Air National Guard Remotely Piloted Aircraft and Domestic Missions

Opportunities and Challenges

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Preface

Remotely piloted aircraft (RPAs) attract significant interest from policymakers, Congress, and the public, especially with respect to their use inside the United States. The Department of Homeland Security operates a fleet of ten RPAs, while the Air National Guard (ANG) operates more than 40. The ANG flew its first domestic response mission in 2013. In this report, we analyze ANG RPA capabilities and constraints, as well as domestic RPA mission types, and identify those domestic missions best suited to the ANG at present and in the future. We then offer recommendations on ways to integrate ANG RPAs into domestic missions. This material will be of interest to policymakers in the Department of Defense, Department of Homeland Security, and Congress, as well as those with an interest in understanding the facts behind the ANG's RPA capabilities.

This research was conducted within the Acquisition and Technology Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community. For more information on the RAND Acquisition and Technology Policy Center, see http://www.rand.org/nsrd/ndri/centers/atp.html or contact the director (contact information provided on the web page).

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Summary

Remotely piloted aircraft (RPAs) attract significant interest from policymakers, Congress, and the public. While interest is especially intense regarding the use of RPAs inside the United States, little attention has been given to the question of using Air National Guard (ANG) RPAs in domestic missions.

With the nation facing a variety of domestic threats and potential emergencies, policymakers are looking for ways to respond, especially as budgets decline. They need to exploit new capabilities and optimize those that already exist. ANG RPAs may offer such an opportunity, particularly as some aircraft return from overseas deployments and the number of Department of Homeland Security (DHS) RPAs has been capped. However, significant sensitivities may arise in the use of military RPAs for domestic missions. There are also constraints at both the operational and policy levels. The ANG operates a fleet of more than 40 RPAs, and it has units in five different states, with six more to be established by 2018. ANG RPAs flew domestic missions for the first time only in 2013, supporting firefighting efforts in Yosemite National Park. At the same time, budgetary constraints have capped the DHS force of larger RPAs at ten aircraft. (Small RPAs, such as those launched by hand, do not fall under this cap.)

In this report, we seek to guide the discussion of the ANG's utility in domestic missions. We analyze which domestic RPA missions are best suited to the ANG's current and planned capabilities and explore the policy and operational constraints that ANG RPAs face in conducting such missions. To address these questions, we gathered and analyzed data on the kinds of missions that RPAs conduct domestically, the current and future capabilities of the ANG's RPA force, and the policy and operational constraints that the ANG faces in using its RPAs to fly domestic missions.

We framed our analysis with three central questions:

1. Is there a role for ANG RPAs in conducting defense support of civil authorities (DSCA) missions, given the growth in their numbers since 2009 and limits on Customs and Border Protection's fleet?
2. What types of DSCA missions are best suited for ANG RPAs, given their capabilities?
3. What are the constraints in using ANG RPAs domestically?

To address these questions, we obtained and analyzed data on

- ANG RPA force structure, capabilities, and commitments to overseas contingency operations (OCOs)
- plans to introduce new platforms and establish additional ANG units

- policies and regulations governing domestic use of DoD RPAs
- costs, especially cost per flying hour.

Findings

The ANG RPA force has grown from one aircraft in early 2009 to 48 today. Since the ANG obtained its 40th RPA in 2011, approximately 40 percent have been deployed to overseas contingency operations or in depot maintenance at any one time. All but 14 are MQ-1 Predators, which carry only electro-optical/infrared cameras. The ANG will replace most of these with more-capable MQ-9 Reapers over the next five years, however, and the new aircraft will have similar optical sensors but also synthetic aperture radar (SAR). Thus, while there is a role for ANG RPAs in conducting DSCA missions, that role could increase as new and better aircraft replace the current fleet.

We identified five types of domestic RPA missions: border countermigrant missions, border change-detection missions, maritime counterdrug missions, incident-reconnaissance missions, and fixed-target surveillance. Given their current capabilities, ANG RPAs are best suited to the last two types. As the ANG introduces more MQ-9s, the force will also become capable of border change-detection missions, which rely on SAR.

Beyond simple technological constraints, ANG RPAs' utility in these missions is affected by several key policy constraints that the ANG must navigate before conducting any domestic RPA missions. First, the Secretary of Defense must explicitly approve any operational use of DoD RPAs within the United States. In addition, as with most other imagery-collecting platforms, RPA units must draft and gain approval (from National Guard headquarters) of a Proper Use Memorandum outlining the mission, intended use of the imagery, and safeguards that will be employed to prevent unauthorized development or use of imagery.

Operating RPAs in most unrestricted airspace requires special approval from the Federal Aviation Administration (FAA) in the form of a certificate of authorization (COA). There are a number of standing COAs along parts of the Mexican, Canadian, and southeastern coastal borders, as well as near military bases that host RPAs. New COAs are required to operate RPAs outside these areas. COA requests include descriptions of intended flight operations, RPA characteristics, and lost link procedures. FAA approvals for COAs can take up to 60 days, although the timelines have been shorter in emergencies. The FAA may also require that an observer, or "chase plane," remain in continuous visual contact with RPAs.

A further constraint involves the differences in United States Code Title 10 (active duty) and Title 32 (state active duty/full-time National Guard) missions. Title 10 allows the Department of Defense (DoD) to share any information its sensors collect during normal operations and training with law enforcement agencies. Outside of normal military operations or training, DoD may collect imagery in support of domestic counterdrug operations within certain parameters. Title 32 is more constrained; it authorizes state National Guard training, as well as missions under the control of the relevant governor.

Recommendations

Our findings lead us to offer five recommendations. First, the current ANG RPA force can add the most value by freeing up DHS RPAs to focus on the three missions for which they are best (and in many cases uniquely) equipped: border countermigrant, border change-detection, and maritime counterdrug missions. This would suggest that decisionmakers consider ANG RPAs for incident-reconnaissance missions. If a response is required faster than ANG RPAs can support, DHS RPAs could be employed until ANG RPAs are available. To the extent that policy restrictions allow, ANG RPAs are also suitable for fixed target surveillance.

As ANG units convert to the MQ-9, the force will become more capable of border change-detection missions. Thus, our second recommendation is that the ANG position itself to support such missions by prioritizing the conversion of units closest to the southwestern border, such as those in Texas and Arizona. This would position aircraft with appropriate sensors closest to the areas where they would be best utilized. Such positioning would speed response while minimizing the need for transits to the border and thus requests for access to additional airspace.

Third, when conducting RPA-related exercises and training, we recommend that the National Guard include events focusing not only on tactics and operations but also on strategic-level policy constraints and coordination with personnel from the Office of the Secretary of Defense and other agencies. This would have the dual benefit of giving both operators and policymakers the experience needed to facilitate the approval process for future missions.

Fourth, we recommend that the National Guard and other stakeholders consider procedures like those associated with the Secretary of Defense Orders Book; this would simplify the process of deploying and employing RPAs for Title 10 and Title 32 domestic operations.

Fifth, we suggest that the ANG consider hosting a series of periodic workshops or conferences to educate law enforcement agencies and first responders about RPAs. These events could focus on the capabilities of ANG RPAs and the processes required to obtain RPA support for law enforcement or emergency management operations. These exchanges should help stakeholders identify ways to streamline civil support processes.

Finally, we recommend a strategy that can help identify and address congressional concerns while providing transparency for the public as DoD works to explain its policies and uses for RPAs domestically.

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CHAPTER ONE

Introduction

Background

The use of remotely piloted aircraft (RPAs), also referred to as unmanned aircraft systems (UAS) or unmanned aerial vehicles (UAVs), attracts considerable interest from policymakers, Congress, and the public. This is especially true regarding their use in missions for defense support of civil authorities (DSCA) conducted by the Department of Defense (DoD).

