Air Force Fixed-Wing Rescue

A Multifaceted Approach for Full-Spectrum Personnel Recovery

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The US Air Force has a rich heritage of highly effective rescue forces supporting global operations. In the past decade, the political and economic landscapes have changed significantly, requiring a retooling of both equipment and tactics for Air Force rescue. Imagine, for example, that an expeditionary rescue squadron located in the Horn of Africa (HOA) receives word that a remotely piloted aircraft carrying a sensitive payload has gone down in central Ethiopia. The Combined Joint Task Force–Horn of Africa (CJTF-HOA) commander requests recovery of the payload, but he is under political pressure to prevent any show of military presence in the area. These concerns eliminate the possibility of dispatching a Guardian Angel (GA) team via CH-53 helicopters or via HC-130 airdrop to carry out a recovery. Thankfully, the squadron commander has a solution. In 30 minutes, one pilot and two pararescuemen take off in a less-conspicuous light aircraft. Touching down on a dirt road near the incident site, it garners no special attention because the locals have become accustomed to bush pilots delivering hunters, scientists, medicine, and other services to remote areas. In a matter of minutes, the pararescuemen return to the aircraft with the sensitive equipment and depart into the African sky—mission accomplished.

This scenario is notional, but the concept is entirely plausible. Present-day personnel recovery (PR) operations involve a spectrum of use neither envisioned nor em-

braced by the current aircraft and tactical construct in Air Force rescue. To meet present and future operational demands, the service must shift its tactics and equipment to offer more flexible options to commanders during the execution of America's no-fail missions at home and abroad. Changes in the geopolitical climate, global economic state, and civil support policies demand an evolution in equipment and tactics to ensure Air Force rescue's viability in today's and tomorrow's state affairs. The HC-130 "King" has served as the Air Force's pillar fixed-wing rescue asset since its introduction late in the Vietnam War. This aircraft brings a host of advantages to its very familiar operating scenarios but leaves specific capability gaps in three areas: access, visibility, and utility. Bridging these gaps would involve introducing a small fleet of varied, light fixed-wing aircraft into existing deployed and garrison units flying HC-130s. The concept of a blended fixed-wing rescue squadron applies to major combat operations, low-intensity conflicts, influence operations, and support to civil authorities throughout the range of military operations. This article examines fixed-wing rescue from a historical perspective, identifies operational shortfalls, and presents the advantages of varied fixed-wing platforms through case-study analysis and a focus on irregular warfare (IW).

History

Currently, the Air Force inventory includes three major weapons systems (the HC-130, HH-60, and GA) having the sole mission of meeting the PR requirements of US combatant commanders.[1] The fixed-wing workhorse of this elite operational community, the HC-130 King, entered the inventory in 1967 to fill multiple roles in the recovery of downed aircrews.[2] HC-130s performed diverse missions, including recovery of ground personnel using the ingenious Skyhook system, simultaneous refueling of two rescue helicopters in flight with a wing-mounted hose-and-drogue system, airborne mission command of PR operations, delivery of specialized aerial packages, and other roles. These missions, with the exception of Skyhook, remain mostly intact today. From its inception in the late 1960s to the present, the King has provided rescue coverage for the National Aeronautics and Space Administration's manned spaceflight program, ensured the safe ocean passage of innumerable fighter aircraft, and furnished alert coverage for US operations around the globe. Wherever American military personnel go, Air Force rescue and the HC-130 have kept the ultimate promise that they will come home.

During the past decade, the United States has found itself in almost continuous conflict spanning the entire range of military actions from major combat operations to counterinsurgency and ideological warfare. The King has deployed constantly since 1993, supporting such major operations as Northern Watch, Southern Watch, Iraqi Freedom, Enduring Freedom (including engagements in both Afghanistan and the Horn of Africa), and many others. Despite these deployments, the HC-130 has also supported numerous humanitarian and disaster-relief operations, including Hurricanes Katrina, Rita, and Ike. As the Air Force's premier fixed-wing rescue asset, it has fulfilled roles on the front lines and the home front, facilitating the recovery of US and coalition forces and winning the hearts and minds of people around the globe. Present operations find Air Force HC-130s operating regularly on four continents (North America, South America, Africa, and Asia) and occasionally worldwide. In a plethora of missions, the King and its dedicated crews perform civil search and rescue, casualty evacuation, traditional combat search and rescue (CSAR), and building partner capacity (BPC) during the course of conducting military-to-military training and humanitarian assistance in Africa. Fixed-wing rescue trains in a wide variety of skills in order to provide such a sweeping range of capabilities and effects.

