A Report
to the
Montana
Legislature

Information Systems Audit

Unmanned Aircraft Systems Deployment and Oversight

Office of the Governor

June 2019

Legislative Audit
Division

17DP-05

Legislative Audit Committee

Representatives

Kim Abbott
Kim.Abbott@mtleg.gov
Dan Bartel
Danbartel2@gmail.com
Tom Burnett, Vice Chair
Burnett.tom@gmail.com
Denise Hayman
Denise.Hayman@mtleg.gov
Emma Kerr-Carpenter
KC@mtleg.gov
Matt Regier
Matt.Regier@mtleg.gov

Senators

Dee Brown
senatordee@yahoo.com
Jason Ellsworth
Jason.Ellsworth@mtleg.gov
John Esp
Johnesp2001@yahoo.com
Pat Flowers
Pat.Flowers@mtleg.gov
Tom Jacobson
Tom.Jacobson@mtleg.gov
Mary McNally, Chair
McNally4MTLeg@gmail.com

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IS audits are performed as stand-alone audits of IS controls or in conjunction with financial-compliance and/or performance audits conducted by the office. These audits are done under the oversight of the Legislative Audit Committee, which is a bicameral and bipartisan standing committee of the Montana Legislature. The committee consists of six members of the Senate and six members of the House of Representatives.

Audit Staff

Hunter McClure
Diedra Murray
T. Shane Somerville

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LEGISLATIVE AUDIT DIVISION

Angus Maciver, Legislative Auditor
Deborah F. Butler, Legal Counsel

Deputy Legislative Auditors:
Cindy Jorgenson
Joe Murray

June 2019

The Legislative Audit Committee
of the Montana State Legislature:

This is our information systems audit of Unmanned Aircraft Systems use by Montana state agencies. This report provides information on how state agencies' use these aircraft and includes recommendations for the Governor's Office to improve statewide operational and information technology policy, oversight, and public outreach across the state. A written response from the Governor's Office is included at the end of the report.

We wish to express our appreciation to the Governor's Office and Department of Transportation, Department of Justice, Department of Environmental Quality, Department of Livestock, Department of Natural Resources & Conservation, Department of Fish, Wildlife & Parks, University of Montana, and Montana State University personnel for their cooperation and assistance during the audit.

Respectfully submitted,

/s/ Angus Maciver

Angus Maciver
Legislative Auditor

Room 160 • State Capitol Building • PO Box 201705 • Helena, MT • 59620-1705
Phone (406) 444-3122 • FAX (406) 444-9784 • E-Mail lad@mt.gov

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	Mike Cooney, Lieutenant Governor
	Tom Lopach, Chief of Staff
	Raphael Graybill, Chief Legal Council
	Ali Bovingdon, Deputy Chief of Staff

Montana Legislative Audit Division

Information Systems Audit

Unmanned Aircraft Systems Deployment and Oversight

Office of the Governor

June 2019 17DP-05 Report Summary

In January 2018 there were one million registered unmanned aircraft systems nationwide with 122,000 belonging to commercial and public operators with estimates to increase to 455,000 by 2022. Currently, eight state agencies plan to use or are using unmanned aircraft in their operations and we determined their use can improve business processes. However, improvements are needed for deployment of these systems to provide coordination and oversight of unmanned aircraft in state government related to pilot certification and training, safe use and citizen privacy, and protection of data gathered.

Context

Unmanned Aircraft Systems (UAS) are being deployed by governments and businesses across the country. Eight Montana state agencies currently use, or plan to use, these systems to monitor construction sites, observe wildlife, investigate vehicle crashes, and contribute to academic research, among other uses. We reviewed the Department of Environmental Quality; Department of Natural Resources and Conservation; Department of Justice; Department of Fish, Wildlife & Parks; Department of Livestock; Department of Transportation; Montana State University; and the University of Montana were reviewed as part of our audit work. Though not reviewed as part of our work, the Department of Corrections and Montana State Library have shown interest in using aircraft. The Department of Commerce used to fly UAS but due to a change in staff no longer use them. By incorporating unmanned aircraft into their operations, agencies may reduce both operating and personnel services costs and increase performance of their operations. However, launching an unmanned aircraft program is not without its challenges, including initial cost of equipment, training pilots, developing policy, and complying with Federal Aviation Administration regulations. We reviewed the risks and benefits of UAS implementation by state agencies, assessed agency compliance with state and federal regulations, and determined if unmanned aircraft usage is consistent, properly managed, and subject to appropriate review across the state.

Results

We found Montana does not coordinate efforts when it comes to agency UAS implementation. Agencies are following federal regulations but lack oversight and guidance when adhering to best practices. While examining current unmanned aircraft activities across eight state agencies, we identified a lack of consistency in operational procedure and policy. Agencies are duplicating effort when it comes to policy creation and are missing key aspects of a complete unmanned aircraft policy. Due to limited information on unmanned aircraft use within state government, we determined the state would benefit from providing

(continued on back)

information outreach as well as a main contact point for interested parties. Based on our review, a central resource would improve consistency, provide guidance to agencies, ensure regulatory compliance, provide informational sessions to local government and other state agencies, and provide information to the public on state government unmanned aircraft use. Our audit includes five recommendations to the Governor's Office that address issues related to cost-benefit analysis, central unmanned aircraft resource, information outreach, and unmanned aircraft operational and IT policy.

Recommendation Concurrence	
Concur	5
Partially Concur	0
Do Not Concur	0

Source: Agency audit response included in final report.