Congressional interest in the use of RPAs for domestic missions dates to at least 2003, when Congress directed the President to study and report on RPA use "for support of homeland security missions."[1] In its budget for fiscal year (FY) 2006, Congress passed a special appropriation for the Department of Homeland Security (DHS) to build a fleet of RPAs in its Customs and Border Protection (CBP) component, and such appropriations have continued in nearly every subsequent year. In 2012, however, Congress capped DHS's authorized RPA force at ten aircraft, citing budgetary constraints.[2]

To date, all large and medium RPAs in DHS remain in CBP, under the Office of Air and Marine. CBP operates two maritime variants in conjunction with the U.S. Coast Guard. There do not appear to be any plans to acquire other RPAs, with the possible exception of very small (for example, hand-launched) aircraft. We provide further details concerning the specific capabilities of the RPA fleet later in this report.

There is also considerable interest in expanding and enhancing National Guard support to domestic missions, including border security. The most-prominent border security examples of this interest are Operations Jump Start and Phalanx, conducted from 2006 to 2008 and from 2010 to 2011, respectively. These operations deployed thousands of guardsmen to the nation's southwest border to support the U.S. Border Patrol.

To date, very little of this interest in expanding National Guard domestic operations has focused on the use of Air National Guard (ANG) RPAs, but this may be changing. The ANG's fleet of RPAs grew from one in 2009 to 48 by late 2014, with RPAs assigned to air wings in five different states, and six more air wings slated for potential establishment by 2018. Nevertheless, the ANG's first domestic mission did not occur until fall 2013, when the 163rd Reconnaissance Wing in California supported firefighting efforts in Yosemite National Park. There have been no similar cases since.

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[1] Public Law 108-136, National Defense Authorization Act for Fiscal Year 2004, Title X, General Provisions, Subtitle D, Reports, Sec. 1034, November 24, 2003.

[2] Stew Magnuson, "Budget Woes End DHS Plans to Expand Drone Fleet," *National Defense Magazine*, August 2012.

Approach

We framed our analysis with three central questions:

1. Is there a role for ANG RPAs in conducting DSCA missions, given the growth in their numbers since 2009 and limits on CBP's fleet?
2. What types of DSCA missions are best suited for ANG RPAs, given their capabilities?
3. What are the constraints in using ANG RPAs domestically?

To address these questions, we obtained and analyzed data on

- ANG RPA force structure, capabilities, and commitments to overseas contingency operations (OCOs)
- plans to introduce new platforms and establish additional ANG units
- policies and regulations governing domestic use of DoD RPAs
- costs, especially cost per flying hour.

We also reviewed a range of literature on domestic RPA missions. This review included congressional testimony; reports from the Government Accountability Office and Congressional Research Service; internal documents, such as reports from inspectors general; and news reports.

We also met or corresponded with a variety of key personnel and stakeholders. These included officers from the ANG A-3, A-4, and Director's Office, as well as a number of RPA units. We spoke with personnel in the Air Force's MQ-1 and MQ-9 program offices, who provided input regarding current and planned capabilities of these two platforms. We also spoke with personnel in the National Guard Bureau J-2 and Staff Judge Advocate offices regarding policy constraints.

Overview

With the nation facing a variety of different types of domestic threats and potential emergencies, policymakers are looking for ways to respond, especially as budgets decline. ANG RPAs offer an opportunity to exploit new capabilities and optimize those that already exist, bearing in mind the sensitivities that arise in the use of military forces in domestic emergencies and the likely strong resistance to the use of RPAs in any domestic surveillance. In this report, we seek to guide the discussion of how useful ANG RPAs can be by identifying the various kinds of missions that RPAs conduct domestically and determining which are best suited to the ANG's current and planned capabilities.

We are particularly interested in the specific capabilities required for each mission, such as sensors, and the constraints that ANG RPAs face in conducting domestic missions. To this end, Chapter Two describes the capabilities of the ANG (i.e., the numbers of RPAs that could be available and the costs of employing them), and then looks at how the capabilities of these systems could be optimized in relation to the RPAs currently being used by other domestic agencies in five different missions. To use the ANG RPAs for these missions, policymakers will need to appreciate the constraints on RPA operations and navigate the complex legal and polit-

ical requirements regarding their use. Thus, in Chapter Three, we detail what these constraints are and how those responsible for using these systems can prepare. Chapter Four summarizes our findings and offers recommendations.

CHAPTER TWO

Air National Guard Remotely Piloted Aircraft Capabilities

We began our analysis by posing our first research question: Is there a role for ANG RPAs in conducting DSCA missions, given the growth in their numbers since 2009 and limits on CBP's fleet? To help answer this question, we started by documenting the number and kinds of aircraft and sensors in the ANG inventory. Since the ANG has only had RPAs for a handful of years, there has not been much time for the program to reach and maintain a "steady state." We illustrate this by tracing the full history of the ANG's RPA force.

Figure 2.1 shows the number of ANG RPAs, at roughly semiannual intervals, from January 2009 to October 2014. The aircraft are also identified by the units to which they were assigned. These units are the 214th Reconnaissance Group (Arizona Air National Guard), 174th Attack Wing (New York), 163d Reconnaissance Wing (California), 147th Reconnaissance Wing (Texas), and 119th Wing (North Dakota).

As Figure 2.1 illustrates, the ANG's RPA strength increased from a single aircraft in early 2009 to 43 by July 2011, and has remained fairly steady since.

The Air Force has considered establishing several additional RPA units in the ANG by FY 2018. These could include units in Tennessee (which began converting to RPAs in FY 2014); Iowa (FY 2016); Michigan, Pennsylvania, and New York (Niagara) (FY 2017); and Arkansas (FY 2018). The number of aircraft to be assigned to these units has not yet been determined.[1]

Aircraft Sensors and Capabilities

As of late 2014, the majority (34) of ANG's 48 RPAs were MQ-1 Predators. The remaining 14 were MQ-9 Reapers, assigned to the 174th Attack Wing in New York and 163rd Reconnaissance Wing in California. The number of MQ-9s in the force doubled during 2014, from seven in late 2013. As Table 2.1 shows, the MQ-9 Reaper is larger, is faster, and can carry a heavier payload than the MQ-1.

ANG MQ-1s are equipped with Raytheon MTS-A electro-optical/infrared (EO/IR) cameras. MQ-9s carry the similar, but more capable, MTS-B cameras. Both types of cameras can capture full-motion video, as well as still images of objects, from flying altitudes in daylight. The infrared feature can capture images at night and may also be used in daylight to focus on objects that give off heat without distractions, such as glare.[2]

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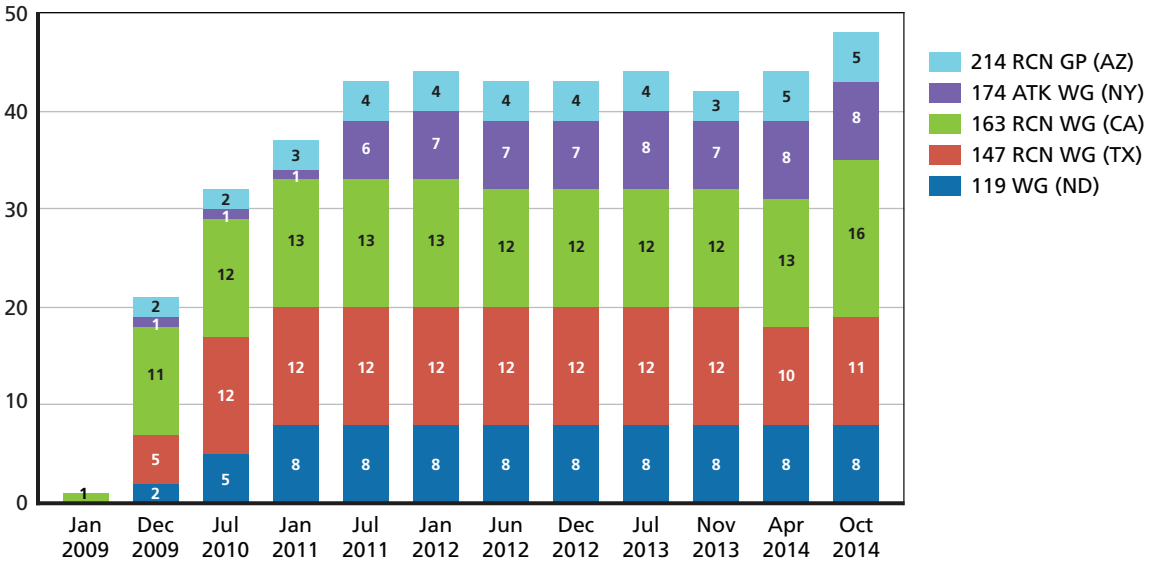
[1] Email communication from Lt Col Chad Smith, United States Air Force Air National Guard, October 16, 2013.

