through Canada under the 1982 Reciprocal Forest Fire Fighting Arrangement (RFFFA).

Helping Canada manage its fire season is direct US self-interest. Every hectare of Canadian forest that does not burn is smoke that does not reach the Midwest and Northeast. US Fire Guardian and AHC deployments under RFFFA during peak Canadian seasons would:

Fire Guardian: Provide persistent aerial ISR over the most threatening Canadian fires, supporting Canadian fire managers' protective action decisions and generating better smoke forecasting data for US air quality predictions. BLOS-capable MQ-9 operations from March ARB or Eielson can cover Canadian fires via satellite with host-nation airspace coordination.

AHC (under COA 3+): Year-round AHC personnel can deploy to Canadian fires under RFFFA reimbursement during peak Canadian season (May-September), overlapping but not identical to US peak season. Canadian reimbursement offsets US costs. AHC deployment to roadless Canadian fires (BC interior, boreal Northwest Territories) matches capability to terrain, complementing Canadian SJ programs.

Enhanced SJ (under COA 2+): Expanded US SJ capacity provides additional mutual aid capability. Canadian SJ programs are small (~60 BC jumpers); US SJs have historically been the primary surge resource during major Canadian seasons.

International Export: Fire Guardian

Fire Guardian has significant export potential to large, fire-prone nations with defense acquisition capacity:

Canada (MQ-9B SkyGuardian): Canada is acquiring MQ-9B for general-purpose ISR through its RPAS (Remotely Piloted Aircraft System) Project. Fire-configured pods (comms relay, atmospheric sensing, precision dispensing) developed under the US Fire Guardian program could be offered to Canada as modular add-ons. Joint development or FMS of fire-specific pods is a natural cooperation pathway.

Australia: Similar continental-scale fire geography. RAAF operates or has considered MQ-9B variants. FMS or direct cooperation on fire-configured pod integration.

Chile, Argentina: Long north-south axis with Patagonian and Andean forest fire exposure. FMS of fire-configured MQ-9 represents meaningful capability transformation for these nations' fire response.

US domestic benefit: Export revenues offset US acquisition and sustainment costs, industrial base benefits, interoperability with allied fire operations.

International Export: Fire Sentinel (Mediterranean Focus)

Fire Sentinel (RQ-7B) is particularly suited to **compact, fire-prone nations** where multiple small operating sites can provide national coverage despite the system's ~60 nmi LOS range. This framing inverts the conventional assumption: the RQ-7's limitations make it a better fit for small Mediterranean nations than for continental allies like Canada or Australia.

Primary Fire Sentinel market -- Mediterranean fire-prone nations:

Nation	Current RQ-7	Fire Coverage	Dual-Use Mil Value
Greece	No	Full national coverage from 4-6 sites (~15-25 aircraft)	Aegean maritime surveillance, border.
Spain	No	National coverage from 5-7 sites (~25-35 aircraft)	Maritime patrol, Gibraltar Strait, African border.
Portugal	No	Coverage from 2-3 sites (~10-15 aircraft)	Maritime patrol, Atlantic approaches.
Italy	Yes (4 systems, 2010)	Add fire pods to existing systems	Already operates; Aegean/Med patrol.
Turkey	Yes (Shadow 600)	Add fire pods to existing systems	Already operates; southern border.
Croatia	No	Coverage from 2 sites (~6-10 aircraft)	Adriatic maritime, Balkan border.

Value proposition for Mediterranean nations: The RQ-7B is dated for near-peer military use (US Army divested in March 2024) but fully adequate for non-combat surveillance missions (fire ISR, maritime patrol, border surveillance). Acquisition cost for surplus RQ-7B under FMS is approximately \$2-4M per aircraft -- a fraction of new MQ-9 acquisition. Total fleet and infrastructure for national fire coverage can be achieved for \$30-100M per nation, comparable to one or two Canadair CL-415 water bombers at \$30M each new. Pneumatic launch and arresting wire recovery eliminate runway requirements. Training support available through former US Army 2nd Bn/13th Aviation Regiment (Ft. Huachuca) operator pipeline.

Existing RQ-7 operators (Italy, Turkey, Romania, Sweden, Australia): Add fire-configured pods to existing military systems. Simpler integration path.

Reciprocal training: The USFS could offer AHC, SJ, FTAC, and Fire Guardian sensor operation training to allied nations' firefighters, mirroring DOD's IMET model. Operator exchanges build interoperability for mutual aid deployments.

Phase 0 development link: The Phase 0 Fire Sentinel program (Section 8.3) is explicitly framed as **export-primary development**. The 4 Phase 0 airframes at Boise develop the fire-configured pods, deployable ground station, training curriculum, and FAA certification work that produce an export-ready package for FMS to the Mediterranean partners listed above. US Phase 0 development costs (~\$30-50M) are positioned for partial recovery through cost-recovery FMS pricing, with the strategic objective of building partner capacity rather than maximizing US revenue. The first 1-2 export deals can offset the bulk of US Phase 0 development investment. Domestic deployment under COA 5 becomes a low-marginal-cost option once development is complete.

9.5 Institutional Framework and Governance

USFS as Lead Agency

The AHC program is a USFS program of record under the Director of Fire and Aviation Management. USFS ownership provides unified program management, a single budget line, unified training standards, and integration with the NWCG resource ordering and dispatch system. AHCs are ordered through interagency dispatch like any other national resource, available to all federal, state, and tribal fire agencies. The MQ-9 ISR capability is a USFS asset. The C-40F unit is an ANG unit under a standing USFS agreement with ~50/50 funding, modeled on MAFFS.

DOD Support Agreements

USAF/ANG/AFRC Airlift: Standing agreement modeled on MAFFS. C-130 from partner wings (153rd AW for Boise, 152nd AW for Reno, 302nd AW for Peterson); C-17 from 62nd AW (JBLM) for CONUS heavy drop, 517th/144th AS (JBER) for Alaska. CH-47 support via Army National Guard.

U.S. Army Training: MOA with TRADOC for approximately 40-80 BAC slots, 10-20 Pathfinder slots, and 15-25 Jumpmaster school slots per year at Fort Moore. Modified CCT training for selected smokejumpers coordinated with AFSOC/Special Tactics.

Rigger Support: Initial standup uses ADOS/TDY from existing RC aerial delivery units: 241st QM Co (Bde AD)(ABN) at JBER for Wainwright; 346th TADC (USAR, Bell CA) as the primary CONUS packing facility; 1161st QM Det (AD) (WA ARNG, JBLM) supplementing Boise; and potentially 19th SFG GSB (UT ARNG, Ogden) and 5th Bn/19th SFG (Watkins CO) for Boise and Peterson (pending confirmation of 92R capacity). Permanent rigger detachments at HE bases (Wainwright, Boise) for heavy-drop rigging. Long-term: USFS establishes organic rigger capability at Boise serving all CONUS bases (Section 5.1), with Army/USAF riggers transitioning to a surge-only role.