For a complete copy of the report (17DP-05) or for further information, contact the Legislative Audit Division at 406-444-3122; e-mail to **lad@mt.gov**; or check the web site at **https://leg.mt.gov/lad/audit-reports**
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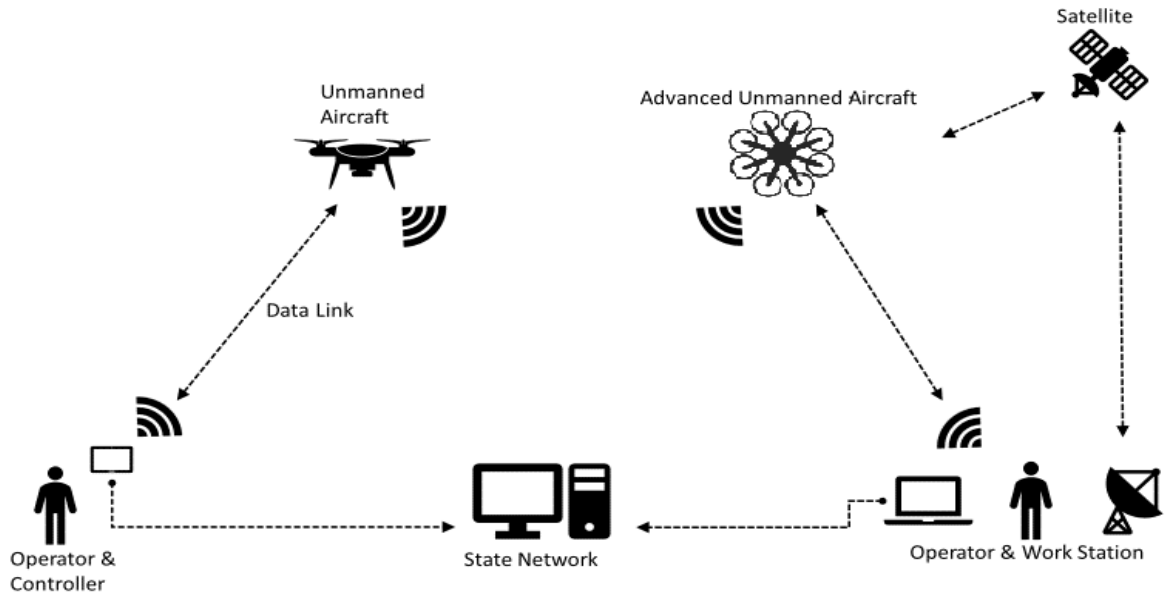
Chapter I – Introduction and Background

Introduction

Unmanned Aircraft Systems (UAS) go by many names; these include Unmanned Aerial Vehicle, Unmanned Aircraft Vehicle, small Unmanned Aircraft Vehicle, drone, and quadcopter. The Federal Aviation Administration (FAA) uses the term Unmanned Aircraft System and for this report we will use this term when referring to these systems. An unmanned aircraft is an aircraft without a human pilot onboard - instead, it is controlled from an operator on the ground. The Unmanned Aircraft System is composed of the unmanned aircraft itself, a ground-based controller, and a system of communications between the two. Similarly, the entire system, the unmanned vehicle and its communication system have a variety of names, including: Unmanned Aerial System, Small Unmanned Aircraft System, and Unmanned Aircraft System.

Figure 1 depicts a human operator using a ground control station to operate the unmanned aircraft. The aircraft and ground control station are connected via data link. The entire figure is the unmanned aircraft system.

Figure 1
Unmanned Aircraft System Diagram



Source: Created by the Legislative Audit Division.

Unmanned aircraft have a wide variety of applications. These applications can include crop surveys, aerial photography, inspection of power lines and pipelines, education,

journalism, and counting wildlife. There are four main users of unmanned aircraft: governmental, commercial, educational, and recreational. There are regulations set in place by the FAA for these users to own and operate unmanned aircraft. These regulations include listed requirements set forth by the FAA's Small Unmanned Aircraft Rule (Part 107), and Certificates of Authorizations.

With clear requirements set forth by the FAA and low costs to purchase an unmanned aircraft, the number of users is the highest it has ever been. Nationwide, the number of commercial and public-sector operators is at 122,000 with the number expected to increase to 455,000 by 2022. Our audit work determined unmanned aircraft use is also increasing in Montana. According to the FAA, there are over 4,000 registered unmanned aircraft in Montana. As the number of operators continues to grow, the importance of proper management increases, particularly regarding transparency of use in government operations and the privacy protection of citizens.

UAS are an important and new technology that change physical space. This change comes with benefits as well as risks. It is important to appropriately manage government UAS use to mitigate the risk. This audit was prioritized by the Legislative Audit Committee in 2017 after a legislative request was conducted in 2015 related to unmanned aircraft use in state government.

Audit Objectives

Our objectives during the audit were to:

1. Determine the potential benefits and risks of Montana state government agencies using unmanned aircraft in their operations.
2. Determine if state agencies comply with Federal Aviation Administration regulations and Montana state law to own and operate an unmanned aircraft.
3. Evaluate Montana agency unmanned aircraft programs and determine if clear guidance is provided at the statewide level to ensure proper use and transparency.