Operational Limitations

Despite the force-multiplying capability it supplies to combatant and task force commanders, Air Force fixed-wing rescue is not without limitations. A variant of the Lockheed Martin C-130 (L-100 series) cargo aircraft, the current production model (HC-130J) measures 132 feet wide (wingtip to wingtip), 97 feet long, and 39 feet high (empennage), with a maximum gross takeoff weight of 175,000 pounds.[3] The relatively large size of the C-130 makes it a flexible platform for the range of fixed-wing rescue missions; however, the aircraft does not lend itself well to low-visibility/low-impact operations.

For instance, when a C-130's engines go into reverse during landing, noise increases and the airport building may begin to vibrate, catching the attention of people intrigued by the presence of a large, grey military aircraft. Curious glances follow the C-130 as it taxis to park, eager to see what happens. The implications of this action can become even more complicated when the aircraft operates in countries where a US presence is unpopular or unannounced. Furthermore, HC-130s exact significant operating and support costs. Given the aircraft's complex systems and hardware, during a typical deployment the number of support personnel equals or exceeds that of aircrew members. The expense of flying an HC-130P is staggering—fuel alone can cost $4,800 per hour.[4] Therefore, having an option to tailor aircraft types and deployment footprints to match the operating environment can enhance mission effectiveness, decreasing risk from threats and realizing monetary and logistical savings.

In addition to the prohibitive size of the aircraft and the cost of operating it, the average HC-130 flying in combat is 45 years old, a fact that generates a host of maintenance issues.[5] Present fleet availability and mission capable rates of 54 percent and 68.6 percent fall well below their respective established standards of 67.8 percent and 74 percent.[6] An effort is under way to replace the HC-130P/N "legacy" fleet with new HC-130Js by the mid-2020s. This acquisition represents a significant step in the right direction for Air Force rescue, but, unfortunately, some validated combatant command requirements will remain unfulfilled. A vital link in the rescue triad, the HC-130 enables the successful recovery of personnel and equipment through its support of the GA and HH-60 and its role in autonomous mass-casualty and disaster-response operations that demand large-capacity aircraft with specially trained crews. Additionally, the CSAR method of PR and the CSAR task force (CSARTF) in particular depend upon the strengths of the King to conduct cross-forward-line-of-troops point-recovery operations. The Joint Requirements Oversight Council has validated a requirement of 78 HC-130s, but present budget and acquisition priorities have lowered that number to only 37 aircraft scheduled for procurement.[7] Similarly, rotary-wing rescue has a validated requirement for a fleet of more than 148 helicopters but is authorized an end strength of only 112.[8] Undoubtedly the inability to acquire a full fleet of aircraft will hinder near- and long-term fixed-wing rescue operations, limiting services to the United States and its interests at home and abroad.

Furthermore, it is important to analyze the monetary cost of operations in terms of beneficial effects. According to the *National Military Strategy of the United States of America* (2011), "Defense budget projections indicate that leaders must continue to plan for and make difficult choices between current and future challenges."[9] An HC-130J, which costs $3,585 per hour to operate, can provide a combination of nine hours airborne time (extended by in-flight air-to-air refueling), multipayload airdrop, and limited recovery operations via infiltration/exfiltration.[10] At an estimated unit cost of $70 million (constant fiscal year 2011 dollars), a fleet of HC-130Js can cover approximately three areas of operation for a lifetime commitment of $15.4 billion.[11] Clearly, this pillar of Air Force rescue comes at a premium price. The service should consider other cost-effective solutions to bridge capability gaps and fill the void between the number of required and authorized rescue aircraft.

Small Airplanes, Big Impact

Adm Michael Mullen, chairman of the Joint Chiefs of Staff, notes that "our Joint Force must prepare for an increasingly dynamic and uncertain future in which a full spectrum of military capabilities and attributes will be required to prevent and win our Nation's wars."[12] More than likely, US military forces will operate in areas where their presence is unacceptable to the local population, host government, or both. For this reason, among others, Air Force Special Operations Command recently initiated a plan to include smaller, commercially acquired assets in its fleet of special operations mobility aircraft—a fleet previously monopolized by variants of the C-130.[13] Air Force rescue could benefit greatly from this Non-Standard Aviation (NSAv) program, which contains a mix of varied-capability aircraft in civil livery capable of deploying with a small footprint and operating in an expeditionary, "outside the wire" environment. NSAv low-visibility platforms can conduct a search at more efficient airspeeds, land on non-purpose-built surfaces, and reduce target highlighting. Additionally, the Air Force can leverage these strengths to lower the risk to recovery personnel/materiel, improve aircrew management, ease maintenance requirements, and employ with decreased economic impact.