[2] Specific capabilities, such as the distances at which objects of a given size can be distinguished, are classified. Raytheon has stated, however, that an MTS-B camera carried on an aerostat allowed operators to view "trucks, trains, and cars from

Figure 2.1
ANG RPA Inventory, January 2009–October 2014



SOURCE: Steven Sammons, "ANG Inventory," Microsoft Excel spreadsheet, Air National Guard A-4, October 20, 2014.
NOTE: 214 RCN GP (AZ) = 214th Reconnaissance Group (Arizona Air National Guard); 174 ATK WG (NY) = 174th Attack Wing (New York); 163 RCN WG (CA) = 163d Reconnaissance Wing (California); 147 RCN WG (TX) = 147th Reconnaissance Wing (Texas); 119 WG (ND) = 119th Wing (North Dakota).
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Table 2.1
Characteristics of the MQ-1 and MQ-9

	Airborne Endurance	Top Speed	Weight	Payload	Range	Altitude
MQ-1 Predators	More than 24 hours	135 mph	1,130 pounds	450 pounds	770 miles	25,000 feet
MQ-9 Reapers	More than 24 hours	230 mph	4,900 pounds	3,750 pounds	1,150 miles	50,000 feet

SOURCES: U.S. Air Force, "MQ-1B Predator," fact sheet, July 20, 2010a; Erik Schechter, "Birds of a Feather," *Gannett Military Newsstand*, May 12, 2014; U.S. Air Force, "MQ-9 Reaper," fact sheet, August 18, 2010b.

The ANG's MQ-9s also carry the Lynx multimode radar, which includes a synthetic aperture radar (SAR) system. SAR systems can image objects at any time of day or night, as well as under environmental conditions that would impair cameras, such as rain, clouds, or fog.[3] Lynx is capable of operating in four modes: spotlight, stripmap, ground moving target indicator (GMTI), and coherent change detection (CCD). In spotlight mode, the radar provides a continuous image of a point on the ground, at resolutions as fine as 0.1 meters. Ranges vary

dozens of miles away." Raytheon Corporation, "Operators Use JLENS-Mounted Sensor to Observe Role-Players Planting Mock-IED During Demonstration," press release, January 14, 2013.

[3] General Atomics Corporation, "Lynx Multi-Mode Radar," undated.

from 4 to 25 kilometers for the finest resolutions, and up to 60 kilometers for coarser resolutions. The radar is also capable of imaging in rain at reduced ranges.[4]

In stripmap mode, Lynx can produce a series of images across a range specified by the operator. The aircraft need not fly a straight path while the radar images this strip. Images created in stripmap mode may be as fine as 0.3 meters, or up to 3 meters. Ranges vary from 7 to 30 kilometers at 0.3-meter resolution, and up to 60 kilometers at coarser resolutions.[5]

In GMTI mode, Lynx can distinguish targets moving as slowly as 5.8 knots (about 6.7 miles per hour), while in CCD mode, the system can compare two images of the same scene taken at different times and identify subtle differences. CCD can detect changes in radar phase, which might not be seen in ordinary-intensity images. It can also detect spatially small changes, such as the presence of human footprints in soil or snow.[6]

There are no plans to introduce additional sensors to the ANG's RPA force, but the Air Force plans to retire most MQ-1s over the next five years and replace them with MQ-9s. The force will thus become more capable over time, which plays a large role in our discussion of domestic missions.

Domestic RPA Missions

Having described ANG inventory and capabilities, our next step was to pose our second research question: What types of DSCA missions are best suited for ANG RPAs, given their capabilities? To help answer this question, we characterized the types of domestic missions for which ANG RPAs might be used, focusing on the five types of domestic missions for which DHS has used RPAs. We reviewed literature on domestic RPA use, including congressional testimony, reports from government and nongovernmental agencies, and news articles. We wanted to understand the nature of each mission and the requirements to perform it effectively, and we were particularly interested in the sensors needed for each mission, as this directly affects the utility of ANG RPAs.

We identified five types of domestic missions for which RPAs have been used. These are

- border countermigrant missions
- border change-detection missions
- maritime counterdrug missions
- incident-reconnaissance missions
- fixed-target surveillance.

Here, we describe each type of mission, including such characteristics as the locations where such missions are flown and the types of targets involved. We then discuss the techniques used, the kinds of sensors required to support these techniques, and the ANG's ability to perform the mission.

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[4] S. I. Tsunoda, F. Pace, J. Stence, and M. Woodring, "Lynx: A High-Resolution Synthetic Aperture Radar," *SPIE Aerosense*, Vol. 3704, 1999, pp. 2–4.

[5] Tsunoda et al., 1999, pp. 2–4.

[6] Tsunoda et al., 1999, pp. 2–4.

Border Countermigrant Missions

One of the highest-profile domestic uses of RPAs involves patrolling border areas for undocumented migrants. This mission has been the subject of frequent congressional hearings and of media and other coverage. RPAs flying border countermigrant missions search for groups of illegal migrants and track them until Border Patrol agents apprehend them.[7]

Historically, RPAs acquired the most contacts with the EO/IR camera, using cueing from ground sensors and agents.[8] In recent years, CBP has begun adding a new sensor to RPAs to improve their performance in countermigrant missions. This sensor, the Vehicle and Dismount Exploitation Radar (VADER), has a GMTI capability that can see targets as small as people, moving as slowly as walking speed.[9] This is frequently referred to as Dismount Moving Target Indicator (DMTI), to distinguish it from the larger and faster-moving targets observable with traditional GMTI.

Although the exact size of VADER's field of view is classified information, it is much larger than that of the RPA's EO/IR camera. RPAs equipped with VADER can acquire many more contacts than they would with the EO/IR system alone. (The differences are sufficiently large that CBP officials have suggested that VADER could drive changes to strategies and tactics in the border countermigrant mission.[10]) Although DMTI alone cannot positively identify detections, it can do so in combination with other sensors. RPAs equipped with VADER would typically surveil an area in DMTI mode, and then use the EO/IR camera to identify and track suspicious contacts.

CBP plans to procure six VADER systems.[11] Reports on VADER's early performance in the border countermigrant mission generated significant interest. At congressional hearings in April 2013, Senator John McCain suggested that VADER on RPAs "could be absolutely vital . . . in attaining effective control of our border."[12]

ANG RPAs do not currently have VADER or other DMTI radars, and the Air Force has no plans to change this. ANG RPAs could support the mission with their EO/IR cameras, but their utility would be lower than that of DHS RPAs.

Border Change-Detection Missions

A second domestic mission that RPAs have conducted related to border security is known as *change detection*, which differs from a countermigrant mission in that it does not attempt to find illegal migrants in real time. Instead, the goal is to identify disturbances in the earth (or

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[7] Major General Michael C. Kostelnik (Ret.), Assistant Commissioner, Office of CBP Air and Marine, U.S. Customs and Border Protection, DHS, testimony before the House Homeland Security Subcommittee on Border and Maritime Security, July 12, 2011.

[8] Kostelnik, 2011.

[9] John Keller, "Army Extends Support for UAV Man-Hunting Radar from Northrop Grumman Through 2013," *Military and Aerospace Electronics*, February 7, 2013. VADER also possesses a synthetic aperture radar with coherent change detection capability. These capabilities are discussed further in connection with border change-detection missions.