Liaison Officer Structure

Outbound USFS LNOs (4):

Position	Function
USFS LNO at Fort Moore, GA	BAC, Pathfinder, and JM school coordination, curriculum adaptation, student management.
USFS LNO at Fort Lee, VA	Rigger/QM community interface. JPADS technical integration, heavy-drop certification coordination.
USFS LNO at ABNSOTD, Fort Liberty, NC	Airdrop certification testing for new configurations (ISV fire variants, MRZR pump packages, dozer rigging, JPADS fire bundles).
USFS LNO at ACC/NAF	MQ-9 / Fire Guardian transition management, aircrew training pipeline, sensor payload integration, maintenance support.

Inbound DOD LNOs at NIFC (3):

Position	Function
USAF Airlift LNO at NIFC	Airlift planning integration with national fire dispatch. C-130/C-17 availability, strip alert rotation coordination, mission tasking.

Position	Function
24th SOW / Special Tactics LNO at NIFC	FTAC doctrine and curriculum coordination. CCT/STS embed management. Airspace management standards alignment. PJ/RQS MOU coordination. Maintained long-term even after organic FTAC capability matures.
U.S. Army LNO at NIFC	JM standards and evaluation. Rigger deployment coordination. Heavy-drop operations advisory. CH-47 airborne integration.

Legislative Pathway

Authorization spans multiple congressional committees: Agriculture Appropriations and Senate ENR / House Natural Resources (USFS fire budget); Armed Services and Defense Appropriations (DOD support, MQ-9 transfers, C-40F); Air Force force structure authorization (124th FW conversion). The recommended approach: include AHC authorization in the NDAA as a dual-use DSCA/readiness program, with appropriations split between Interior/Agriculture and Defense spending bills. Precedent: the MAFFS program.

Wildfire Consolidation Discussion

There is an ongoing policy discussion about consolidating federal wildland fire management from its current multi-agency structure (USFS under USDA; BLM, NPS, FWS, BIA under DOI) into a single organization, potentially a standalone Wildland Fire Service under DOI. Proponents note that DOI manages more total federal acreage than USFS, that NIFC is already a BLM facility, and that consolidation would eliminate duplication in training, dispatch, and aviation. Opponents note that USFS has the deeper institutional fire expertise (Missoula MTDC, 7 of 9 SJ bases, majority of IHCs, largest fire research program), that transferring ~10,000 USFS fire personnel across departments would be enormously disruptive, and that separating fire management from the land management agency creates operational seams.

The AHC concept is designed to be agency-agnostic. It requires a lead federal fire agency with authority to enter interagency agreements with DOD, order resources through the national dispatch system, and manage an aviation fleet -- functions that either USFS or a consolidated fire organization could perform. This paper recommends initial standup under USFS because it leverages existing smokejumper expertise, the established MAFFS relationship, and USFS fire aviation infrastructure. If a consolidated Wildland Fire Service is established, the AHC program could transfer with minimal structural change.

The Layered Structure of DOD Support

Viewed together, the military arrangements in this paper are not a collection of ad hoc activations but a deliberate layered structure of DOD support to wildland firefighting, running from occasional surge to standing dedicated capability. **MAFFS** is the removable-kit surge system on airlift C-130s, now additionally serving as the seasonal night-development and FTAC-insertion test bed (Sections 6.4, 6.7). The **C-40F** sits outside MAFFS entirely: a purpose-converted standing tanker with permanent belly plumbing and a native night cockpit, much closer to an even partnership between the Air Force and the wildland fire mission than to a surge kit (Section 6). The **airlift partnership** -- ANG/AFRC C-130s and C-17s -- provides AHC insertion and sustainment (Section 5.2). The **rescue partnership** -- Guard rescue squadrons and pararescue -- provides the medical contingency layer for DZ operations (Section 5.4). The **Army** contributes the JM/PF standup cadre, rigging support, and the Gray Eagle/Mojave crew

ecosystem (Sections 3.8, 5.1, 8.1). Most of this leverages existing force structure rather than requiring new units; a Pentagon reader should see the whole ask at once and recognize a spectrum of engagement, each layer earning its place through capabilities the civilian system does not provide.

9.6 ROM Cost Estimates

All figures FY2026 dollars. ROM for scale, not budget submission.

One-Time Standup Costs

Item	Estimated Cost
AHC facility construction/modification (4 bases) + chute storage	\$45-65M
MC-6 procurement (~1,000 systems incl. reserves)	\$22-28M
ISV flatbed (12-16) + MRZR D4 (36-42) + tactical trailers (12-16) procurement	\$8-11M
Cat D3 (8-10) + D4 (2-4) + airdrop platforms	\$7-10M
JPADS procurement (60-100 units)	\$12-20M
Fire Guardian aircraft acquisition (6-8 new-build MQ-9B + 10-12 Mojave STOL, incl. CGCS/SC2 ground stations)	\$420-590M
MQ-9 GCS, LRE kits, infrastructure (4 MOBs)	\$40-60M
MQ-9 sensor pod development/procurement (5 types)	\$50-70M
C-40F conversion (10-12 a/c, 737-700C w/cargo door)	\$140-200M
C-40F ANG infrastructure at Gowen Field	\$25-35M
Training programs (incl. FTAC curriculum, JM program)	\$8-12M
Fire Sentinel (12-18 surplus RQ-7B + GCS + launch/recovery)	\$5-10M
FBAN equipment (ROVER kits, displays, vehicles)	\$2-3M
Ground Recovery Detachment fleet (4 AHC bases × ~\$500K + HE adders)	\$2-3M
Total One-Time Standup	\$790-1,130M

Annual Recurring Costs (at Full Build)

Item	Est. Annual Cost
AHC personnel (320 crew + 64 HE aug. + 16 log spec. + 60 support)	\$60-78M
Army school slots (BAC, Pathfinder, JM: 65-125/yr)	\$3-5M
Proficiency jumps + C-130/C-17/CH-47 flight hours	\$12-16M
JPADS consumables and replenishment	\$5-7M
Fire Guardian operations (18 mixed-fleet aircraft, flight hrs, maint, crews, dual training pipelines)	\$45-65M
Fire Guardian LRE deployments + FBAN teams	\$6-10M
Fire Sentinel (12-18 RQ-7B, ops + personnel)	\$8-12M
C-40F operations (10-12 aircraft, ~50% USFS funded)	\$18-28M
Rigger support (permanent dets + ADOS/TDY)	\$5-7M
Equipment maint., vehicle parts, dozer replacement fund	\$12-18M
Ground Recovery Detachment personnel (~32-50 across all bases)	\$3-5M

Item	Est. Annual Cost
LNO positions (4 outbound USFS + 3 inbound DOD)	\$2-3M
International deployment support	\$2-3M
Total Annual Recurring	\$180-260M

Context: Federal wildfire suppression routinely exceeds \$2-3 billion annually. A single Type 1 wildfire can cost \$50-200M+ to suppress. If the AHC program prevents 3-5 campaign fires per year through early intervention in roadless areas, avoided suppression costs likely exceed the program's annual budget within 2-3 years of reaching full operational capability. Opportunistic prescribed fire (Section 5.1) generates additional long-term value by reducing future fire severity across treated landscapes.

For the recommended Phase 0 proof-of-concept approach (~\$35-55M standup, ~\$42-65M/yr with MQ-9B lease), see Section 8.