Rescue for Combined Joint Task Force–Horn of Africa: Highlighting the Value of Light Aircraft

Africa represents perhaps the greatest challenge for PR professionals because of its vast distances, sparse recovery assets (presently only HC-130s, GA, and CH-53s exist on the continent—and not in a centralized location), and large number of sovereign states and autonomous tribal nations. Nevertheless, the African continent and its people are essential to US efforts against nonstate terrorist actors. The *National Military Strategy of the United States of America* emphasizes this point, observing that "the Joint Force will continue to build partner capacity in Africa, focusing on critical states where the threat of terrorism could pose a threat [*sic*] to our homeland and interests."[14] Air Force rescue has executed and supported this mission for years as part of CJTF-HOA.

Having a long-time, constant presence in the CJTF-HOA combined joint operating area, King combat rescue aircrews have a well-developed understanding of the time-and-distance problem that is Africa, and of the limited number of areas that can support an aircraft as large as the HC-130. Typically a C-130 landing zone requires a semi-prepared surface 3,000 feet long by 60 feet wide.[15] CJTF-HOA's combined joint operating area contains 1,186 charted airfields, but only about 80 of them (7 percent) are suitable for the C-130 (table 1).[16] Assuming a rescue coverage area of 11,759,420 square kilometers, each landing zone suitable for the C-130 would need to provide access to about 147,000 square kilometers. The HC-130's speed allows reasonably quick point-to-point coverage in Africa, but the absence of a nearby, usable airfield would limit organic recovery options. Conversely, light fixed-wing aircraft, such as those identified in the extralight and medium categories (see table 2), can operate out of nearly all of Africa's 1,186 charted airfields, bringing the coverage area per airfield down to about 10,000 square kilometers.[17] Well suited to land on roads and other surfaces, some light fixed-wing aircraft do not need a prepared landing zone at all, further reducing this coverage area to a walkable distance.

Unlike the previous example of a C-130 landing at a local civilian airport, NSAv aircraft attract hardly a glance when they fly. Because their visual and audible detection range is much less prominent than that of the much larger King, light fixed-wing aircraft offer a level of security on a distant continent with varying threat levels. An airplane landing on a dirt field might simply signal the arrival of hunters, a geological expedi-

Table 1. Charted airfields in CJTF-HOA's combined joint operating area (area of responsibility / area of interest)

Country[a]	*Total Airfields*	*Runways <3,000 feet*	*C-130 Suitable*[b]	*Territory (sq km)*[c]
Burundi	8	4	1	27,830
Chad	56	11	3	1,284,000
Comoros	4	0	2	2,235
Eritrea	13	2	3	117,600
Ethiopia	61	8	10	1,104,300
Democratic Republic of Congo	198	62	9	2,344,858
Djibouti	13	2	2	23,200
Kenya	191	56	9	580,367
Madagascar	84	21	3	587,041
Mauritius	5	1	1	2,040
Mozambique	106	44	7	799,380
Rwanda	9	4	1	26,338
Seychelles	14	6	1	455
Somalia	59	7	2	637,657
Sudan	140	39	5	2,505,813
Tanzania	124	34	10	947,300
Uganda	46	9	1	241,038
Yemen[d]	55	11	10	527,968
Total	1,186	321	80	11,759,420

Source: Data compiled by the author from Combined Joint Task Force–Horn of Africa, http://www.hoa.africom.mil/; *The World Factbook*, Central Intelligence Agency, https://www.cia.gov/library/publications/the-world-factbook/index.html; and "Airfield Suitability and Restrictions Report," Air Mobility Command, https://gdss2.c2.amc.af.mil/.

[a] CJTF-HOA's combined joint operating area is defined as the 18 sovereign states listed in this table.

[b] C-130-suitable runways have a 3,000-foot-long by 60-foot-wide landing surface stressed for twin-tandem landing gear at a maximum gross weight of 175,000 pounds.

[c] Territory includes both land and maritime surface claimed under international law and as published in the *CIA World Factbook*.