Audit Scope

The scope of our audit focused on FAA regulations and compliance, coordination of Montana's state agency unmanned aircraft usage, and impacts of their use, such as increased costs, cost savings, and risk reductions or increases to the state of Montana. The audit focused on how state agencies use unmanned aircraft and if procedure follows regulations and aligns with best practices. The time frame of our review was calendar year 2017-2018. The agencies reviewed included: the Department of Commerce; Department of Environmental Quality; Department of Natural Resource and Conservation; Department of Justice; Department of Fish, Wildlife & Parks;

Department of Livestock; Department of Transportation; Montana State University; and the University of Montana. We selected these agencies because they are either using unmanned aircraft or in the process of implementing these aircraft into their operations. Due to the number of agencies involved with these aircraft, the audit team directed recommendations to the Office of the Governor.

Audit Methodologies

The following methodologies were conducted to answer our objectives:

- Reviewed standards and regulations for unmanned aircraft usage established by Montana and the Federal Aviation Administration (FAA).
- Interviewed FAA staff regarding unmanned aircraft federal policy and registration requirements.
- Reviewed current Montana laws and regulations, as well as past proposed legislation related to state agency unmanned aircraft use.
- Reviewed state agency unmanned aircraft program policies and procedures and observed flights at the Department of Environmental Quality, Department of Transportation, and University of Montana.
- Researched other states/organizations with unmanned aircraft programs to identify best practices for program structure.
- Surveyed the eight agencies (100 percent response rate) to understand the level of unmanned aircraft development for each state agency. Information gathered included the age of program, development of operation policies, scope of operations, size of support staff, and research conducted when establishing their program.
- Conducted a cost savings comparison of state agency unmanned aircraft use. This included an assessment of agency operating costs prior to unmanned aircraft implementation, costs related to implementing and maintaining unmanned aircraft operations, and determining net savings or additional costs related to unmanned aircraft implementation.
- Reviewed unmanned aircraft operations in other states and compared them to Montana to identify potential benefits of use in state government operations.
- Interviewed Department of Administration procurement office staff to understand unmanned aircraft procurement procedures.
- Interviewed State Information Technology Services Division staff to understand technology controls over unmanned aircraft purchases and use.
- Interviewed Risk Management and Tort Defense Division staff to understand state insurance implications related to unmanned aircraft use.
- Interviewed Governor's Office staff to determine its oversight role of unmanned aircraft use across state agencies.

- Interviewed unmanned aircraft staff at the University of Montana's Autonomous Aerial Systems Office to determine if UM meets federal requirements and to observe an unmanned aircraft flight.

Report Contents

The remainder of this report discusses our audit work and includes chapters detailing our findings, conclusions, and recommendations in the following areas:

- Chapter II addresses our work in determining state agency compliance with FAA regulations and state law.
- Chapter III provides our cost savings comparison of state agency unmanned aircraft use. This chapter also discusses the benefits and risks of state agencies incorporating unmanned aircraft into their operations, and the importance of conducting a cost-savings analysis and of having a UAS central resource.
- Chapter IV discusses state agency unmanned aircraft use and best practices, and compares Montana's uses (of UAS) to those in other states.

Chapter II – Review of State Agency Compliance With Unmanned Aircraft Requirements

Introduction

This chapter discusses our objective to determine if state agencies, including the university system, comply with Federal Aviation Administration (FAA) regulations and state law. We discuss two different areas in this chapter. The first area focuses on FAA standards and regulation review. The second area discusses state agency unmanned aircraft procedures to determine if they align with FAA regulations and state law. We found Montana has few state laws or policies pertaining to unmanned aircraft use. Currently, most rules and regulations are at the federal level and were enacted by the FAA. Based on our review, state agencies are following federal regulations but have little guidance at the state level in terms of state laws or administrative rules.

Federal Unmanned Aircraft Regulations Differ Based on the Type of User

To determine the rules and regulations government operators must follow, we reviewed federal unmanned aircraft policy as well as the FAA's preeminence over the National Airspace System. Governmental, commercial, educational, and recreational users have similar regulations they must follow but have different options to operate under. All unmanned aircraft under these regulations are considered "small" meaning the unmanned aircraft must weigh less than 55 pounds. It should be noted that flying a large unmanned aircraft (over 55 pounds) is permitted via a public Certificate of Waiver or Authorization or through an exemption, which are issued by the FAA.

Requirements Applicable to Recreational Users

Individuals can fly their unmanned aircraft for recreational purposes. To be considered a recreational user, individuals must meet these requirements:

- Fly for hobby or recreation only
- Register unmanned aircraft with FAA
- Fly within visual line-of-sight
- Follow community-based safety guidelines and fly within the programming of a nationwide community-based organization
- Unmanned aircraft must weigh under 55 pounds unless certified by a community-based organization
- Never fly near other aircraft
- Never fly near emergency response efforts

The FAA Reauthorization Act of 2018 was signed into law in October 2018. Part of this act made minor changes to rules regarding the recreational use of unmanned aircraft. These changes did not impact government use. The FAA is evaluating the impacts of this change in law and how implementation will proceed. The Reauthorization Act was not fully implemented upon signing and the FAA is encouraging operators to follow all current policies and guidance with respect to recreational use of unmanned aircraft.

Governmental and Other Users May Fly Under FAA Part 107

Government entities, such as federal and state government agencies, law enforcement agencies, and public colleges and universities, have the option to follow the FAA's Small Unmanned Aircraft Rule (Part 107). Part 107 has two main requirements: registering the unmanned aircraft and becoming an FAA certificated unmanned aircraft pilot by passing a knowledge test. Recreational, commercial, and educational users also have the option to operate under Part 107.