9.7 Implementation Timeline

Phase	Key Milestones
Year 1	Program authorization and initial funding. Interagency MOAs signed (USAF, Army, AFSOC). USFS program office established at NIFC. Site surveys. MQ-9 transfer negotiations. C-40F conversion contract. First AHC cadre selected from experienced SJs and IHC supes. LNO positions filled. 124th FW transition planning begins.
Year 2	First AHC candidates attend BAC, JM, and Pathfinder schools at Fort Moore. Base construction begins (Boise and Wainwright). First MQ-9s transferred and modified. ADOS rigger support activated; permanent rigger detachments at HE bases established. CCT embeds assigned (24th SOW, 125th STS, 22nd STS). FTAC curriculum development begins. Joint training exercises with partner ANG C-130 units. First C-40F conversion begins.
Year 3	IOC: 4 AHCs operational (2 Boise, 2 Wainwright). First fire-season deployments. MQ-9 IOC at Boise and Wainwright. USFS JMs operational. First FTACs in training. First C-40F deliveries to 124th FW. Peterson and Reno base construction. Heavy-drop training established. First biennial national exercise.
Year 4	Expansion to 8-10 AHCs across three bases. MQ-9 at 3 MOBs. First operational heavy-equipment airdrop (dozer). C-40F IOC. Pathfinder-qualified AHC managing heavy drops. Organic FTAC capability growing. CH-47 airborne operations validated.
Year 5	FOC: 15-16 AHCs across 4 bases. MQ-9 at all 4 MOBs. C-40F fully operational. HALO-qualified SJs. International deployment pilot (Australia/Canada). Program evaluation and lessons learned. Boise growth path to 5-6 crews. Second national exercise.

9.8 Key Risks and Mitigations

Risk	Sev.	Mitigation
Jump injury in fire terrain	Med	MC-6 has the lowest descent rate of any military parachute (14.5-18.5 fps). DZ selection by USFS spotters who understand fire terrain. Layered DZ preparation (Section 5.4). Annual PLF training. Robust medevac planning for every insertion.
Fire entrapment post-insertion	High	MQ-9 overwatch with staring IR providing continuous fire behavior monitoring. LCES protocols applied before every insertion. DZ doubles as initial safety zone. ATAK blue force tracking. FTAC vectors emergency retardant in seconds. Atmospheric pod detects wind shifts early. Superintendent has absolute authority to decline a jump.
C-130/C-17 unavailability (military contingency)	Med	C-40F provides non-DOD airlift for repositioning. AHCs deploy by ground/helo when airlift unavailable -- they are firefighters first, parachutists second. Multiple ANG/AFRC partner units provide redundancy. Allied airlift for international operations.
MQ-9 airspace integration	Med	MQ-9 operates at 15,000-25,000+ ft, well above airtanker/helicopter altitudes (150-500 ft AGL). FTAC-trained personnel manage deconfliction. Formalized procedures within TFRs. LRE team coordinates with ATGS.
IHC/SJ community resistance	Low	AHC explicitly meets all SIHCO IHC standards = IHC-plus. SJ community retains elite status (ram-air, FTAC, HALO). AHC serves as feeder/recruiting pipeline for SJs. SJ leadership involved in AHC program design from day one.
AHC line-of-duty death	High (impact)	Rigorous safety standards from inception. Transparent incident review. Pre-emptive messaging: AHC personnel are experienced firefighters using proven military equipment. All wildland firefighting carries inherent risk regardless of delivery method.
Cross-agency friction	Med	USFS single lead agency. Standing MOAs (not ad hoc DSCA). LNO network provides continuous coordination. MAFFS program provides proven model. ADOS rigger model avoids creating new military force structure.
HE extraction failure	Low	D3 primary (within CH-47 envelope at most elevations). D4 limited to 1-2 per HE base. Dozer may self-extract via cut road. Write-off option: \$150-200K replacement cost far below fire suppression savings.

10. Conclusion

The wildfire crisis in the western United States and Alaska is fundamentally an access problem in roadless areas, compounded by surveillance, communications, and logistics gaps. Fires that could be contained at one acre grow to campaign scale because firefighters cannot reach them in time, cannot see what they are facing when they arrive, cannot communicate reliably in terrain-masked backcountry, and cannot sustain operations without road-based resupply.

Every component of the proposed solution already exists and has been demonstrated: static-line parachute insertion (MC-6, used by Army SOF since 2006); precision GPS-guided cargo delivery (JPADS, operational with BLM Alaska smokejumpers since 2022); persistent overhead ISR (MQ-9, demonstrated by California ANG for fire-mapping); airdrop of vehicles and heavy equipment (ISV, MRZR, and bulldozers, practiced by the 82nd and 11th Airborne Divisions); multi-role tanker/transport (737 Fireliner, operational in the U.S. and Australia); complex airspace management (USAF Combat Controllers); and blue force tracking (ATAK). The innovation is not in any single technology but in integrating these proven capabilities into a coherent wildfire response package under civilian fire management authority.

The layered safety architecture -- Fire Guardian overwatch, comms relay, tiered ATAK blue force tracking, FTAC airspace management, layered DZ preparation, airtanker standby during insertion, and atmospheric early warning -- directly addresses the failure modes that killed nineteen firefighters at Yarnell Hill. The CARP airdrop methodology, refined by real-time Fire Guardian wind data and pre-drop IR clearance, enables insertion through the heavy smoke that grounds helicopters -- delivering firefighters precisely when and where they are most needed. These safety systems benefit all firefighters on an incident, not just AHC personnel.

Beyond suppression, the AHC enables opportunistic prescribed fire in wilderness areas that are otherwise untreatable, converting a suppression capability into a landscape-scale fuels management tool. International deployments to Canada, Australia, and European partners extend the program's value, build interoperability, and maintain crew proficiency year-round.

The career progression from ground firefighter through IHC, Airborne Hotshot, and smokejumper -- with FTAC and HALO qualifications at the apex -- creates a professional development pipeline that strengthens the entire wildfire workforce. The explicit requirement for AHCs to meet all IHC standards ensures the Airborne Hotshot designation is earned, not granted.

In 1945, the Triple Nickels proved that military airborne capability could be applied to wildfire. Eighty-one years later, with better parachutes, precision cargo systems, persistent ISR, digital communications, and hard-won lessons from firefighter fatalities, it is time to build that bridge again.