[d] Though not on the African continent, Yemen is included in CJTF-HOA's area of interest.

tion, or missionaries in rural Africa.[18] Thus, the chances of adversaries singling out an NSAv rescue vehicle as a target of opportunity diminish rapidly. By the time they discover that they are looking at a US aircraft, their window of opportunity to act has already closed. (One must note that such actions are not an attempt to conduct or suggest clandestine recovery operations. This type of employment merely demonstrates the difference between advertising a presence [show of force] and selective disclosure.)

Structured Response

Fielding a fleet of mixed fixed-wing aircraft would give commanders more options when planning and initiating a rescue. A blended fixed-wing rescue squadron could contain a mix of HC-130-type aircraft to retain the flexibility and strengths of this platform, while introducing smaller single or multiengine commercially available aircraft. These blended squadrons would allow the construction of specialized deployment packages of two to three aircraft types, based on theater requirements. A deployment to Africa might contain one HC-130J, one Twin Otter (DHC-6), and one Quest Kodiak—a mix that would retain a full range of capabilities in a given theater. Aircraft providing rescue coverage could employ together or as separate elements from common or distributed forward operating bases, as necessary. For example, an HC-130 might be most advantageously colocated with rotary-wing assets that depend upon air refueling and at locations where maritime missions are possible. NSAv aircraft would have more utility in remote areas in which small teams work in isolation, away from large airfields, and in rough terrain. The package works together when a light fixed-wing aircraft responds to an incident and meets an HC-130 at an established airfield to conduct a transload of patients or equipment.[19] Utilizing all available assets, commanders can bridge the time-and-distance gap in remote operating areas. Additionally, these recovery vehicles have the innate capability of blending in with their surroundings and intermixing with other aircraft commonly seen in the African bush, such as the Cessna 206 "Skywagon," Cessna 208 "Caravan," and LET-410 "TurboLet."[20] Much like the aircraft in table 2, these planes are well suited to remote, off-airfield operations and come properly equipped from the factory floor (or they could easily be modified).[21]

The *National Military Strategy of the United States of America* emphasizes that "forces must become more expeditionary in nature and will require a smaller logistical footprint in part by reducing large fuel . . . demands."[22] Many expeditionary locations don't have the fuel supplies, much less the

Table 2. Comparison of HC-130 and light fixed-wing aircraft

Aircraft	*Crew*	*Payload (lb.)*[a]	*En Route Speed (KTAS)*[b]	*Landing Distance (feet)*[c]	*Takeoff Distance (feet)*[d]	*Endurance (hours)*[e]	*Size (feet)*[f]
			Extra Light / Short Takeoff and Landing (STOL)				
A-1C	1	925	126	500x30	200	+6	22x35
MT-7-420	1	960	139	500x30	600	+5	23x33
			Medium / STOL				
C-208	1	3,284	186	1,700x40	2,100	+5	37x52
GA-8	1	1,764	134	1,600x30	1,700	+4	29x40
Quest Kodiak	1	3,535	172	705x30	1,001	+7	45x33
DHC-6	1	3,250	182	1,200x40	1,200	9	52x65
			Heavy / STOL				
HC-130P/N	7	34,000	290	3,000x60	6,000	+9	97x132
HC-130J[g]	5	37,000	310	3,000x60	5,000	+9[h]	97x132

Source: Data compiled by the author from "Husky A-1C," Aviat Aircraft, http://www.aviataircraft.com/hspecs.html; "Performance Specifications," Maule Air, http://www.mauleairinc.com/Literature/performance.pdf; "Cessna Caravan Specifications," Cessna Aircraft Company, http://www.cessna.com/caravan/caravan-675/caravan-675-specifications.html; "GA8 Specifications," GippsAero, http://www.gippsaero.com/ZoneID=153.htm; "Kodiak Specifications," Quest Aircraft Company, http://www.questaircraft.com/kodiak/specs/; "Twin Otter—Series 400," Viking Air, http://www.vikingair.com/content2.aspx?id=276; Technical Order (TO) 1C-130(H)H-1, *Flight Manual USAF Series HC-130P/N Aircraft*, 1 February 2004, 5-26, 5-39; and TO 1C-130(H)J-1, "Draft Flight Manual USAF Series HC-130J Aircraft," 1-1, 1-8.

[a] Payload, also known as useful load, is the weight available for cargo, passengers, and so forth, after accounting for fuel, crew, and required equipment. All numbers estimate typical or capacity fuel loads.

[b] En route speed is the published cruise airspeed (knots true airspeed [KTAS]).

[c] Data is derived from information published by the aircraft manufacturer. When possible, numbers represent landing distance to clear a 50-foot obstacle (short field). Runway width is a number estimated by the author, based on wingspan and experience.