[10] Martin E. Vaughan, Executive Director, Southwest Region, Office of Air and Marine, U.S. Customs and Border Protection, Department of Homeland Security, testimony before the House Homeland Security Subcommittee on Border and Maritime Security, April 17, 2012.

[11] Calvin Biesecker, "CBP Wants Six VaDER Radar for Border Security Operations," *Defense Daily*, Vol. 258, No. 9, April 10, 2013, p. 7.

[12] Ted Robbins, "Border Drones Fly into Fight over Immigration," *NPR.org*, June 11, 2013.

other surfaces in the immediate vicinity of the border) and compare them with observations from earlier patrols in the same area. The changes are analyzed to estimate the amount of illegal traffic in the area.[13]

Change detection is usually used in lower-traffic areas of the border, allowing the CBP agency to concentrate other assets, especially personnel, in higher-threat areas. The change-detection missions alert CBP to increases in traffic in lower-threat areas, thus informing decisions about whether to reallocate assets.[14]

RPAs perform change-detection missions using SAR's CCD capability,[15] which is able to detect smaller changes than other sensors (such as EO/IR cameras or the naked eye) by comparing both the phase and amplitude of the radar returns.

As noted earlier, the ANG's MQ-9 RPAs possess the SAR-capable Lynx radar system and can perform CCD missions. The ANG's MQ-1s do not carry Lynx radars; thus, the majority of the fleet is not currently capable of CCD missions. This will change as MQ-9s replace the remaining MQ-1s, a process that is expected to be completed by about 2020. ANG RPAs' utility in this mission will therefore increase as this transition progresses.

Maritime Counterdrug Missions

In maritime counterdrug missions, RPAs fly over open ocean waters searching for small "go-fast" motorboats, larger fishing vessels, or semisubmersible craft carrying drugs. CBP RPAs typically execute this mission in the "source and transit zones" of South and Central America. These are regions from which drugs originate and through which they are shipped en route to the United States. Counterdrug missions are also sometimes flown in U.S. coastal waters.

DHS- and DoD-manned aircraft also conduct maritime counterdrug missions, operating from bases in Panama, Costa Rica, and elsewhere.[16] A CBP RPA deployed to the Dominican Republic to fly counterdrug missions from May to July 2012.[17] CBP viewed this as a prototype for deployments to other countries, including those from which manned aircraft now operate.[18]

CBP and the Coast Guard have developed a variant of the MQ-9 for maritime counterdrug missions. The key differences between this variant, called Guardian, and the base MQ-9 used by the ANG are in the aircraft's sensors. The Guardian carries a Raytheon SeaVue marine search radar, which is designed to detect small targets in areas characterized by high seas and large numbers of vessels. It was originally developed for the U.S. Navy to detect enemy submarine periscopes only briefly visible in high seas. It is also useful for tracking small or stealthy drug-running craft, such as go-fast motorboats and self-propelled semisubmersibles. SeaVue can simultaneously track many more maritime targets than standard radars—typically thousands, as opposed to hundreds.[19] SeaVue also has a maritime moving target indicator (MMTI) capability, analogous to the GMTI and DMTI capabilities discussed earlier.

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[13] U.S. Customs and Border Protection, *2012–2016 Border Patrol Strategic Plan*, Washington, D.C., undated, p. 14.

[14] U.S. Customs and Border Protection, undated, p. 15.

[15] Tsunoda et al., 1999, pp. 1–8.

[16] U.S. Customs and Border Protection, "Lockheed P-3 Orion Airborne Early Warning (AEW) Fact Sheet," May 1, 2013.

[17] "Dominican Authorities Unleash a U.S. Predator on Drug Trafficking," *Dominican Today*, July 16, 2012.

[18] Michael C. Kostelnik, "UAS on the Leading Edge in Homeland Security," Customs and Border Protection, Office of Air and Marine, briefing to the National Defense Industrial Association, October 4, 2012, p. 19.

[19] Bill Carey, "Paris 2011: Raytheon Expands SeaVue Capability," *AINonline*, June 19, 2011.

Targets acquired with SeaVue would likely be identified with EO/IR cameras. The Guardian's EO/IR camera is modified to provide improved capability in the maritime environment, and the aircraft also possesses structural modifications and differences in the avionics and communications capabilities of its ground control system.[20]

ANG RPAs do not possess the SeaVue radar or maritime-modified optical sensors, and there are no plans to acquire such systems. ANG RPAs could perform the mission with standard EO/IR sensors if cued to targets by other sensors. This would allow them to track targets that had already been identified. Using ANG RPAs in this way could allow other aircraft to search for additional targets or return to base because of fuel or aircrew flying-time limitations. Compared with DHS RPAs, however, ANG RPAs have relatively low utility in this mission.

Incident-Reconnaissance Missions

In incident-reconnaissance missions, RPAs fly over an affected area and transmit images of threats or damage to be used by first responders. In flood responses, for example, RPAs provide images of floodwaters near threatened dams, bridges, and levees, and show changes in the location of flooding. During wildfires, RPAs provide images showing the locations of fire lines.

Incident-reconnaissance missions typically rely on EO/IR cameras but may also use SAR change detection. SAR may be useful in one of two ways. High-value facilities, such as power plants or dams, can be imaged with SAR before a disaster. Subsequent flights can reimage the facilities during or after the disaster, and CCD can determine whether they are damaged. EO/IR cameras can also provide images that can be analyzed for change. SAR images, however, can be generated with fewer constraints from daylight or weather conditions.

In more-dynamic disasters, such as floods, change detection can help determine where threats or damage are greatest on a given day, so that responders can react appropriately. Examples include documenting whether floodwaters are rising or receding in a specific area, or determining where water levels are highest. EO/IR cameras can also help find safe routes for emergency response in flood, fire, or other scenarios.[21]

All ANG RPAs are equipped with the EO/IR cameras most commonly used in incident-reconnaissance missions. Missions requiring SAR can only be supported by the ANG's 14 MQ-9s, but this limitation will abate as more MQ-9s enter the force in the future. ANG RPAs' utility in this mission is thus relatively high.

ANG RPA missions in support of the 2013 California Rim Fire response were of this type, and DHS RPAs have participated in several incident-reconnaissance missions involving floods, fires, and other threats. DHS RPAs have also flown missions in support of the Federal Emergency Management Agency (FEMA), National Oceanographic and Atmospheric Office, and National Guard ground units. CBP RPAs flew incident-reconnaissance missions on the Atlantic coast during the 2008 hurricane season and during floods on the Red River in 2009 and 2010.[22]

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[20] U.S. Customs and Border Protection, Office of Air and Marine, "Guardian UAS Maritime Variant Predator B," May 1, 2013.

[21] VADER's DMTI mode might also support incident reconnaissance—for example, by finding stranded people waving their arms or using other movements to signal for help. We are not aware of any demonstrations of this capability in a real-world incident, however.

[22] U.S. Customs and Border Protection, Office of Air and Marine, "Unmanned Aircraft System MQ-9 Predator B," November 2011.

Fixed-Target Surveillance

The fifth mission flown by DHS RPAs is fixed-target surveillance, which involves imaging individual buildings or other discrete targets, such as vehicles. DHS RPAs have surveilled suspected smugglers' tunnels in this way.[23] Military RPAs are sometimes used in the same manner overseas, surveilling suspected terrorist safe houses, for example.[24] Since most surveillance of this type is done with EO/IR cameras, ANG RPAs' utility in this mission would be relatively high.

Summary

In this chapter, we have identified and examined the ANG RPAs' aircraft sensors and capabilities, as well as five types of domestic RPA missions. We have discussed the characteristics of each mission, including the techniques used to maximize effectiveness and the sensors required to support these techniques. We have compared these findings with the sensors that are fielded and planned for ANG RPAs. Table 2.2 summarizes these findings.