Appendix A: Consolidated Infrastructure Reference

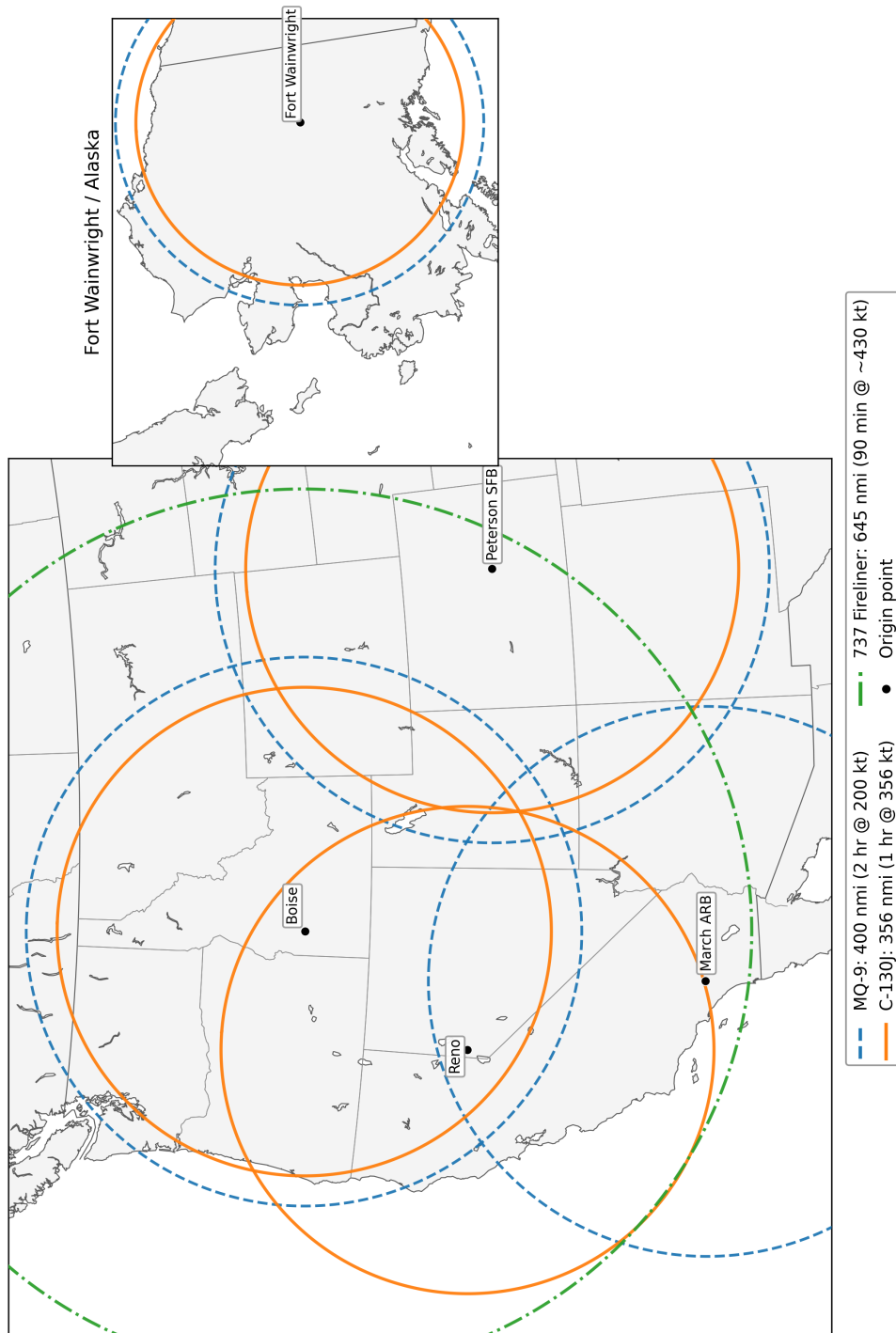
All program elements by location, shown on the map below and detailed in the tables that follow. All C-130 and C-17 units across CONUS and Alaska are depicted regardless of direct program involvement.

Coverage Map: Range Rings from Selected Bases

MQ-9 (400 nmi / 2 hr at 200 kt), C-130J (356 nmi / 1 hr at 356 kt), and 737 Fireliner/C-40F (645 nmi / 90 min at ~430 kt) range rings from Boise, Reno, Peterson SFB, March ARB, and Fort Wainwright. Rings are geodesic distances on WGS84.

Range Rings from Selected Bases

Durations: MQ-9 = 2 hr; C-130J = 1 hr; 737 Fireliner = 90 min. Fireliner speed is a 737-300 planning assumption; rings are geodesic distances on WGS84, Western U.S.



Alaska

Location	Type	Unit / Organization	Notes
Ft. Wainwright	AHC Base	USFS Airborne Hotshots (4 AHC at full build)	HE base. Co-located with BLM SJs.
Ft. Wainwright	SJ Base	BLM Alaska Smokejumpers (~80 SJs)	Existing. JPADS-2K operational.
Eielson AFB	MQ-9 MOB	USFS Fire Guardian (2 orbits / 6 a/c)	26 mi from Wainwright. BLOS-capable. Active USAF base.
JBER	Airlift	517th AS / 144th AS (C-17 Globemaster III)	Active duty + AK ANG.
JBER	Airlift (supp.)	211th RQS (AK ANG) HC-130J Combat King II	Airdrop-qualified. Can deliver SJ pathfinders or small AHC.
JBER	Rigger	241st QM Co (Bde AD)(ABN) 11th Airborne Division	Primary rigger support for Wainwright AHC.
JBER	PJ / Rescue	212th RQS (AK ANG, 176th Wing)	Freefall PJs. FTAC training partner; medical embed. Fire medical MOU.
Fairbanks area	Air Attack	Fairbanks Tanker Base	Existing USFS infrastructure.

Idaho

Location	Type	Unit / Organization	Notes
Boise (NIFC)	AHC Base	USFS Airborne Hotshots (5-6 AHC at full build)	HE base. National coord hub.
Boise (NIFC)	SJ Base	BLM Great Basin SJs (~75-80 SJs)	Existing at NIFC.
Boise (NIFC)	MQ-9 MOB	USFS MQ-9 Det. (1-2 orbits / 3-6 a/c)	NIFC direct ISR tasking.
Boise (Gowen)	C-40F Unit	124th FW, ID ANG (10-12 C-40F)	Converted from A-10. MAFFS integration.
Boise	Rigger	Permanent USFS-funded det. (4-6 riggers)	HE rigging on-site. ADOS surge from CA units.
McCall	SJ Base	USFS McCall SJs	Existing. ~100 mi north.
Grangeville	SJ Base	USFS Grangeville SJs	Existing.
Boise	Air Attack	NIFC / Boise Tanker Base	National coordination center.

Nevada

Location	Type	Unit / Organization	Notes
Reno	AHC Base	USFS Airborne Hotshots (3 AHC at full build)	No HE. Sierra/Great Basin.
Reno	Airlift	152nd AW, NV ANG (C-130H, MAFFS)	Co-located. Primary C-130.

Location	Type	Unit / Organization	Notes
Moffett, CA	Airlift (supp.)	129th RQW (CA ANG) HC-130J Combat King II	~220 mi. Airdrop-qualified; fire-certified since 2008.
Reno	Rigger (ADOS)	346th TADC (USAR, Bell CA)	~450 mi. Box truck from CA home station.

Colorado

Location	Type	Unit / Organization	Notes
Peterson SFB	AHC Base	USFS Airborne Hotshots (3 AHC at full build)	No HE. Central Rockies.
Peterson SFB	Airlift	302nd AW, AFRC (C-130H, MAFFS)	Co-located.
Peterson SFB	MQ-9 MOB	USFS MQ-9 Det. (1-2 orbits / 3-6 a/c)	Near Fort Carson.
Peterson SFB	Rigger	TBD -- see 5th Bn/19th SFG and 19th SFG GSB below	Potential solution pending 92R capacity confirmation.
Fort Carson	Army	10th SFG (MC-6 heritage); 4th Infantry Division	Institutional ABN expertise; CH-47 potential.
Watkins, CO	Rigger (potential)	5th Bn, 19th SFG(A) (UT ARNG element)	~75 mi from Peterson. Requires confirmation of 92R rigger capacity.