[d] Data is derived information published by the aircraft manufacturer. When possible, numbers represent takeoff distance to clear a 50-foot obstacle (short field).

[e] These figures reflect the manufacturer's published maximum endurance rounded down to the nearest hour or calculated with a 45-minute fuel reserve, when able.

[f] Size (aircraft dimensions) is expressed in length x total wingspan rounded to the nearest foot.

[g] The HC-130J's performance data was not published as of this writing. The author offered an estimate, based on existing C-130J data and the experience of subject-matter experts.

[h] The HC-130J is capable of aerial refueling, which greatly extends endurance; thus, flight time is limited only by the crew duty day.

ramp space, to stage PR effectively from a remote airfield using the current complement of fixed-wing rescue aircraft. NSAv aircraft meet the intent of the national military strategy and the operational demand for PR in austere locations. Furthermore, they are smaller, easier to operate, and simpler to maintain than existing rescue aircraft. These advantages translate to savings because of the need for fewer crews and maintainers, especially when coupled with a reliance on the established support infrastructure for fixed-wing rescue. Use of on-demand maintenance facilities available throughout the world and of contract maintenance personnel in expeditionary environments would easily meet aircraft support requirements.[23] In most cases, such aircraft require only one or two maintenance personnel—a stark contrast to the tens of individuals needed for military aircraft.[24]

The past 50 years of airpower have been dominated by aircraft purpose-built for a small and very narrow set of military applications.[25] These expensive planes typically employ with a large (often excessively so) support network. Arguably their design and procurement have had a detrimental effect on unique missions calling for a small footprint, agility, and, frequently, a high level of operations security. Fielding a small fleet of commercially available aircraft offers the advantages of low cost; minimal time for research, development, testing/evaluation of tactics; and almost no aircraft modification from the factory floor.[26] Along with well-trained crews and proper tactics, the simple addition of an ultrahigh frequency (UHF) radio could make a civil aircraft militarily viable for rescue operations. All of the aircraft in table 2 (except the HC-130) cost less than $1.7 million—most of them are less than $500,000.[27] In line with the 2010 *Quadrennial Defense Review Report*'s recommendations, acquisition could take place in less than one year, with forces fielded and deployed in months.[28] Light aircraft could become part of existing fixed-wing rescue squadrons and share established administrative and support resources.

Infusion of NSAv aircraft into the rescue fleet could improve the overutilized and underresourced status of its helicopter assets. A deficiency of around 40 aircraft will remain after restoration of the HH-60 fleet from combat loss to its authorized number of 112 aircraft.[29] Economical NSAv aircraft can play a significant part in filling the traditional helicopter role as the recovery vehicle in permissive environments and in those allowing a short or unimproved landing. This employment strategy would let combatant commanders mass rotary-wing force on objectives that absolutely require the advantages that helicopters bring to rescue. Cost-effective NSAv aircraft, with their greater speed and endurance, can reduce the overstressing of rotary-wing assets and help make up for this substantial gap between requirements and procurement.

Additionally, a knowledge base concerning light fixed-wing aircraft and operational experience with these planes already exists within the Air Force family. The Civil Air Patrol (CAP) presently operates the GA-8 aircraft as a utility and incident-awareness-and-assessment platform rigged with the Airborne Real-Time Cueing Hyperspectral Enhanced Reconnaissance system, a surveillance technology used to gain vital information about an incident site.[30] Much like the HC-130, the GA-8 employs an operator and console on board the aircraft to control, assess, and relay information. GA-8s and other CAP aircraft have proven themselves cost-effective assets to national defense and homeland security through their use in disaster response and counterdrug operations. Any infusion of NSAv aircraft into Air Force rescue should not overlook the CAP's level of experience. Furthermore, light video surveillance systems have been tested and installed on the Quest Kodiak (see table 2) aircraft for use in monitoring operations involving domestic vehicular traffic.[31] Much of the technology and knowledge necessary to operate NSAv aircraft as rescue and IW enablers already exists in today's Air Force and American industry.