Table 2.2
Domestic Missions, Sensor Requirements, and ANG RPA Utility

Mission Type	Technique	Primary Sensor Requirements	ANG RPA Utility by Mission[a]
Border countermigrant	DMTI surveillance with EO/IR classification	VADER	Low
Border change detection	CCD	Lynx or VADER	Increasing as MQ-9s enter force
Maritime counterdrug	MMTI with EO/IR classification	SeaVue	Low
Incident reconnaissance	Visual imagery; occasionally SAR	EO/IR camera; occasionally Lynx or VADER	High
Fixed-target surveillance	Visual imagery	EO/IR camera	High

[a] Utility indicates how suitable ANG RPAs are for each mission relative to CBP RPAs and relative to other potential ANG RPA missions.

[23] DHS, Office of the Inspector General, *CBP's Use of Unmanned Aircraft Systems in the Nation's Border Security*, Washington, D.C., OIG-12-85, May 2012.

[24] RPAs could also be used to provide surveillance support for large events, such as presidential inaugurations or nominating conventions. Such use could be subject to airspace restrictions, especially if manned aircraft were also present, but the Federal Aviation Administration (FAA) may relax such restrictions in the future.

CHAPTER THREE

Constraints

In this chapter, we pose our third research question: What are the constraints in using ANG RPAs domestically? Those operating ANG RPAs in the United States will confront several constraints based on normal availability and cost limitations, as well as public sensitivities over air safety and civil liberties. These constraints involve a complex set of legal requirements and policies, both for the operation of RPAs and for how their use is approved. Some of the constraints are common for other types of operations conducted by DoD, while others are unique to RPAs. All need to be included in how DoD plans domestic RPA missions.

First, the ANG faces operational constraints. One facet of this is aircraft availability and cost. Another operational constraint has to do with safety, particularly the FAA's "see and avoid" rules. These rules generally require a pilot in an aircraft's cockpit to ensure optimal awareness about what else is in the airspace around an aircraft. This means that any use of RPAs in unrestricted airspace requires special FAA permissions.

Second, the ANG must consider policy constraints arising from a long-standing sensitivity in the United States to using military forces for law enforcement activities. Depending on the mission, constraints established by the Posse Comitatus Act and related policies require explicit authorization by appropriate civilian law enforcement officials before RPA operators or any other military personnel can engage in law enforcement activities; this imposes restrictions on the types of activities that can be undertaken.

A third set of constraints arises from the delicate circumstances associated with any use of the military for domestic surveillance. Americans are sensitive to domestic surveillance in general, and the government places particular requirements on the military for conducting these activities. Further constraints arise from public sensitivities about RPAs, particularly conducting any domestic missions beyond standard training. DoD policies require approvals by the Secretary of Defense for RPA missions in support of civil authorities, as well as extensive interagency cooperation.

Table 3.1 depicts the nature of the constraints on RPA use.

Aircraft Availability: Commitments to Overseas Contingency Operations

The number of RPAs assigned to the ANG does not represent the number available for domestic missions. Throughout the history of the program, a substantial share of ANG RPAs has been deployed for OCOs with the active Air Force. A smaller number has regularly been in the possession of Air Force Materiel Command (AFMC) for depot maintenance. Thus, the total

Table 3.1
Constraints on ANG RPA Operations

Type of Constraint	Reason	Description
	Operational	
Availability	Not all RPAs in ANG inventory are available for domestic missions	• Approximately 25 RPAs potentially available for domestic missions at any given time out of 40+ in inventory
Cost	ANG requires funding/reimbursement for RPA operations	• MQ-1 missions: $618 per flying hour for DoD; $777 for other users • MQ-9 missions: $1,142 per hour for DoD; $1,322 for others
Air safety	The FAA has special regulations to address public concerns about RPAs sharing airspace with traditional aircraft	• FAA certificates of authorization (COAs) can take up to 60 days to receive; required for any action in unrestricted airspace • FAA aircraft safety standards
	Policy	
Posse Comitatus	There are public sensitivities to DoD's support to law enforcement activities	• Prohibits use of the armed forces to perform the tasks of civilian law enforcement unless explicitly authorized by appropriate civilian law enforcement officials
	Sensitivity	
Proper Use Memoranda (PUMs)	There are public sensitivities to the execution of domestic surveillance missions by DoD	• Required by DoD for any domestic collection of airborne or satellite imagery
Secretary of Defense approval	There are public sensitivities to use of RPAs domestically by DoD	• Required for any ANG use of RPAs in support of civil authorities
Interagency coordination	There are internal government sensitivities to DoD acting domestically without sufficient integration with civilian agencies	• Information sharing • Agency clearances

number of aircraft available for domestic missions has been a subset of the ANG's total RPA inventory.

Table 3.2 shows the number of ANG RPAs by possessing organization at specific points between 2009 and late 2014. Besides AFMC depot maintenance, RPAs were also possessed by the ANG and deployed with Air Combat Command (ACC) for OCOs. In another case, an ANG RPA was briefly possessed by Special Operations Command (SOCOM).

As Table 3.2 shows, the ANG has had more than 40 RPAs since mid-2011, although overseas operations and depot maintenance requirements have, until recently, limited the number of aircraft in its possession to about 25, or roughly 60 percent of the force. By late 2014, these figures had increased to 31 of 48 RPAs, or nearly 65 percent. Among the ANG's 14 MQ-9s, there were ten, or about 70 percent, in ANG possession.[1] Despite these limitations, the ANG has roughly three times as many RPAs in the United States as DHS, which might boost the argument in favor of ANG RPA use for domestic missions. On the other hand, the ANG (or

[1] Sammons, 2014.

Table 3.2
Air National Guard RPA Availability for Domestic Missions

Date	ANG Total	ACC	AFMC	SOCOM	Total Available
January 2009	1				1
December 2009	21	10			11
July 2010	32	10	3		19
January 2011	37	10	1		26
July 2011	43	11	1		31
January 2012	44	19			25
June 2012	43	17	1		25
December 2012	43	17	1		25
July 2013	44	17	1	1	25
November 2013	42	16	1		25
April 2014	44	14	1		29
October 2014	48	14	3		31

SOURCE: Sammons, 2014.

even DoD) might object to domestic use of RPAs, given their potential need for operations overseas and the possibility that such use could disrupt units' training and preparation.[2]

It is not clear whether the overseas requirements for ANG RPAs will decrease as U.S. forces draw down in Afghanistan. If so, it would increase the potential number available for use domestically. The United States may seek to address terrorism or other security concerns by employing RPAs elsewhere, however.

Cost

The Air Force asks for reimbursement of costs associated with operation of its aircraft for missions outside the service's normal utilization plans. For FY 2013, the Air Force requested $618 per flying hour for MQ-1 missions performed for DoD, and $777 for other users. Comparable costs for the larger, more-capable MQ-9s total $1,142 per hour for DoD missions and $1,322 for non-DoD users.[3] These rates are intended to cover fuel, depot-level maintenance and repairables, and miscellaneous other costs. The higher rate for non-DoD users includes costs for aircrew and the cost of benefits for any civilians involved in supporting the mission.[4]

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[2] See, for example, Dave Majumdar, "Exclusive: U.S. Drone Fleet at 'Breaking Point,' Air Force Says," *The Daily Beast*, January 4, 2015.

[3] Frank Kistler, "A15-1 Aircraft Reimbursement Rate," Microsoft Excel spreadsheet, October 17, 2012, derived from U.S. Air Force Instruction 65-503, *U.S. Air Force Cost and Planning Factors*, Washington, D.C.: Headquarters, U.S. Air Force, February 4, 1994.

[4] U.S. Department of Defense Financial Management Regulation, DoD 7000.14-R, Volume 11A, Chapter 6, Appendix E, "Department Of ___(1): Accounts to Which Collections Are to Be Deposited for Reimbursements for the Use of DoD-

Air Safety

The FAA is tasked with ensuring air safety and managing air traffic in the U.S. National Airspace System (NAS). Federal aviation regulations generally require a pilot in the cockpit of all aircraft to see and avoid other air traffic. The FAA has therefore developed several special regulations that constrain RPA use, including an occasional requirement that a visual observer or "chase plane" maintain visual contact with RPAs operating in the NAS.