Utah (Support -- Requires Confirmation)

Location	Type	Unit / Organization	Notes
Ogden	Rigger (potential)	Group Support Battalion, 19th SFG(A) (UT ARNG)	~300 mi from Boise; ~500 mi from Peterson. Requires confirmation of 92R rigger capacity.

California (Support Units)

Location	Type	Unit / Organization	Notes
March ARB	MQ-9 MOB	USFS MQ-9 Det. (2 orbits / 6 a/c)	Co-located with 163rd ATKW (CA ANG). 163rd is designated USAF MQ-9 surge wing.
March ARB	MQ-9 Surge	163rd Attack Wing (CA ANG, MQ-9 FTU)	Primary USAF surge support wing for USFS MQ-9 ops. BLOS from March GCS.
Channel Islands	Airlift	146th AW, CA ANG (C-130J, MAFFS)	Supplementary C-130 for Alaska and backup.
Moffett Federal Airfield	PJ / Rescue	129th Rescue Wing (CA ANG) HC-130J / HH-60	CA fire region medical/ insertion. Fire medical MOU. HC-130J supp. airlift for Reno.
Bell, CA	Rigger	346th TADC (USAR)	Home station packing for Reno + surge.
JFTB Los Alamitos	Rigger (supp.)	128th QM Det (AD) (CA ARNG)	Small unit. Supplements 346th TADC as needed.
Redding	SJ Base	USFS Region 5 SJs	Existing.
Redding	Air Attack	Redding Air Attack Base	Major USFS air attack.

Oregon / Washington (Support)

Location	Type	Unit / Organization	Notes
Redmond, OR	SJ Base	USFS Redmond SJs	Existing.
Winthrop, WA	SJ Base	USFS North Cascades SJs	Existing.
Portland ANGB	CCT / STS	125th STS (OR ANG)	PNW FTAC training partner. ~350 mi from Reno.
Portland ANGB	PJ / Rescue	304th RQS (AFRC)	PNW PJ medical contingency partner. Fire MOU.
Portland ANGB	AFE Support	OR ANG AFE billets/facilities supporting 125th STS	1P0X1 personnel can qualify as airdrop load inspectors via 92R Phase 1.
JBLM, WA	Airlift	62nd AW (C-17)	CONUS heavy-drop partner.
JBLM, WA	CCT / STS	22nd STS	PNW CCT. Complements 125th. Near 62nd AW.
JBLM, WA	Rigger	1161st QM Det (AD) (WA ARNG)	~430 mi from Boise. Co-located with 62nd AW.
La Grande, OR	Air Attack	La Grande Air Attack Base	Major PNW air attack.

Montana

Location	Type	Unit / Organization	Notes
Missoula	SJ Base	USFS Missoula SJs + Aerial Fire Depot + MTDC	Largest SJ base. Parachute R&D; center.
W. Yellowstone	SJ Base	USFS W. Yellowstone SJs	Existing.
Great Falls	Airlift	120th AW, MT ANG (C-130H, converting to J)	Supplementary lift for Boise and Alaska.
Missoula	Air Attack	Missoula Tanker Base	Major N. Rockies air attack.

Wyoming (Support)

Location	Type	Unit / Organization	Notes
Cheyenne	Airlift	153rd AW, WY ANG (C-130H, converting to J; MAFFS)	Primary C-130 partner for Boise AHC.

Schoolhouses

Location	School	AHC / SJ Use
Fort Moore, GA	Basic Airborne Course Pathfinder School Jumpmaster School	All AHC (BAC); selected AHC (Pathfinder, JM)
Fort Lee, VA	92R Parachute Rigger Course; Quartermaster School	Rigger training; JPADS curriculum. USFS LNO.

Location	School	AHC / SJ Use
Fort Liberty, NC	ABNSOTD (Airborne and SOF Test Directorate)	Airdrop certification for new equipment configurations.
Various (AFSOC)	Modified CCT curriculum (via 24th SOW)	FTAC qualification for selected smokejumpers.
Yuma Proving Ground, AZ	Military Free-Fall (MFF) School (~4 weeks)	HALO qualification for selected FTAC SJs (~3-5 slots/yr initially).

ANG / AFRC C-130 Wings

Unit	Location	Type	MAFFS	AHC Role
120th AW	Great Falls, MT	ANG, C-130H (converting J)	No	Boise/Wainwright strip alert rotation; Boise supp.
130th AW	Charleston, WV	ANG, C-130J	No	Available for rotation
133rd AW	Minneapolis, MN	ANG, C-130H	No	Available for rotation
136th AW	NAS JRB Ft Worth, TX	ANG, C-130J	No	Boise strip alert rotation. 82nd ABN airdrop proficient.
139th AW	St. Joseph, MO	ANG, C-130H	No	Available for rotation
143rd AW	Quonset Point, RI	ANG, C-130J	No	--
145th AW	Charlotte, NC	ANG, C-130H	No	--
146th AW	Channel Islands, CA	ANG, C-130J	Yes (2)	Boise/Wainwright strip alert rotation; AK supp.
152nd AW	Reno, NV	ANG, C-130H	Yes (2)	Reno AHC 1-3 hr standby. Exempt from Boise rotation.
153rd AW	Cheyenne, WY	ANG, C-130H (converting J)	Yes (2)	Boise strip alert rotation (primary Boise partner).
165th AW	Savannah, GA	ANG, C-130H	No	--
182nd AW	Peoria, IL	ANG, C-130H	No	Available for rotation
302nd AW	Peterson SFB, CO	AFRC, C-130H	Yes (2)	Peterson AHC 1-3 hr standby. Exempt from Boise rotation.
314th AW	Little Rock, AR	Active, C-130J	No	C-130J FTU. Training.
317th AW	Dyess, TX	Active, C-130J	No	Available if needed.
910th AW	Youngstown, OH	AFRC, C-130H	No	--
911th AW	Pittsburgh, PA	AFRC, C-130H	No	--
913th AG	Little Rock, AR	AFRC, C-130J	No	--
934th AW	Minneapolis, MN	AFRC, C-130H	No	--
103rd AW	E. Granby, CT	ANG, C-130H	No	--
123rd AW	Louisville, KY	ANG, C-130J	No	Available for rotation

MAFFS column shows number of MAFFS systems assigned (8 total nationally, 2 per wing). Each MAFFS wing has 6-9 total airframes; MAFFS uses only 2, leaving ample non-MAFFS aircraft for AHC airdrop. 'Available for rotation' = airdrop-qualified or convertible; suitability for AHC strip alert rotation depends on airdrop currency and willingness.