The introduction of light fixed-wing aircraft presents a unique opportunity to capitalize on personnel and talents that already exist in the fixed-wing rescue community. Air Force Special Operations Command's leadership in fielding light aircraft systems demonstrates the proven model—one that the Air Force tends to revisit each time a new asset is introduced. With a new airplane come new units and a (typically) significant increase in personnel. A tactically advantageous and more fiscally responsible approach could mean the addition of rescue NSAv aircraft without the overhead and infrastructure that accompany new squadrons and significant additional support. It may be possible to place these aircraft in existing HC-130 squadrons with minimal increase in aircrew manning. Preferably, current rescue-qualified crew members would be available to fly the NSAv aircraft, thereby retaining knowledge of the mission and operational command and control, capitalizing on and improving interoperability tactics, and developing subject-matter experts in fixed-wing rescue. Light aircraft offer this possibility due to their relatively simple systems and similar operating procedures. In this rare case, introducing an entirely new aircraft into the Air Force inventory would entail minimal investment in capital and personnel.[32]

Roles and Missions

Addressing desired force capabilities, the *National Military Strategy of the United States of America* observes that "our strategy, forged in war, is focused on fielding modular, adaptive, general purpose forces that can be employed in the full range of military operations."[33] A blended squadron of light to midsized rescue aircraft, properly deployed, could have a tremendous impact on a wide range of military operations. Besides the recovery of sensitive equipment already mentioned, the following represent just a few types of tactical operations that could benefit from employing these vehicles:

- overland/water search
- light airdrop/resupply (precision-capable)
- communication relay
- spotting/marking isolated persons
- preparation for authentication/extraction
- low-visibility insertion/extraction
- nontraditional intelligence, surveillance, and reconnaissance
- on-scene commander
- humanitarian relief (first responder)

Many of these roles, presently filled by the HC-130, could be performed by NSAv-type aircraft that blend into indigenous surroundings and that do not highlight activities in nontraditional operating areas.

Furthermore, defense support to civil authority and maritime missions could profit from the introduction of NSAv seaplane-type aircraft. A typical scenario might involve assisting a mariner with an acute medical issue, searching for a distressed vessel, or investigating a suspected aircraft incident at sea. Present equipment limitations dictate that at least one HC-130 and a pair of HH-60 helicopters respond to open-water missions when the Coast Guard requests assistance.[34] Weather and tactics permitting, this costly footprint could be reduced to one seaplane with a GA team on board that would land at the incident site outside the response envelope of Coast Guard assets. Moreover, the Air Force could employ these aircraft in remote areas that presently lack adequate coverage (notably United States Pacific Command) at minimal cost.

Irregular Warfare: The Force of Choice

The United States Government will make a sustained effort to engage civil society and citizens and facilitate increased connections among the American people and peoples around the world—through efforts ranging from public service and educational exchanges,

> *to increased commerce and private sector partnerships. In many instances, these modes of engagement have a powerful and enduring impact beyond our borders, and are a cost-effective way of projecting a positive vision of American leadership. Time and again, we have seen that the best ambassadors for American values and interests are the American people.*
>
> —*National Security Strategy*, May 2010

This statement emphasizes the importance of engagement between Americans and citizens of foreign nations. In the realm of IW, Air Force rescue—particularly fixed-wing rescue—has an important role to play in building partnerships and engagement. The report of the Air Force's Irregular Warfare Tiger Team recommends "expand[ing] and resourc[ing] the USAF Rescue community's mission to include IW and BPC aviation advising."[35] Because rescue forces by nature are nonoffensive weapons systems that react to externally triggered events, when packaged correctly they can open doors to previously denied areas and populations. Even the poorest of countries need rescue services—including those that cannot afford C-130s or an aircraft program dedicated solely to rescue. The *Quadrennial Defense Review Report* identifies the creation of "mechanisms to expedite acquisition and transfer of critical capabilities to partner forces" as a key initiative in BPC.[36] Furthermore, the report states that "we will also enhance our air forces' contributions to security force assistance operations by fielding within our broader inventory aircraft that are well-suited to training and advising partner air forces."[37]

Introduction of NSAv aircraft to the fixed-wing rescue fleet has the potential to create an IW "weapon of choice" for commanders. According to representatives of US Air Forces Africa,

> For likely operations on the African continent, the most appropriate aircraft are rugged, affordable, light- and medium-mobility and rotary-wing aircraft to reach areas where roads and other infrastructure are non-existent. MEDEVAC [medical evacuation] and SAR [search and rescue] are high payoff capabilities in legitimizing the government. To move at will on the continent in support of the engagement strategy, US personnel require MEDEVAC, SAR, and CSAR [combat search and rescue] support.[38]

The ability to provide military-to-military training, humanitarian assistance, and liaison operations while conducting organic rescue alert for US assets is exactly the kind of solution that provides low-to-no-cost effects with tailored visibility and minimal negative influence. We have heard that our partner nations do not want to fly anything that we don't fly ourselves.[39] Giving partners the opportunity to purchase aircraft that cost less than $2 million could boost our economy at home via exports as well as facilitate continued theater security cooperation and BPC activities.[40] When asked about the type of aircraft that would best support IW activities in US Africa Command, US Air Forces Africa personnel responded that "four [Cessna 208] Caravans may be better than one C-27. We should analyze what poor countries really need and what they are able to sustain."[41] Air Force rescue can supply training and support through air-adviser-type roles after the sale of aircraft. Rescue's unique, simplified command and control, as well as its inherent ability to deploy to austere locations with little to no support, make it the right choice for BPC operations and more.