Certificates of Authorization

DoD has relatively flexible authorities to operate RPAs for training in the restricted airspace above U.S. military facilities, but operating RPAs in most unrestricted airspace requires special approvals for both DHS and DoD. Whether for one-time or ongoing missions, DoD must request an FAA COA. The request must include a description of intended flight operations, RPA characteristics, and lost link procedures.[5]

A COA is typically issued for a specific RPA, limited to a specific route or area, and valid for a limited period.[6] In 2012, 257 COAs were issued to entities across the government operating RPAs, and a total of 545 COAs were active as of December 4, 2013.[7]

CBP has several COAs to operate RPAs for its missions. Figure 3.1 shows the areas where CBP can operate RPAs along U.S. land borders and the waters around Florida. It also depicts areas covered by COAs for emergency operations, an RPA test site off the California coast, and transit corridors between the various operating sites.

Although FAA approvals for COAs sometimes take up to 60 days, the timelines can be shorter. In 2013, the FAA granted DoD an emergency COA for the Rim Fire in California within days of the request. One consideration in that case may have been that the RPAs were flying only 60–70 miles from their normal operating area.[8] In addition, the FAA is working to develop a plan for integrating RPAs into the U.S. national airspace. This plan is scheduled to be completed by September 2015, and it may change or shorten the current COA approval process.

Safety Standards

As with manned aircraft, FAA regulations require that RPAs meet certain testing, airworthiness, and crewmember training standards. DoD relies on its UAS Airspace Integration Joint Integrated Product Team (JIPT) to address testing and airworthiness standards. The JIPT addresses both near-term operational constraints and long-term technology requirements, and coordinates closely with the FAA and the special committee it chartered to develop civil performance standards. In some cases, an airworthiness certification allowing unlimited NAS access may be costly and unnecessary, so the JIPT may recommend that DoD request lim-

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Owned Aircraft (Fixed Wing)," Washington, D.C.: Under Secretary of Defense, December 2008 , pp. 6-E-1–6-E-2.

5 DoD, *Unmanned Systems Integrated Roadmap FY2013–2038*, Washington, D.C., 2013, p. 83.

6 Past exceptions to these limitations include a national COA issued to the Air Force for Global Hawk operations in the NAS, and a disaster relief COA issued to U.S. Northern Command (USNORTHCOM). See DoD, *Unmanned Systems Roadmap 2007–2032*, Washington, D.C., 2007, p. 88.

7 Gary Mortimer, "FAA Updates UAS Page," *sUAS News*, January 7, 2014.

8 Interviews with DoD officials, December 2013.

Figure 3.1
U.S. Customs and Border Protection Air and Marine Unmanned Aircraft Systems Operations

SOURCE: Kostelnik, 2012.
NOTE: PED = processing, exploitation, and dissemination; AFB = Air Force Base; AMOC = Air and Marine Operations Center; LRE = launch and recovery element; MCE = mission control element.
RAND *RR1016-3.1*

ited certification to operate only in uncongested airspace.[9] Regarding crew member training, DoD's Joint Staff maintains an instruction describing minimum levels of training that meet FAA standards. This also helps standardize training across the military services.[10]

Congress and the Future of RPA Integration in the National Airspace

Congress has played an important role in providing guidance on how the U.S. government should address the integration of RPAs into the NAS. The 2009 National Defense Authorization Act stated: "The pace of progress in access of [RPA] systems to the National Airspace System has been insufficient and poses a threat to national security." To help resolve disputes

[9] DoD, 2007, p. 96.

[10] Chairman of the Joint Chiefs of Staff Instruction 3255.01, *Joint Unmanned Aircraft Systems Minimum Training Standards*, Washington, D.C.: Joint Staff, October 31, 2011, p. 1.

over RPA policies and procedures between DoD and the FAA, Congress recommended establishing a Joint Executive Committee.[11]

The UAS Executive Committee (ExCom) has become a focal point for officials from DoD, FAA, the National Aeronautics and Space Administration (NASA), and DHS to identify solutions to enable the integration of DoD and other federal agency RPAs into the NAS. The UAS ExCom approved the UAS NAS Access Plan in October 2010, which addresses the milestones, policy recommendations, flight standards, and operating procedures necessary to provide a path for UAS integration into the NAS.[12]

In 2012, Congress expressed a sense of urgency in requiring that the FAA produce a plan to accelerate the integration of commercial and government RPAs into the NAS and publish a road map every five years detailing progress. Congress also directed the establishment of six RPA test ranges as a way of testing all aspects of RPA integration into the NAS.[13] In December 2013, the FAA selected sites in Alaska, Nevada, New York, North Dakota, Texas, and Virginia as RPA test ranges.[14]

Merely flying RPAs between military bases requires notification of the Chairman of the Joint Chiefs of Staff. Given that the National Guard based RPAs in five states as of 2014 and that the potential for domestic RPA missions is growing, the UAS ExCom, JIPT, and other processes for accelerating RPA integration into the NAS are becoming increasingly important.

Policy Constraints

Many of the policy constraints on ANG RPA operations are founded on safeguarding society or promoting effective DoD enterprise management. The same constraints that apply to domestic operations by manned aircraft also apply to RPAs, but the political sensitivities surrounding RPAs add to the challenges and complexity.

The policy constraints on domestic RPA operations by DoD are especially complex for a variety of reasons. These include

- differences in United States Code (U.S.C.) Title 10 (active duty) and Title 32 (state active duty/full-time National Guard) missions[15]

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[11] Public Law 110-417, Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Section 1036(a), Stat. 4596, October 14, 2008.

[12] DoD, 2013, p. 84.

[13] U.S. House of Representatives, conference report to accompany H.R. 658, FAA Modernization and Reform Act of 2012, 2012, pp. 195–197.

[14] These sites were in addition to DoD's Sense and Avoid test sites and other RPA sites on military installations. FAA, "FAA Selects Unmanned Aircraft Systems Research and Test Sites," press release, December 30, 2013.

[15] The nuances of the U.S. military's active duty, reserve, and National Guard authorities under Title 10 and Title 32 of the U.S.C. are themselves complex. Most of the laws for federal mission operations are in Title 10, which extends federal tort protection to all national guardsmen who are federalized. Under Title 10, active duty means full-time duty in the active military service of the United States. Title 10 allows the President to federalize National Guard forces by ordering them to active duty in their reserve component status or by calling them into federal service in their militia status. Title 32 authorizes state National Guard training, as well as missions under the control of the relevant governor. Federal tort protection for guardsmen in Title 32 status includes such duties as monthly drill, annual training, attendance at service schools, and specified drug interdiction activities—but these are specifically delineated aspects of federal tort protection, which would not apply to a broad range of homeland security activities. For more information on Title 10 versus Title 32, see Lynn E.

- special guidance applied to RPAs
- different authorities relating to various missions categorized as DSCA.[16]

Often, these different authorities and guidance are at odds with each other, which complicates real-world operations. For example, DoD does not consider state governors using U.S. military forces under Title 32 to be DSCA.[17] But DoD guidance on RPAs states that the Secretary of Defense's approval is required if a state governor wants to use RPAs, even though such use would be in Title 32 status (and thus technically not DSCA).[18]

Given these kinds of complexities, we next explain the key constraints on RPA operations and describe some of the processes DoD and the National Guard use to manage them.