C-17 Wings

Unit	Location	Type	AHC Role
62nd AW	JBLM, WA	Active	CONUS heavy-drop primary.
437th AW	Charleston, SC	Active	Available for surge.
60th AMW	Travis AFB, CA	Active	Available for surge.
436th AW	Dover AFB, DE	Active	Available for surge.
97th AMW	Altus, OK	Active	C-17 FTU. Training only.
144th AS	JBER, AK	ANG	Alaska primary. C-17 standby for AHC. 11th ABN support.
517th AS	JBER, AK	Active	Alaska primary (with 144th).
172nd AW	Jackson, MS	ANG	Available for surge.
105th AW	Stewart ANGB, NY	ANG	Available for surge.
445th AW	Wright-Patterson, OH	AFRC	Available for surge.
452nd AMW	March ARB, CA	AFRC	Available for surge. Co-located with MQ-9 MOB.
514th AMW	McGuire, NJ	AFRC	Available for surge.

Appendix B: Small UAS Integration Detail

This appendix provides detailed specifications for the Fire Sentinel (RQ-7B) concept referenced in Sections 5.6 and 8.3. Fire Sentinel is an optional program element, included in COA 5 (Maximum Capability), that adds Group 3 tactical UAS capability complementing the strategic Fire Guardian.

B.1 RQ-7B Shadow: Platform Background

The AAI RQ-7B Shadow is a Group 3 tactical UAS operated by the US Army (over 1.3 million flight hours across deployments in Iraq, Afghanistan, and training) from introduction in 2002 through retirement on 19 March 2024. Key specifications:

Parameter	Specification
Endurance	6-9 hours
Operating altitude	5,000-15,000 ft AGL (typical: 8,000-10,000 ft day)
Speed	110 kt cruise
Data link range	~67 nmi LOS, C-band
Payload	60 lbs external
Launch	Pneumatic catapult (no runway required)
Recovery	Tactical Automatic Landing System (TALS) with arresting wire; ~170 ft landing run; earlier variants supported parachute recovery
Crew	2-person GCS (pilot + sensor operator)
Current operators	Italy (4 systems, 2010), Turkey, Romania, Sweden, Australia

B.2 Fire Sentinel Payload Configuration

The 60-lb payload budget accommodates a fire-configured sensor and communications package:

Component	Weight	Function
EO/IR sensor ball (POP-300 or upgraded)	~25 lbs	Visible and thermal imagery for fire behavior observation and DZ reconnaissance.
Miniaturized comms relay (SDR + ATAK gateway, e.g. TrellisWare TSM Shadow or Silvus StreamCaster)	~5-8 lbs	VHF/UHF radio relay and ATAK mesh extension for comms dead-spot coverage.
Atmospheric sensors (anemometer, T/RH probe, PM2.5 particulate)	~3-5 lbs	Wind speed/direction at altitude; fire-weather data feeding behavior models.
Mounting hardware, wiring, small battery	~2-5 lbs	System integration.
Total	~35-43 lbs	of 60-lb budget

The payload is roughly the 80% solution for division-level fire ISR. Capabilities not included (vs. Fire Guardian): wide-area staring IR, precision dispensing containers, full atmospheric profiling, SATCOM/BLOS C2, and multi-hour persistence. These are retained for the Fire Guardian strategic tier.

B.3 Fire Sentinel Operations

A Fire Sentinel team (5-6 personnel: 2 operators, 2 maintainers, 1 FBAN, 1 launch/recovery) deploys with equipment by truck from Boise (Phase 0 home base) to within approximately 60 nmi of a fire. Total deployment timeline: 4-12 hours including drive time and setup. The pneumatic launcher and arresting wire recovery gear transport on Humvees or equivalent USFS trucks. Recovery area requires approximately 170 ft of flat ground on a Forest Service road, meadow, or dirt strip; no pavement required.

Fire Sentinel data feeds into the same ATAK/TAK ecosystem as Fire Guardian, displayed on the same FBAN monitors at the ICP. When multiple Fire Sentinels support a large fire, the full 2-person FBAN team manages the integrated picture. Altitude deconfliction: Fire Sentinel below 15,000 ft, Fire Guardian above 15,000 ft, airtankers/helicopters below 5,000 ft.

B.4 Manpower

Full program manpower (COA 5 full build):

Base	Aircraft	Personnel	Notes
Boise (Phase 0)	4-6	~15-20	Initial fielding. 2-3 aircraft operational simultaneously.
Reno (Phase 1)	4-6	~15-20	If proven valuable at Boise.
Peterson (Phase 1)	4-6	~15-20	If proven valuable at Boise.
Total (Phase 1)	12-18	~45-60	Full build under COA 5.

Personnel recruited from separating Army 15E UAS operators as the RQ-7B fleet divests. The Army's 2nd Battalion, 13th Aviation Regiment at Fort Huachuca trained thousands of operators over the RQ-7's service life; a pool of trained operators separating from service is available for USFS hire.

B.5 International Export Framework

Fire Sentinel is particularly suited to **compact, fire-prone nations** where multiple small operating sites can provide national coverage despite the system's ~60 nmi LOS range. The RQ-7B is considered dated for near-peer military use -- the US Army divested precisely because it is insufficient for contested airspace -- but fully adequate for non-combat surveillance missions (fire ISR, maritime patrol, border surveillance) that smaller fire-prone nations actually need.

Primary markets: Greece, Spain, Portugal, Croatia, and other compact Mediterranean fire-prone nations (detailed in Section 9.4). Italy and Turkey already operate RQ-7 variants and could add fire-configured pods to existing military systems. Acquisition cost for surplus RQ-7B under FMS is approximately \$2-4M per aircraft, a fraction of new MQ-9 acquisition. Total fleet and infrastructure for national fire coverage can be achieved for \$30-100M per nation.

Secondary markets: Large continental allies (Canada, Australia) face the same scale issue as the US: their geography doesn't support distributed Fire Sentinel networks. For them, MQ-9 Fire Guardian is the better strategic fit. Fire Sentinel might serve as a tactical supplement to MQ-9 for specific regional operations (e.g., BC coastal fires, Tasmanian forest fires) but is not the primary capability.

Changelog

This paper, **Next-Generation Aerial Wildland Firefighting**, supersedes the *Airborne Hotshot Crew (AHC) Integrated Wildfire Response Concept* paper (versions 1.0 through 6.0, 15-19 April 2026). The new paper elevates Fire Guardian to a co-equal primary concept with AHC, adds a Courses of Action framework for decision-support, incorporates climate change as a primary problem driver, expands the international cooperation discussion (particularly US-Canada mutual aid), differentiates Fire Sentinel (Group 3 tactical UAS) from smaller small UAS applications, and restructures the document to reflect its expanded scope. All substantive content from the v6.0 predecessor is preserved.