Final Thoughts

The fixed-wing rescue community remains in high demand, presenting many capabilities to combatant commanders despite a capability shortfall. The infusion of fiscally responsible and capability-rich NSAv aircraft to the present fleet could fill shortfalls while creating opportunities for international partnership. Capitalizing on current industry, NSAv aircraft are an expedient and cost-effective means of bringing the fixed-wing rescue fleet to full capacity while giving commanders an effective IW tool at no additional cost. Creative solutions can fill capability shortfalls in access, visibility, and utility while bringing the rescue inventory up to fully authorized numbers. Since these assets require little research and development, an accelerated acquisition could place them in the hands of commanders with very little delay. By assessing the history of fixed-wing rescue and operational shortfalls, and by analyzing case studies, this article has shown that a blended fixed-wing rescue squadron can provide unique, specialized effects in PR and IW. By offering a multirole solution to both rescue and IW mission sets, NSAv aircraft enable airpower at a responsible cost to taxpayers. Most importantly, a mixed aircraft inventory enhances the responsiveness of rescue forces and increases overall system capability consistent with the goal of Air Force rescue: "that others may live."[42] ✪

Notes

1. Air Force Doctrine Document (AFDD) 3-50, *Personnel Recovery Operations*, 1 June 2005, 13.
2. "HC-130P/N King" fact sheet, US Air Force, 8 January 2010, http://www.af.mil/information/factsheets/factsheet.asp?id=106.
3. "Products," Lockheed Martin, 2011, http://www.lockheedmartin.com/products/; and "C-130 Hercules" fact sheet, US Air Force, 22 October 2009, http://www.af.mil/information/factsheets/factsheet.asp?id=92.
4. Figure calculated by the author based on a fuel-burn rate of 6,000 pounds per hour and the price of Jet A fuel at Tucson International Airport on 19 April 2011 at $5.49 per gallon.
5. "HC-130P/N King" fact sheet.
6. Mr. Kenneth R. Mortensen (Headquarters Air Combat Command Requirements) to the author, e-mail, 24 June 2011; and Air Combat Command AA/MC Standards. Availability rate (AA) is a fleet measurement—the percentage of aircraft that are unit-possessed and mission capable (on the ramp and capable of flying). Mission capable rate (MC) is the number of aircraft assigned that are ready to fly (percentage of the available fleet). Definitions and research provided by Mr. Mortensen, HQ ACC/A8RT (A4YR).
7. Gen T. Michael Moseley, "Capability Development Document for HC/MC-130 Recapitalization Capability" (Washington, DC: Headquarters US Air Force, 20 November 2007), iii.
8. "Capability Development Document for Combat Search and Rescue Replacement Vehicle (CSAR-X) / Personnel Recovery Vehicle (PRV)" (Washington, DC: Headquarters US Air Force, 16 June 2005), ii.
9. Joint Chiefs of Staff, *The National Military Strategy of the United States of America* (Washington, DC: Joint Chiefs of Staff, 2011), 2, http://www.jcs.mil//content/files/2011-02/020811084800_2011_NMS_-_08_FEB_2011.pdf.
10. Mr. David C. Vanik (Headquarters Air Combat Command Requirements), to the author, e-mail, 29 June 2011. The cost per flying hour is in fiscal year 2011 constant dollars.
11. Ibid.; and Lt Col Brian Pitcher (Headquarters Air Combat Command Requirements), to the author, e-mail, 28 March 2011.
12. Joint Chiefs of Staff, *National Military Strategy*, cover letter.
13. US Special Operations Command, *Fiscal Year (FY) 2009 Budget Estimates* (MacDill AFB, FL: US Special Operations Command, February 2008), 45.
14. Joint Chiefs of Staff, *National Military Strategy*, 12.
15. Air Force Instruction 13-217, *Drop Zone and Landing Zone Operations*, 10 May 2007, 42.
16. "CJTF-HOA Factsheet," CJTF-HOA Public Affairs Office, http://www.hoa.africom.mil/AboutCJTF-HOA.asp. The number 80 is an estimate based on compatible airfield length and width and data found in the Air Mobility Command airfield suitability restrictions report (see also note 14).
17. Coverage area per airfield calculated based on data presented in table 1, compiled and averaged to determine an estimated amount of land area serviced by each accessible airfield.
18. CC Milne Pocock, *Bush and Mountain Flying* (South Africa: 2009), 21; and "MAF Profile," Mission Aviation Fellowship South Africa, http://www.mafsa.co.za/content/profile-maf-south-africa.php.
19. Joint Publication 3-50, *Personnel Recovery*, 5 January 2007, VI-20.
20. "Fly with MAF," Mission Aviation Fellowship South Africa, http://www.mafsa.co.za/content/fly-with-maf-south-africa.php; and Pocock, *Bush and Mountain Flying*, 26, 44.
21. Pocock, *Bush and Mountain Flying*, 24–29, 36–38.
22. Joint Chiefs of Staff, *National Military Strategy*, 18.
23. "Authorized Service Facilities," Cessna Aircraft Company, http://www.cessna.com/customer-service/aircraft-service/service-facilities.html; and