Remote pilot certificate requirements include: being at least 16 years of age, having the ability to read, speak, write, and understand English; being in a physical and mental condition to safely operate an unmanned aircraft; and passing the initial aeronautical knowledge exam. Individuals wishing to receive their license for the first time must take and pass the initial aeronautical knowledge exam at an FAA-approved knowledge testing center. The aeronautical knowledge exam contains several questions relating to unmanned aircraft regulations such as airspace classification, aviation weather sources, effects of weather on unmanned aircraft performance, radio communication procedures, and safety and emergency procedures. The certificate should be easily accessible by the remote pilot during all unmanned aircraft operations and is valid for two years.

The FAA provides "regulatory flexibility" in its unmanned aircraft regulations that come in the form of waivers. Examples of Part 107 waivers include:

- Operations from a moving vehicle
- Operation over people
- Operation of multiple unmanned aircraft

Pilots submit a waiver application to the FAA containing information such as responsible party, operation parameters, justification, and existing waivers. The approval process can take up to 90 days.

Additional Certification Requirements for Government Users Only

During unmanned aircraft's early integration into the National Airspace System, the only way for a government operator to operate an unmanned aircraft was through a public Certificate of Authorization (COA), which is an authorization issued by the FAA to a public operator for specific unmanned aircraft activity. Only government entities, such as federal and state government agencies, law enforcement agencies, and public colleges and universities, can receive a COA for public unmanned aircraft operations. A COA generally has all the requirements of Part 107 but can also have special exceptions preemptively approved by the FAA. To receive a COA, agencies are required to fill out detailed sections on an application including procedures, flight operations area/plan, flight aircrew qualifications, and any special circumstances for operations. In most cases, the FAA will provide a formal response within 60 days from the time a completed application is submitted. In 2016, the FAA implemented Part 107 to make unmanned aircraft rules easier to understand. This gave public operators two options to fly, Part 107 or a COA, based on their operation needs.

Federal Oversight of National Airspace Limits State and Local Governments Regulation of Unmanned Aircraft Use

The FAA has preeminence over the National Airspace System. This preeminence limits state and local governments ability to enact laws and ordinances concerning unmanned aircraft use. For example, in December 2016 the city of Newton, Massachusetts passed a law to ban unmanned aircraft flights below 400 feet, ban flights over private and public property without landowner's permission, and require local registration of unmanned aircraft. However, a federal judge in Massachusetts in 2017 ruled the city does not have authority due to the FAA's preeminence over the airspace.

The FAA does recognize areas of shared responsibility with state and local governments. Cities and states can pass laws and ordinances regarding land use, zoning, privacy, trespass, and law enforcement operations. For example, according to the FAA, a state or city could implement no launch and no land zones where they deemed necessary and not overstep the FAA's preeminence over the airspace. These laws and ordinances would not overstep the FAA's preeminence over the airspace.

Through interviews with FAA officials, we found states do not have any enforcement responsibilities related to unmanned aircraft. According to FAA officials, the FAA focuses on educating individuals who fly unmanned aircraft and the burden for compliance generally falls on the individual who holds the certificate. The act of enforcing unmanned aircraft laws is difficult, because according to FAA officials the

agency does not have staff available across the country to do so. With education in mind, the FAA is focusing on a preventative approach to address unmanned aircraft misuse. If an individual is misusing an unmanned aircraft, FAA officials indicated it is best to contact local law enforcement because of their ability to get to the scene quicker than the FAA. Additionally, the FAA developed the "Law Enforcement Guidance for Suspected Unauthorized Unmanned Aircraft Operations" to help law enforcement manage the use of unmanned aircraft in their jurisdiction.

Montana State Laws and Policy Pertaining to Unmanned Aircraft

According to the Montana Operations Manual (MOM) policy "Advanced Procurement Requirements and Issues," Risk Management & Tort Defense Division (RMTD) has developed an aid to determining appropriate insurance requirements for various risk levels. We interviewed RMTD officials to learn about insurance policies surrounding unmanned aircraft. The State of Montana self-insures all unmanned aircraft purchased for agency use. Agency unmanned aircraft are automatically covered by liability insurance immediately after procurement and would be classified under the self-propelled or specialized equipment category. This is a "catch-all" category so it is not broken down specifically into unmanned aircraft. If there were to be an accident involving an unmanned aircraft, the incident would be covered by state insurance if it occurred during normal work conditions. Agencies can get additional comprehensive and collision insurance, which is tracked by RMTD. If an agency were to get the additional coverage this should be reported to RMTD as soon as they procured the unmanned aircraft. Agencies can also purchase additional coverage for unmanned aircraft procured in past years if they have not already.

Our work found there were nine unmanned aircraft with this additional coverage from the Department of Environmental Quality, Department of Natural Resources and Conservation, Montana State University, and the University of Montana. Based on automatic coverage of liability insurance, we determined agencies are following Montana insurance policy. MOM policy also states any commercial unmanned aircraft operation is permitted on state grounds through the Unmanned Aircraft Systems Use Permit. Our audit work found no permits had been issued to date.

Legislative Actions Regarding Unmanned Aircraft Use

Over the last several legislative sessions, the Montana Legislature has raised several questions regarding unmanned aircraft use in Montana. Several bills have been introduced in a piecemeal approach to address various areas regarding how and where

unmanned aircraft can be used. Some bills have passed and been enacted into law, while other have not. Recent bills that were introduced but not passed into law include:

- Establishing requirements for operations of unmanned aircraft (HB0593, 2015).
- Limiting unmanned aircraft use and prohibiting any governmental entity within the State of Montana from owning or using unmanned aircraft with weaponry (SB0150, 2013).
- Providing civil penalties for unauthorized operation of an unmanned aircraft over real property (SB0170, 2017).
- Prohibiting use of unmanned aircraft near certain airports, emergency operations, or aerial spraying operations (HB0586, 2015).
- Restrict the use of unmanned aircraft systems near critical infrastructure (HB0655, 2019).