Ver.	Date	Changes
v6.0 (predecessor)	04-19	<i>Final version of predecessor AHC paper.</i> Phase 0 proof-of-concept elevated to standalone section. Fire Guardian C2 architecture (March BLOS hub, Boise LOS/LRE, Eielson BLOS for AK). Fire Sentinel (RQ-7B) introduced. Army JM/PF standup cadre. ATAK retardant pilot via MAFFS. FBAN ground integration. 3-per-orbit baseline; 18 a/c initial fleet. Eielson AFB for AK Fire Guardian. Precision dispensing containers. Pod development timeline. C-40F permanent belly plumbing and minimal military modification. ROM: standup \$440-650M, annual \$170-240M.
0.9	04-22	<i>Interim accretive restructure (superseded by v1.0).</i> Title and abstract changed to new paper framing; climate section (1.2), capability gap (1.3), and COA section (16) added; Canada mutual aid and Mediterranean Fire Sentinel export framework added to Section 14; AHC equipment revised (CVC coverall, FAST helmet with goggles, no fire-rated face shield); Malmstrom references corrected to Great Falls ANGB; A-10 extension noted; C-40F repositioned as separate optional element. <i>Preserved v6.0 section ordering (AHC at Section 3, Fire Guardian at Section 8); did not complete the structural reorganization agreed in planning.</i>
1.0	04-23	Full structural restructure as agreed in planning phase. Fire Guardian promoted to Section 3 (was Section 8); new 3.7 Standalone Value subsection argues Fire Guardian justifies itself independent of AHC. AHC moved to Section 4 (was Section 3). New Section 5 Supporting Capabilities consolidates prior Sections 5 (Rigging), 6 (Airlift), 9 (Airspace/Safety), 11 (Rx Fire) as subsections 5.1, 5.2, 5.4, 5.5; new 5.3 Enhanced Smokejumper Integration (Reno/Peterson bases, expanded personnel, C-130 integration, HALO/FTAC expansion, seasonal eastern detachment); new 5.6 Small UAS Integration with Group 1/3/5 distinction. C-40F to Section 6 (was Section 7); new 6.6 Integration with Fire Guardian and AHC. COAs to Section 7 (was Section 16, placed before Phase 0 for decision logic). Phase 0 to Section 8 (was Section 4). New Section 9 Implementation consolidates prior Sections 10 (CONOPS), 12 (Basing), 13 (Exercises), 14 (International), 15 (Institutional), 17 (Costs), 18 (Timeline), 19 (Risks) as subsections 9.1 through 9.8. Conclusion to Section 10. Added Appendix B: Small UAS Integration Detail with RQ-7B platform background, payload configuration, operations, manpower, and international export framework. All cross-references updated throughout. All content from v6.0 predecessor and v0.9 accretive additions preserved.

Ver.	Date	Changes
1.1	04-24	Corrections and refinements. Fixed circular reference in 3.2 (now points to 8.2 Phase 0 C2 Architecture). Cleaned up awkward parenthetical cross-references introduced during v1.0 restructure (e.g., 'Section 5.2 (drop methodology)' shortened to 'Section 5.2'). Fixed cross-references that incorrectly pointed to Section 5.4 for exercise content, which is in Section 9.3. Fixed cross-reference for ATAK retardant drops to point to Section 6.6 and Section 8 (Phase 0). Fire Sentinel deduplication: Removed detailed Fire Sentinel content from Section 3.5 (replaced with brief pointer); detailed content remains in Section 5.6 and Appendix B as canonical references. Rigger model revised: Section 5.1 removed the rigger TDY recovery teams traveling to fire areas; AHCs now pack out their own canopies, transport to base, perform chute shake at base, and store in UPRBs for periodic bulk transport to home rigging station for repack via box truck. HALO supplemental oxygen: Section 5.4 added explicit note on FAR 91.211 supplemental oxygen requirements above 12,500 ft AGL, continuous use above 14,000 ft, and pre-oxygenation procedures for HALO insertions above 15,000 ft. 124th FW deduplication: Section 6.3 reduced to brief intro pointing to Section 7.6 for the full host unit candidate discussion and 124th FW forward option. Section 4.6 vehicle packages revised: Standard package = 2x MRZR D4 with type-3 wildland skid + 1-2 tactical trailers + JPADS-2K supply bundles, all in one C-130 sortie via JPADS multi-load release; augmented package adds 1x flatbed ISV (5-pax GM Defense variant), requiring C-130J-30 or two standard C-130 sorties. ISVs limited to HE bases and augmented missions; vehicle procurement reduced from 20-24 ISVs to 12-16 flatbed ISVs with 36-42 MRZR D4s. Airlift partnership table updated to indicate which units operate the C-130J-30 stretched variant (146th AW, 130th AW, 165th AW, 143rd AW are confirmed J-30 operators) versus standard 40-ft cargo bay C-130; 152nd AW J transition request 2019 not yet effective; 153rd AW J transition status to be confirmed.
1.2	04-27	Operational additions. New Section 4.7 Ground Recovery Detachment at each AHC base: 8-12 personnel (10-15 at HE bases) covering vehicle and personnel recovery, forward supply runs, and serving as trainee pathway into AHC. Per-base fleet: 2x F-550 with trailers + 3x 15-pax vans (~\$400-600K); HE bases add 1x Class 8 commercial truck with detachable lowboy for dozer recovery (~\$700-900K total). GR Det vehicle fleet (\$2-3M) and personnel (\$3-5M/yr) added to cost tables. Section 4.6 dozer extraction language revised with priority sequence (drive to road / cut own road / CH-47 sling-load / disassembly + multi-load / CH-53K / write-off); IHCs explicitly noted as not operating dozers (AHC parachute dozer delivery is novel). Dozer crew composition formalized: 4-6 personnel parallel to AHC, BAC-qualified, lead also Pathfinder-qualified for sling-load LZ management. Vehicle recovery responsibility assigned to GR Det rather than dozer crew. Sections 4.7 (HE Support) and 4.8 (Equipment) renumbered to 4.8 and 4.9. New Section 3.6 Pod Sharing for Multi-Platform Integration: framed as Year 3+ development opportunity (not Phase 0/1 commitment); comms relay and atmospheric sampling pods on lead planes, ATGS King Airs, RC-26 Metroliners; sensor pods explicitly excluded due to operator workload and bandwidth constraints; OV-10 noted as lower priority due to aging fleet. Phase 0 cross-reference in cost section corrected from Section 3 to Section 8.
1.3	04-28	Phase 0 alignment refinements. Fire Sentinel reframed as export-primary in Phase 0 (Section 8.3). Resolves COA inconsistency: Fire Sentinel appears only in COA 5 for US domestic use, but Phase 0 develops it as an export-ready package for Mediterranean fire-prone partners (Greece, Spain, Portugal, Italy, Croatia). US Phase 0 development costs (~\$30-50M) positioned for partial recovery through cost-recovery FMS pricing. Domestic deployment under COA 5 becomes a low-marginal-cost option since development is complete and partially recovered during Phase 0. Phase 0 Fire Sentinel reduced from 4-6 to 4 airframes consistent with export-development scope. Phase 0 ISVs added: 1-2 flatbed ISVs (GM Defense 5-pax variant) added to Phase 0 force structure to validate augmented vehicle package, flatbed LVAD certification for AHC use, and operational data on when ISV is needed vs. MRZR-only. Initial Ground Recovery Detachment added to Phase 0 (6-8 personnel at Boise) to validate trainee pathway and recovery model. Section 9.4 Mediterranean export framework expanded to explicitly link Phase 0 development to export sales pipeline. Section 7.5 (COA 5) notes Fire Sentinel low-marginal-cost addition once Phase 0 development is complete. Phase 0 ROM updated: \$40-65M -> \$45-70M standup; \$30-50M -> \$32-52M/yr recurring; reflects ISV addition and Fire Sentinel export-development scope.