Posse Comitatus and Related Policies

The Posse Comitatus Act (18 U.S.C., Section 1385) and associated legislation and regulations prohibit use of the armed forces to perform the tasks of civilian law enforcement unless explicitly authorized. It does not apply to National Guard personnel on duty under Title 32 authority, although federal regulations generally prohibit such personnel from directly participating in arrests or searches.[19]

DoD's National Guard Counter Drug Support policy, for example, states that National Guard personnel on Title 32 counterdrug missions are generally not authorized to directly participate in the arrest of suspects, conduct searches that include direct contact with suspects or the general public, or become involved in the chain of custody for evidence.[20] Under this policy, DoD may fund RPA operations that support Title 32 counterdrug missions, but a law enforcement officer must be engaged in all missions.[21] Of our five mission types, border countermigrant missions and fixed-target surveillance require law enforcement engagement.

Posse Comitatus–driven constraints keep military RPAs and other forces in a supporting role, even when acting under Title 32. DSCA missions, such as emergency response, search and rescue, and special event support, may involve different divisions of responsibility with law enforcement and other agencies.

Davis, David E. Mosher, Rick Brennan, Jr., Michael D. Greenberg, K. Scott McMahon, and Charles W. Yost, *Army Forces for Homeland Security*, Santa Monica, Calif.: RAND Corporation, MG-221-A, 2004.

[16] Defense support of civil authorities is support provided by federal military forces, DoD civilians, DoD contract personnel, DoD component assets, and National Guard forces (when the Secretary of Defense, in coordination with the governors of the affected states, elects and requests to use those forces in Title 32 status or when federalized) in response to requests for assistance from civil authorities for domestic emergencies, law enforcement support, and other domestic activities, or from qualifying entities for special events.

[17] DoD Directive 3025.18, *Defense Support of Civil Authorities*, Washington, D.C.: U.S. Department of Defense, September 21, 2012, p. 16.

[18] DoD, *Interim Guidance for the Domestic Use of Unmanned Aircraft Systems*, Washington, D.C., September 28, 2006.

[19] For a detailed review of Posse Comitatus, see Charles Doyle and Jennifer K. Elsea, *The Posse Comitatus Act and Related Matters: The Use of the Military to Execute Civilian Law*, Washington, D.C.: Congressional Research Service, CRS Report R42659, August 16, 2012.

[20] National Guard Regulation 500-2/ANGI 10-801, *National Guard Counterdrug Support*, Washington, D.C.: U.S. Department of Defense, August 29, 2008, p. 3.

[21] National Guard Regulation 500-2/ANGI 10-801, 2008, pp. 6–7.

Imagery Collection and Proper Use Memoranda

Policies related to Posse Comitatus are intended to ensure that DoD follows strict procedures in collecting domestic imagery. U.S. law enforcement agencies have overall responsibility for gathering domestic intelligence. DoD can assist these agencies, including with RPAs, but only within specified guidelines.

Title 10 provides DoD with broad authority to share any information that its sensors collect during normal operations and training that "may be relevant to a violation of any Federal or State law" with law enforcement agencies.[22] In the case of domestic counterdrug operations, DoD may collect imagery outside normal military operations or training within the following parameters:

1. An appropriate law enforcement agency official must submit a valid request for DoD counterdrug support.
2. DoD may not directly engage in most law enforcement activities.[23]
3. DoD sensor use must be constrained to 25 miles inside U.S. territory along the border.[24]

In supporting any domestic missions (counterdrug or otherwise), DoD requires that the relevant units develop and submit a PUM for any domestic collection of airborne or satellite imagery. The PUM must clearly define the collection requirements for and intended use of the imagery and the collecting unit's understanding and acceptance of the relevant legal and policy restrictions.

The Defense Intelligence Agency coordinates PUMs for airborne platforms and was originally the approving authority for National Guard collection requests, until it delegated that authority to the National Guard Bureau in February 2012.[25]

Air Force Instruction 14-104 identifies several types of missions that "generally constitute legally valid requirements for domestic imagery."[26] These include disaster management, critical infrastructure protection, environmental studies, and training. Of the five mission types we discussed in the previous chapter, only one—maritime counterdrug operations—could be conducted without a PUM.

Secretary of Defense Approval

A second constraint on domestic ANG RPA operations is a requirement for approval by the Secretary of Defense. Although the National Guard Bureau can approve PUMs for domestic

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22 10 U.S.C. 371, Use of Information Collected During Military Operations, December 1, 1981.

23 10 U.S.C. 375, Restriction on Direct Participation by Military Personnel, January 7, 2011, describes the prohibition on DoD direct support to law enforcement.

24 This is from Section 1004 of the 1991 National Defense Authorization Act, recorded as a note to 10 U.S.C. 374, Maintenance and Operation of Equipment, January 16, 2014. All three sections of Title 10 stipulate the same geographic limit where the DoD is authorized to conduct detection and monitoring operations, which is up to 25 miles within U.S. territory.

25 Defense Intelligence Agency, "Request for Delegation of Proper Use Approval Authority," memo to National Guard Bureau, February 27, 2012.

26 U.S. Air Force Instruction 14-104, *Oversight of Intelligence Activities*, Washington, D.C.: Headquarters, U.S. Air Force, April 23, 2012, p. 10.

imagery collection by ANG units, the Secretary of Defense must approve any domestic operation of RPAs, including all five mission types we considered.

Approval by the Secretary of Defense is required for almost all DSCA missions, but DoD officials below the secretary may authorize an immediate response to emergencies to "save lives, prevent human suffering, or mitigate great property damage within the United States."[27] This exception does not apply to RPA operations, however. DoD Directive 3025.18 states, "No DoD unmanned aircraft systems (UAS) will be used for DSCA operations, including support to Federal, State, local, and tribal government organizations, unless expressly approved by the Secretary of Defense. Use of armed UAS for DSCA operations is not authorized."[28]

Similarly, as mentioned earlier, while DSCA guidance does not restrict National Guard units operating under Title 32, DoD RPA guidance does: "Governors in states where DoD UAS assets are assigned to the State's National Guard may use DoD UAS assets with the express approval of the Secretary of Defense."[29] This is a sensitive topic, given the autonomy that state governors usually have in using DoD assets for Title 32 missions.

The requirement for approval of RPA operations by the Secretary of Defense is not intended to discourage their use. On the contrary, DoD guidance encourages governors with access to RPAs to incorporate them into response plans and coordinate those plans with military units that may respond under Title 10 authorities.[30]

As discussed earlier, the California Rim Fire was the first domestic use of an ANG RPA for DSCA. California's Office of Emergency Services (Cal OES) formally requested RPA support on August 24, 2013. The California ANG's 163rd Reconnaissance Wing submitted a PUM and request for approval by the Secretary of Defense. The PUM request followed the well-established process of coordination and information sharing among relevant DoD inspectors general, judge advocates/general counsels, intelligence officers, and operators. The request to the Secretary of Defense, however, was unprecedented.

In addition to the 163rd Reconnaissance Wing's request, the National Interagency Fire Center forwarded Cal OES's request to FEMA. This created a separate, federal-level request for assistance. These went to the responsible FEMA regional office (FEMA region IX), which prompted the region's defense coordination officer to submit a "mission assignment" to USNORTHCOM for validation.[31] USNORTHCOM validated the requirement and submitted it to the Joint Staff for Secretary of Defense approval through the Global Force Management (GFM) process.[32] After a significant amount of senior leader consultation, the secretary approved the mission on August 27.[33]

Future emergencies may require a more rapid response, and they could benefit from an accelerated RPA approval process. Selected DSCA missions using specific systems are preap-

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[27] DoD Directive 3025.18, 2012, pp. 3–6.

[28] DoD Directive 3025.18, 2012, p. 6.

[29] DoD, 2006.

[30] DoD, 2006.

[31] Defense coordination officers serve as liaisons to FEMA's ten regions and facilitate coordination with state adjutant generals and USNORTHCOM leadership.

[32] Senator Barbara Boxer also made a call about the request to press for Secretary of Defense approval.

[33] Interviews with DoD officials, December 2013.

proved by the Secretary of Defense through a standing USNORTHCOM execution order. While emergency RPA deployments could be approved through GFM, this process is oriented toward Title 10 deployments. Using it for RPA deployments in Title 32 status may create additional challenges due to the different authorities, personnel, and state agencies involved.[34] It may be advisable for ANG staff to work with Office of the Secretary of Defense (OSD) and Joint Staff personnel involved in the GFM process to develop a standard procedure for a special Secretary of Defense Orders Book that would facilitate both Title 10 and Title 32 domestic RPA deployments.