Recently enacted legislation clarifies unmanned aircraft use by law enforcement and increases safety during wildfire suppression efforts. Specifically, §46-5-109, MCA, limits when law enforcement can use information from an unmanned aircraft as evidence in court. Additionally, §7-32-401, MCA, prohibits law enforcement from acquiring armored or weaponized unmanned aircraft. Chapter 274, Laws of the 2017 Regular Session, prohibits interference with wildfire suppression efforts using privately owned unmanned aircraft, and prevents the enactment of local ordinances allowing unmanned aircraft use during active wildfire suppression efforts. It also sets penalties for individuals equivalent to the reasonable costs of obstructing, impeding, preventing, or interfering with an aerial wildfire suppression response effort.

While these laws relate to unmanned aircraft use, outside of law enforcement and insurance, they do not provide guidance to state agencies regarding their use or acquisition of unmanned aircraft. Based on our review, there is limited guidance in state law or policy that references unmanned aircraft use. Therefore, the only regulations state agencies must currently follow when owning and operating unmanned aircraft are federal. Following federal regulations is important, but they do not provide specific policy and expectations for state agencies when using unmanned aircraft in their operations.

State Agency Compliance With Federal Regulations

We evaluated state government agencies and university system procedures pertaining to unmanned aircraft use. Each agency reviewed currently uses, plans to use, or has used unmanned aircraft. These included the Department of Commerce, Department of Environmental Quality (DEQ), Department of Natural Resources and Conservation (DNRC), Department of Fish, Wildlife & Parks (FWP), Department

of Transportation (MDT), Department of Justice (DOJ), Department of Livestock (DOL), Montana State University (MSU), and University of Montana (UM). The Department of Commerce was the only agency that previously used unmanned aircraft, but no longer uses them because unmanned aircraft licensed staff left the department. DEQ, MDT, MSU, DOJ, DOL, and UM are currently using unmanned aircraft within their organizations.

We determined all agencies operate under Part 107, except for the universities which operate under several COAs. The following sections discuss the results of our comparison of whether state agencies complied with the requirements. While Part 107 is consistent within its requirements, COAs had varying requirements; therefore, we had to review each university's COA to determine if these requirements were being met.

State Government Agencies Meet Federal Unmanned Aircraft and Pilot Licensing Requirements

In 2015, the FAA Reauthorization Act authorized the FAA to create the unmanned aircraft registration database. The database will provide for more efficient confirmation of pilot licensing and unmanned aircraft vehicle registration. At the time of the audit, the FAA was still working on getting the database operational, so the database information was incomplete. Therefore, we requested copies of agency aircraft registration certificates and pilot licenses to determine compliance with federal unmanned aircraft and pilot licensing requirements. We found all agencies currently using unmanned aircraft have properly registered them and have licensed pilots.

Observation of State Government Unmanned Aircraft Flights Found FAA Flight Regulations Are Followed

Our work included observing unmanned aircraft flights conducted by agencies with active unmanned aircraft programs. This included DEQ, MDT, and UM. Our observations were conducted to verify each agency followed FAA flight regulations. Examples of flight regulations that must be followed include pilots maintaining a visual line-of-sight of the unmanned aircraft, not operating over any persons not directly participating in the operations, flying only in daylight hours, conducting preflight inspections, obtaining landowner permission, and not exceeding an altitude of 400 feet above the ground. Our observations found each agency followed all FAA flight regulations as required. The following sections briefly describe each observation we conducted.

- DEQ conducted an unmanned aircraft flight over Prickly Pear Creek to take before and after video of creek restoration work. Since the flight was within five miles of Helena Regional Airport, DEQ was required to obtain a waiver

from the FAA. DEQ obtained the necessary waivers. The flight also occurred over private land and landowner permission was obtained prior to the flight. Our observations found DEQ followed all relevant FAA rules during this unmanned aircraft flight.

- We observed an MDT flight intended to show unmanned aircraft mapping capabilities, teach other MDT employees how to use the unmanned aircraft, and test a new terrain mapping feature. The flight took place four miles west of I-15 near Helena. The flight occurred over private land and we found landowner permission was obtained prior to the flight. We verified MDT employees went through proper FAA pre-flight inspections of the unmanned aircraft and followed all FAA operating procedures for the aircraft's flight.
- UM has a dedicated unmanned aircraft office, called the Autonomous Aerial Systems Office (AASO), which oversees its unmanned aircraft program. Our final observation flight took place at the UM campus where AASO co-directors were training a student. The training consisted of going through a pre-flight checklist and various aerial maneuvers. UM operates under a COA and were within guidelines for this flight training. These guidelines included maintaining direct, two-way communication with the air traffic control, receiving formal training from a qualified instructor, and documenting all operations associated with the flight.

Conclusion

State agencies and operators are complying with FAA regulations for unmanned aircraft, including licensing and registration and obtaining necessary insurance coverage. However, state-level oversight, laws, and administrative rules for unmanned aircraft are minimal.