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1.4	04-29	Post-Epic Fury acquisition rework. New Section 3.8 Airframe Acquisition Strategy: Operation Epic Fury losses (24 MQ-9A destroyed; USAF fleet ~135 vs. 189-aircraft floor; FY27 NDAA divestment prohibition; MQ-9A production line closed) eliminate the divested-MQ-9A acquisition path this concept previously assumed. New strategy: Phase 0 leases 3 MQ-9B SkyGuardian (civil-certifiable STANAG 4671, flight-into-known-icing qualified, ATLC, 40+ hr endurance, GA-ASI instructor crews included); target fleet is owned 6-8 MQ-9B + 10-12 Mojave STOL (586-ft dirt takeoff / 335-ft landing, UH-60-portable ground support, C-130 transportable, 3,600-lb payload preserving pod suite, forward-basing from FS infrastructure); divested Army Gray Eagle (FY28 ATI retirements) presented as optional bridge only, not committed fleet. Vendor-reality note added: no US competitor at required capability (CCA-class platforms wrong tool); lease-to-own structured to preserve negotiating leverage. Section 3.3 surge architecture rewritten: dual Guard pools -- ANG MQ-9 crews surge MQ-9B via 2-4 wk differences course (RAF Protector precedent; ATLC removes LRE landing qualification burden); ARNG Gray Eagle 25M operators surge Mojave (shared 25M/SC2 ecosystem); GA-ASI contractor crews during lease phase; CGCS/Block 30-50 non-interoperability flagged as planning assumption; post-Epic Fury crew-to-airframe surplus and separating-crew hiring pool noted. Costs updated throughout: COA 1 \$180-260M -> \$600-850M standup; COA 2 \$720-1,030M; COA 3 \$820-1,170M; COA 4 \$920-1,320M; COA 5 \$1,020-1,490M; annual figures raised ~\$10-20M for dual pipelines; Section 9.6 aircraft line now \$420-590M (new-build mixed fleet + ground stations), program standup total \$790M-1.13B, annual \$180-260M. Phase 0 ROM: \$35-55M standup + \$42-65M/yr (lease shifts aircraft cost from standup to recurring). Abstract and Section 8.1 updated to leased MQ-9B.
1.5	07-15	Broader fleet and night operations package. New Section 6.7 The Broader Airtanker Fleet and Night Aerial Attack: contracted LAT/VLAT fleet context (aging conversions, finite feedstock, Nov 2025-May 2026 DC-10 grounding as fragility example, only 8 MAFFS systems); explicit scope statement deferring recapitalization and contract reform to dedicated analysis; two levers this paper enables -- fleet-wide ATAK integration and night aerial attack. Night fixed-wing aerial attack named as Phase 1 objective (no fixed-wing night retardant delivery has ever been operational anywhere; rotary precedent mature: Victoria NFAP 2015-16 approval through first NVG initial attack 2019-20 and CASA CH-47 approval 2022; SoCal QRF 24/7/365 with ~60% of hours at night; CAL FIRE Firehawk gates; Palisades Fire Jan 2025 night ops credited with stopping Mandeville Canyon run). TFR deliberately designed out (pre-planned corridor operations flown on HUD/EVS/SVS against Fire Guardian IR-validated ATAK corridors; RNP AR analogy); C-40F specified with HUD, EVS, SVS, and NVG cockpit at conversion. Go/no-go chain (Fire Guardian on station as hard gate, validated corridor with auto-abort, ~300-ft night floor, sensor minima not illumination minima, exclusive block time, currency, terrain-class gating, surface wind data) and five-rung test ladder (rotary partnership, MAFFS water drops over benign terrain, graduated complexity, C-40F native, 1-2 premium night contracted LATs on modern airframes). New MAFFS dual-role concept: FTAC stick deployment via aft ramp (standard HALO/HAHO exit, usable with MAFFS loaded) or right paratroop door while carrying full retardant load; FTAC inserts then controls its own delivery aircraft's drops; named Phase 0 test objective (W&B;,, egress, certification unvalidated); C-40F and contracted LATs explicitly excluded as jump platforms. Night pathfinder insertion named as Phase 1 objective (Section 5.4): 2-4 specialist-tier jumpers, night HAHO/HAHO to Fire Guardian-surveyed DZ, ground/sensor-confirmed-fire gate, crawl-walk-run maturation; night AHC mass tactical explicitly deferred indefinitely. Specialist tier unified (Sections 5.3, 5.4): FTAC + MFFPC + ATIC for all ~15-25 tier members; MFFPC night/oxygen/equipment jumps included at graduation; ATIC (3-week Yuma follow-on) trains night oxygen HAHO onto unmarked blacked-out DZs and night GPS-guided bundle employment. Oxygen as smoke protection added to 5.4: mask-on-to-the-deck doctrine, exposure concentrated under canopy rather than freefall, eye protection and bottle duration flagged as residual planning factors. COA 2 value proposition (Section 7.2): cheapest COA buying both degraded-visibility capabilities; stated as defensible constrained-budget landing spot. Section 3.7 and Phase 0 growth path (8.4) cross-reference the named night objectives; Phase 0 force table adds MAFFS dual-role trial.

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1.6	07-15	MAFFS expansion and DOD-support synthesis. Section 4.5, new FTAC Alert Element at MAFFS Operating Locations: 2-jumper FTAC element attaches to the MAFFS Air Expeditionary Group at its activated operating location, converting a co-located tanker into an initial-attack package (element inserts from the MAFFS ship and controls the retardant runs of the aircraft that delivered it). Sequenced incrementally: co-located MAFFS/SJ bases first (152nd Reno, 302nd Peterson, drawn from resident jumpers), daylight first, night as the night program matures, non-co-located wings (146th Channel Islands, 153rd Cheyenne) later given forward-deployment overhead; gated on MAFFS activation -- an opportunistic accelerator, not a standing overnight guarantee. Section 6.4, expanded MAFFS identity: a second identity named openly alongside last-resort surge -- seasonal baseline capability flying scheduled night-development and FTAC-insertion missions regardless of commercial-fleet saturation; requires Air Force buy-in and a rethink of the commercial-competition activation gate for these mission sets; defensible because neither capability exists in the commercial fleet. Section 6.4, later-phase procurement note: contingent on the expanded MAFFS role (not Phase 0), one additional C-130 (J or J-30) per participating MAFFS wing, fire-program funded, sized to the lengthening 4-6 month season under a constant MAFFS-system count; single-airframe increment deliberately limits added personnel/infrastructure footprint and folds into each wing as dual-use airlift depth; multi-year acquisition sequenced after the expanded role is demonstrated, J-30 preferred where it aligns with a wing's transition. Section 9.5, new synthesis The Layered Structure of DOD Support: MAFFS (surge + seasonal test bed), C-40F (standing dedicated tanker outside MAFFS, near-even Air Force/fire partnership), airlift partnership, rescue partnership, and Army contributions framed as a deliberate spectrum from occasional surge to standing capability; pointer added from Section 6.7.