"Global Tactical Aircraft Support Solutions," DynCorp International, http://www.dyn-intl.com/tactical-aviation.aspx.

24. In accordance with Title 14, Aeronautics and Space, Code of Federal Register, pt. 43, sec. 3, "The holder of a mechanic certificate may perform maintenance, preventative maintenance, and alterations." Additionally if that mechanic is appropriately trained for the type of aircraft, it is reasonable to believe that a maintenance crew of two personnel could provide maintenance support for one or several small aircraft. This assumes fully trained and licensed airframe and power-plant mechanics with at least one having an appropriate inspection authorization.

25. Lt Col George H. Hock Jr., "Closing the Irregular Warfare Air Capability Gap," *Air and Space Power Journal* 24, no. 4 (Winter 2010): 57–68.

26. In this example, aircraft could flow to operational units either from the factory without modification or with very light modification (possibly the installation of a UHF radio, satellite communications capability, or a video downlink, as described). The cost would be low, relative to the acquisition and sustainment of a major aircraft program such as the HC-130J or F-22A (hundreds of thousands of dollars compared to billions of dollars). Analysis by the author.

27. Unit cost of light aircraft compiled from multiple sources. See notes 15 and 16 as well as the sources in table 1.

28. Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Department of Defense, February 2010), 80, http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf.

29. "Capability Development Document for Combat Search and Rescue Replacement Vehicle," ii; and Col Jason Hanover (commander, 563rd Rescue Group), to the author, e-mail, 2 May 2011.

30. Lt Col Brian Ready (wing vice-commander, CAP Arizona), to the author, e-mail, 2 March 2011; and "Fact Sheet: Civil Air Patrol ARCHER System Technical Specifications," Civil Air Patrol National Headquarters, Operations Support Division, August 2005, http://atg.cap.gov/downloads/FINAL%20VERSION%20ARCHER%20Technical%20Fact%20Sheet.pdf.

31. Dave Hirschman, "Quest Kodiak: A Higher Calling," *AOPA* [Aircraft Owners and Pilots Association] *Pilot Magazine* 54, no. 3 (March 2011): 52, http://www.aopa.org/members/files/pilot/2011/march/feature_higher_calling.html.

32. Minimal investment when compared to major aircraft acquisition programs such as the F-22A. Analysis conducted by the author.

33. Joint Chiefs of Staff, *National Military Strategy*, 18.

34. Col Jason Hanover (commander, 563rd Rescue Group), to the author, e-mail, 25 April 2011.

35. Department of the Air Force, *US Air Force Irregular Warfare Tiger Team Observations and Recommendations* (Washington, DC: Department of the Air Force, 2009), iii.

36. Department of Defense, *Quadrennial Defense Review Report*, viii.

37. Ibid., x.

38. Department of the Air Force, *Tiger Team Observations and Recommendations*, 67.

39. Ibid., 61.

40. Aircraft listed in table 2 are all US manufactured except the GA-8 (Gippsland Aviation of Australia) and the DHC-6 (Viking Air of Canada).

41. Department of the Air Force, *Tiger Team Observations and Recommendations*, 67.

42. Present adaptation of Brig Gen Richard Kight's "Code of an Air Rescue Man."

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