Chapter III – Unmanned Aircraft Benefits and Risks

Introduction

This chapter addresses our objective to evaluate the benefits and risks of unmanned aircraft use. We gathered information from state agencies on the costs and savings associated with their unmanned aircraft programs. We also reviewed the cost of agency operations with unmanned aircraft and those without. This was done by comparing agency business costs for operations that use unmanned aircraft to similar activities that do not use unmanned aircraft. We examined the risks associated with unmanned aircraft use such as potential privacy issues, safe use of the aircraft, data storage, and data retention. Finally, we reviewed the need for a central resource to coordinate unmanned aircraft oversight at the state level.

We found while there are upfront costs to starting unmanned aircraft programs, state agencies have experienced cost savings when using them in their operations. Unmanned aircraft provide benefits including savings in operations, decrease in time spent on operations, and reducing safety risk to state workers. However, there are also risks involved with their use, including security of data obtained, employee workstation vulnerability, and risk of losing control of unmanned aircraft during flights. Agencies are not conducting thorough cost-benefit analyses to determine if an unmanned aircraft is necessary at the agency, and Montana agencies lack guidance on implementing unmanned aircraft programs. This chapter includes two recommendations involving a cost/benefit analysis requirement and implementation of a central Unmanned Aircraft System (UAS) resource for Montana.

Costs Associated With Unmanned Aircraft Programs

We conducted a survey to gather information from various state agencies regarding their deployment of an unmanned aircraft program. The agencies surveyed were those we initially identified as using unmanned aircraft. These agencies included Department of Transportation (MDT); Department of Justice (DOJ); Department of Environmental Quality (DEQ); Department of Livestock (DOL); Department of Natural Resources and Conservation (DNRC); Department of Fish, Wildlife & Parks (FWP); the University of Montana (UM); and Montana State University (MSU). All eight agencies responded to our survey. Survey questions related to the age of their unmanned aircraft program, development of program operation policies, number of staff involved in the program, costs for procuring and using unmanned aircraft, expectation of program growth, the potential need for state shared resources,

and any research conducted in establishing their program. The table below shows agency reported aircraft and pilots. Agency pilots are employees that have other job responsibilities in addition to pilot responsibilities.

Table 1
Total Unmanned Aircraft & Pilots at Agencies

Agency	Unmanned Aircraft	Pilots
DOL	1	2
DNRC	2	1
DEQ	4	6
MDT	4	6
FWP	5	3
MSU	6	12
DOJ	9	16
UM	20	12
Total	**51**	**58**

Source: Compiled by the Legislative Audit Division from survey data.

Standard Costs for Unmanned Aircraft Implementation

We conducted a cost review of unmanned aircraft use across state agencies. Information was gathered from agency survey work and interviews with agency staff. Every unmanned aircraft program must have a licensed Federal Aviation Administration (FAA) Part 107 pilot. The FAA requires all pilots to pass an Aeronautical Knowledge exam. The cost to take this exam is $150. The FAA provides study materials online free of charge, but agencies can also choose to take pilot training courses that vary in cost. Unmanned aircraft pilots must renew their license every two years by taking the recurrent exam at a cost of $150.

Once an agency has a pilot, there is the cost of the unmanned aircraft itself. The typical unmanned aircraft that agencies are currently using costs around $2,000. However, there are more advanced unmanned aircraft that can cost upwards of $10,000 each. In addition, each unmanned aircraft must be registered at a cost of $5 per aircraft and is valid for three years.

There are various software costs associated with unmanned aircraft. This software can cost $150 per month for unmanned aircraft flying and mapping capabilities and $350 per month for cloud-based processing. There may be other software cost depending on how unmanned aircraft will be used. For example, since a typical photo session with an unmanned aircraft can take up to 2 gigabytes, there may be additional data storage costs as well, depending on an agency's data usage. To create specialized imagery, software can cost an estimated $3,500 for a lifetime professional license.

Unmanned aircraft have the added cost of insurance. According to Risk Management and Tort Defense Division (RMTD), when an unmanned aircraft is reported to them, it increases the number of insured units (same as any other vehicle procurement). The number of insured units is what determines the vehicle liability insurance premium charged to an agency. If an agency were to obtain additional liability insurance, the premium would cost 1.5 percent of the value of the unmanned aircraft, which would be around $30 per unit for an unmanned aircraft valued at $2,000.

Financial Cost of Unmanned Aircraft Implementation Estimated by Agencies

While the licensing, registration, unmanned aircraft, and equipment/software purchases are all needed to start and maintain an unmanned aircraft program, there are other costs that vary significantly across agencies. Since unmanned aircraft use is relatively new in the state, there is limited centralized tracking and information regarding agency unmanned aircraft use, including any type of the "true" cost of the unmanned aircraft. Therefore, we relied on cost information provided by agency staff regarding unmanned aircraft expenditures.

Table 2 (see page 16) illustrates the number of hours each agency estimated spending on their unmanned aircraft program, including policy development and staff training. The table also includes the agency's estimated operating costs, including the costs to purchase unmanned aircraft, certify pilots, and register each unmanned aircraft.

Table 2
Montana Agency UAS Program Creation Total Cost & Hour Estimation

Agency	Total Hours	Total Cost	Cost Per Hour
DOL	170	$1,900	$11.18
DNRC	175	$4,000	$22.86
FWP	25	$5,000	$200.00
MHP	660	$25,500	$38.64
DEQ	1,000	$35,000	$35.00
MDT	500	$40,000	$80.00
UM	5,000	$300,000	$60.00
MSU*	60	NA	NA

Source: Compiled by the Legislative Audit Division from agency-submitted data.

*MSU calculated cost on a per pilot basis.