Interagency Coordination

The recent successful interagency coordination on border security has paved the way for future DSCA missions. More-recent events suggest that ANG aerial monitoring missions, including through RPAs, may become more common in the future.

At the outset of the 2006–2008 border security initiative called Operation Jump Start, DHS identified several major missions that would support the Border Patrol while keeping military personnel separate from direct law enforcement activities. One of these missions was surveillance and reconnaissance to provide increased detection and tracking capabilities. This mission included fixed, mobile, and airborne sensor systems.[35] The ANG participated in Jump Start to a far greater degree than it had in most previous homeland security missions.[36] Although RPAs were not used, the interagency coordination employed in planning the operation should facilitate future domestic RPA use.

On May 25, 2010, President Barack Obama announced that up to 1,200 National Guard troops would be sent to the southern U.S. border to support the Border Patrol as part of Operation Phalanx. In late 2011, DoD and DHS decided to reduce the number of troops assigned to the border mission to 300, with the remaining forces focusing on aerial surveillance.[37] DoD's continued support of aerial surveillance along the border has involved close coordination with DHS and may pave the way for future RPA operations.

In other potential RPA missions, such as emergency response, interagency coordination can be hampered by constraints related to intelligence sharing. For example, most DoD imagery is processed, exploited, and disseminated on classified computer systems. Most first responders cannot access these systems without first receiving clearances, a process that can rarely be completed fast enough to provide timely access in an emergency situation. While the benefits of imagery from RPAs could be significant, the lack of an information technology architecture that can feed it directly to first responders is a constraint that may deserve additional attention by policymakers.

While not discussing RPAs explicitly, the Secretary of Defense directed in December 2013 that DoD account for law enforcement agency needs when planning information-collection activities within normal training and operations. The secretary established the Senior Steering

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[34] Interviews with DoD officials, December 2013.

[35] Michael D. Doubler, *Operation Jump Start: The National Guard on the Southwest Border, 2006–2008*, Arlington, Va.: National Guard Bureau, Office of Public Affairs, Historical Services Division, October 24, 2008, p. 20.

[36] Doubler, 2008, pp. 2, 68.

[37] The mission was also renamed Operation Nimbus at this point. Mickey McCarter, "National Guard to Shift Support to Border Patrol from Ground to Air," *HSToday.us*, December 12, 2011.

Group to implement this guidance and engage with DHS and the Department of Justice.[38] It may be beneficial for this group to discuss how and to what extent RPAs may be used for future civil support missions, and how to facilitate interagency cooperation during such missions. This would be particularly useful for emergency response scenarios.

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[38] Chuck Hagel, "Leveraging Military Training for Incidental Support of Civil Authorities," memo, Department of Defense, December 16, 2013.

CHAPTER FOUR

Conclusions and Recommendations

In this report, we have examined ANG RPA suitability for domestic missions by asking three central questions:

1. Is there a role for ANG RPAs in conducting DSCA missions, given the growth in their numbers since 2009 and limits on CBP's fleet?
2. What types of DSCA missions are best suited for ANG RPAs, given their capabilities?
3. What are the constraints in using ANG RPAs domestically?

Our analysis identified ANG RPA capabilities, constraints, and the types of domestic missions that RPAs have flown. These include border countermigrant, border change-detection, maritime counterdrug, incident-reconnaissance, and fixed-target surveillance missions.

Our findings lead us to offer several recommendations. First, the current ANG RPA force can add the most value by freeing up DHS RPAs to focus on the three missions for which they are best (and in many cases uniquely) equipped: border countermigrant, border change-detection, and maritime counterdrug missions. This would suggest that decisionmakers consider ANG RPAs for incident-reconnaissance missions. If a response is required faster than ANG RPAs can support, DHS RPAs could be employed until ANG RPAs are available. To the extent that policy restrictions allow, ANG RPAs are also suitable for fixed-target surveillance. Because the MQ-1s composing the bulk of the current ANG RPA force carry only EO/IR sensors, they are best suited to incident-reconnaissance and fixed-target surveillance missions. This would allow DHS RPAs—with additional sensors, such as VADER, SeaVue, and Lynx—to stay fully engaged in the border and counterdrug missions that require (or are optimally performed with) those sensors.

As ANG units convert to the MQ-9, however, the force will become more capable of border change-detection missions. Thus, our second recommendation is that the ANG position itself to support such missions by prioritizing the conversion of units closest to the southwestern border, such as those in Texas and Arizona. This would position aircraft with appropriate sensors closest to the areas where they would be best utilized. Such positioning would speed response while minimizing the need for transits to the border and thus requests for access to additional airspace.

Since the existing force is best suited to incident-reconnaissance missions, we also suggest that the ANG continue to apply the experience gained from the Rim Fire operation. Thus, our third recommendation is that when planning and conducting RPA-related exercises and training, the National Guard should increase its focus on policy issues and on working through the approval and coordination processes for incident-reconnaissance missions. Increasing involve-

ment in such events by OSD and other officials will also be valuable. This will educate both operators and policymakers, and thus help to facilitate future approvals.

Fourth, we recommend that the National Guard and other stakeholders consider procedures like those associated with the Secretary of Defense Orders Book; this would simplify the process of deploying and employing RPAs for Title 10 and Title 32 domestic operations.

Fifth, we suggest that the ANG consider hosting a series of periodic workshops or conferences to educate law enforcement agencies and first responders about RPAs. These events could focus on the capabilities of ANG RPAs and the processes required to obtain RPA support for law enforcement or emergency management operations. These exchanges should help stakeholders identify ways to streamline civil support processes.

Finally, while we defer to policymakers about how and whether ANG RPAs are to be used domestically, significant external engagement with Congress and the public will be necessary. Thus, we recommend developing a strategy that can help identify and address congressional concerns while providing transparency for the public as DoD works to explain its policies and uses for RPAs domestically.

Abbreviations

ACC	Air Combat Command
AFMC	Air Force Materiel Command
ANG	Air National Guard
Cal OES	California's Office of Emergency Services
CBP	Customs and Border Protection
CCD	coherent change detection
COA	certificate of authorization
DHS	Department of Homeland Security
DMTI	Dismount Moving Target Indicator
DoD	Department of Defense
DSCA	defense support of civil authorities
EO/IR	electro-optical/infrared
ExCom	Executive Committee
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FY	fiscal year
GFM	Global Force Management
GMTI	ground moving target indicator
JIPT	Joint Integrated Product Team
MMTI	maritime moving target indicator
NAS	National Airspace System
OCO	overseas contingency operation
OSD	Office of the Secretary of Defense
PUM	Proper Use Memorandum

RPA	remotely piloted aircraft
SAR	synthetic aperture radar
SOCOM	Special Operations Command
UAS	unmanned aircraft systems
UAV	unmanned aerial vehicle
U.S.C.	United States Code
USNORTHCOM	U.S. Northern Command
VADER	Vehicle and Dismount Exploitation Radar

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With the nation facing a variety of domestic threats and potential emergencies, policymakers are looking for ways to respond, especially as budgets decline. They need to exploit new capabilities and optimize those that already exist. Air National Guard (ANG) remotely piloted aircraft (RPAs) may offer such an opportunity. However, significant sensitivities may arise in the use of military RPAs for domestic missions. There are also constraints at both the operational and policy levels. This report analyzes which domestic RPA missions are best suited to the ANG's current and planned capabilities and explores the policy and operational constraints that ANG RPAs face in conducting such missions. The authors gathered and analyzed data on the kinds of missions that RPAs conduct domestically, the current and future capabilities of the ANG's RPA force (such as sensors), and the policy and operational constraints the ANG faces in using its RPAs to fly domestic missions.

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