As illustrated in Table 2, UM has the highest unmanned aircraft hours and cost. This is because UM has the Autonomous Aerial Systems Office where they have been conducting training, certification/licensing, and policy-making over the course of three years. DEQ has the highest unmanned aircraft use among executive branch agencies logging 1,000 hours of flight time and spending $35,000 over the course of seven years. MSU does not have a central unmanned aircraft office on campus, and due to the distributed nature of those operations, it is difficult to estimate total cost and time.

We obtained cost information from each agency currently using unmanned aircraft. These costs included amounts spent to purchase the unmanned aircraft, staff training, and policy development. We also obtained information on how these agencies use these aircraft in their operations. The following are some examples of unique figures related to the unmanned aircraft programs.

- DOJ spent $25,500 on their unmanned aircraft program. This included $19,000 to purchase unmanned aircraft (9 total), $1,550 for the FAA prep course, and $2,400 for 16 state troopers to take the FAA Remote Pilot licensing exam.
- DEQ received a policy template from a national unmanned aircraft workshop and has spent 20 hours creating policy.
- DNRC has spent roughly 200 hours of personnel time on unmanned aircraft policy research and creation with a focus on ensuring citizen privacy is kept during unmanned aircraft flights.

- UM estimated it spent $300,000 in costs on the unmanned aircraft program using school allocated funds over the course of three years.

CONCLUSION

While some agencies were able to provide estimated costs for their programs, no formal cost analysis had been conducted. This makes it difficult to determine the true or expected costs associated with implementing an unmanned aircraft program.

Current Operational Use and Savings Reported by Agencies

Agencies were asked to provide cost estimates of operations with and without unmanned aircraft usage. We also asked them to provide information on how unmanned aircraft are used in agency operations. We used this to conduct a savings comparison and determine how unmanned aircraft were used at DOL, DOJ, DEQ, and MDT. UM and MSU did not have a savings comparison completed because their programs focused on research rather than replacing current operations. DNRC and FWP did not have a cost savings comparison completed because their unmanned aircraft programs were not operational at the time of the audit.

DOL uses unmanned aircraft to observe bison in West Yellowstone and Gardiner and occasionally to locate missing livestock. Prior to using unmanned aircraft, DOL flew helicopters at a cost of $800-1,200 per hour. After the implementation of unmanned aircraft these same tasks cost $50-100 per hour. According to DOL staff, the department also reduces risks to employees since they do not need to fly in a helicopter to accomplish these tasks.

DOJ's main purpose for using unmanned aircraft is for staff of the Montana Highway Patrol to enhance crash investigations and reconstruct crash scenes. DOJ staff recognize there are potential additional benefits, such as rescue operations, natural disaster response, and civil disturbance situations, but currently only use unmanned aircraft for crash scene investigations and reconstruction. According to DOJ officials, officers would take approximately two hours, on average, to conduct crash scene investigations and reconstruction before they began using unmanned aircraft. As part of most crash scene investigations, DOJ officials indicated officers would either use a man lift or helicopter to get above a crash scene to better assess the cause of the crash. Man lifts cost $400-$500 per use, and if it were needed after regular business hours it would cost up to $1,600. A helicopter costs $400-$500 per hour, meaning a two-hour investigation using helicopter assistance could cost as much as $1,000 for a single investigation.

DOJ officials currently view the cost of using unmanned aircraft as negligible since the resources are already acquired and manpower is already being spent during the crash investigation whether the unmanned aircraft is deployed or not. They indicated the time to conduct crash investigations with unmanned aircraft is reduced to around 20 minutes instead of 2 hours without the use of the aircraft. DOJ officials said this also helps reduce the time roads might be closed while crash investigations are being conducted. For example, based on MDT's road user cost delay spreadsheet, closing one lane of interstate during rush hour near Billings could cost up to $27,000 per hour. Since unmanned aircraft reduce crash investigations to approximately 20 minutes, the total cost of a single investigation is reduced from $54,000 to approximately $9,000.

DEQ uses unmanned aircraft to monitor construction projects and to create orthomosaics of mining sites and archaeological sites. An orthomosaic is an accurate photo representation of an area, created out of many photos that have been stitched together and geometrically corrected so that it is as accurate as a map. To obtain the high-resolution data without unmanned aircraft, DEQ would have to hire a contractor (including data processing) for an estimated total cost of $1,000 to $2,000. DEQ officials indicated using agency personnel and unmanned aircraft would cost approximately $300 to conduct the same work. DEQ officials noted immediate high-resolution data acquisition is unavailable from satellite images.

MDT uses unmanned aircraft for bridge inspections, landslide monitoring, environmental documentation (such as emergency stream bed repair), and measuring large stockpile volumes (such as gravel piles and other materials). According to MDT staff, traditional surveys to measure stockpiles would cost about $1,800 compared to approximately $180. MDT also monitors active rock fall sites and potential landslide areas to help ensure motorist safety. Traditionally, MDT would collect imagery of these areas using a helicopter with an hourly cost of $2,500. When using an unmanned aircraft, the total cost of these monitoring activities is approximately $400. MDT officials also indicated using unmanned aircraft reduces safety risks to MDT employees since they do not have to fly in a helicopter to monitor these sites. MDT staff indicated the department received an increase of federal share for construction projects of $6.7 million due to incorporating unmanned aircraft into their operations. Table 3 (see page 19) is a summary of savings realized by agencies incorporating unmanned aircraft into their operations.

Table 3
Montana Agency Unmanned Aircraft Savings

Agency	Unmanned Aircraft Operation	Cost of Operation Before Unmanned Aircraft	Cost of Operation With Unmanned Aircraft
DOL	Observation of bison in West Yellowstone and Gardiner & occasionally missing livestock	$800-$1,200	$50-$100
DOJ	Crash Scene Investigation	$500-$1000	$0
DEQ	Monitor Construction on Linear Facilities	$1,500	$300
MDT	Measure Stockpile & Monitor Rock Fall Areas	Measure stockpile - $1,800 Monitor Rock Fall Areas - $5,000	Measure stockpile - $180 Monitor Rock Fall Areas - $400

Source: Compiled by the Legislative Audit Division from agency-submitted data.

As expected, there are costs associated with starting unmanned aircraft programs including acquiring aircraft, creating policy, and training employees to be unmanned aircraft pilots. However, agencies using unmanned aircraft have reported savings and safety risk reduction to employees using these programs. Currently, agency unmanned aircraft operations are limited in size and scope but could potentially be expanded to other areas of operations.

Conclusion

While agencies were able to provide estimated savings for their programs, along with benefits including increased safety to employees, no formal documentation or review occurred prior to the program being established. This makes it difficult to determine the purpose of the program and whether expected savings or benefits have occurred.

There Is Need for a Cost-Benefit Analysis Before Unmanned Aircraft Procurement

Montana agencies are procuring unmanned aircraft to fulfill operational needs without a thorough cost-benefit analysis being conducted. There are not any requirements in place for agencies to conduct this analysis before the purchase of an unmanned aircraft.

Over the course of the audit, through the survey and interviews, we reviewed the steps agencies took when deciding to purchase an unmanned aircraft and whether

a cost analysis was conducted on their UAS program. Agencies have taken a variety of approaches to assessing their UAS needs. For example, DNRC and DEQ have looked to other states and the federal government to see how other organizations have conducted cost analysis and procurement. The University of Montana Autonomous Aerial Systems Office has established goals for their UAS program. These goals include coordinating and guiding faculty, staff, and students, establishing infrastructure and resources, and stimulating UAS-related innovation. For the most part, agencies established their unmanned aircraft program for one specific task. Of the eight agencies surveyed only one has begun the process of conducting a cost/benefit analysis of their program. Overall, agency approach to procurement is varied.

Cost-Benefit Analysis Recommended in Best Practices

Other states and publications have recommended and implemented an analysis of unmanned aircraft before they are purchased. For example, in Utah any UAS purchase must go through the UAS office. There they review the purpose for the purchase to make sure there is a return on investment for its use. Additionally, they determine if someone in the division requesting the purchase has gone through Utah's UAS training and has a license from the FAA. Once the UAS office has conducted their review, the purchase then goes through the normal procurement process. The National Institute of Justice published an article titled "Considerations and Recommendations for Implementing an Unmanned Aircraft Systems (UAS) Program." This publication outlines actions needed to be completed by the agency internally before implementation of the program. Specifically, an agency should identify the actual need for an unmanned aircraft technology in relation to its mission. An agency needs to identify the specific scenarios where the aircraft would be used. Next, an agency needs to determine whether the specific UAS technology that best matches their intended use is commercially available and should conduct an analysis to determine if there is another method for performing the mission. Agencies should research options of sharing the unmanned aircraft with other agencies. Finally, an agency should evaluate whether it can support the technology. Questions agencies should be answering include:

- Are there processes in place to support funding, storage, maintenance, and training considerations?
- What type of staff should conduct the UAS operation?
- Who will be responsible for UAS in the agency?
- How often will the UAS be used?
- If the agency has an aviation unit, will UAS operations fall within the scope of that unit's responsibilities?

The publication also provides a "Technology Decision Tool." This tool is used to conduct a cost/benefit analysis of implementing a UAS program.

Agency Needs May Not Require UAS Procurement

After an agency addresses these cost-benefit questions, they could potentially choose not to procure an unmanned aircraft due to risk or cost. Since state agencies are not required to conduct a cost/benefit analysis prior to moving forward with a UAS program, they could be investing in a program that does not meet their mission or needs. Agencies have options outside of starting a UAS program. Since starting up a UAS program can be expensive and time-consuming, agencies could contract out to either private companies or to other state agencies for their unmanned aircraft needs. Drones as a Service is offered by private companies that are hired to perform a specific task using an unmanned aircraft. Contracting out can save agencies time and money if they find they have a limited need to own an unmanned aircraft.

Newer Technology With a Lack of Oversight

Due to the lack of statewide resources and oversight, there are currently no requirements in place to have agencies conduct a cost-benefit analysis before purchasing an unmanned aircraft. While some agencies have asked cost-benefit questions prior to starting their program, it is not consistent across agencies. Therefore, it is unclear whether current unmanned aircraft use across state agencies is providing a positive cost/benefit to the State of Montana.

RECOMMENDATION #1

We recommend the Governor's Office require a cost-benefit analysis be performed before the procurement of an unmanned aircraft by state agencies.

State Agencies Are Currently Using Unmanned Aircraft and Most Plan to Expand Operations

Our survey results show agency unmanned aircraft programs at varying levels of maturity, with plans to increase use in the future. DEQ was one of the first agencies to operate unmanned aircraft in spring of 2011; so, it is to be expected there would likely be differences in the size and scope of each agency's unmanned aircraft program. Our work found state agency unmanned aircraft programs vary in size ranging from one aircraft to twenty aircraft and one pilot to sixteen pilots licensed in their programs.

Five of the eight agencies surveyed see their programs increasing in scale, including both pilots and aircraft, over the next five years. For example, DEQ hopes to have 10 unmanned aircraft pilots while adding additional unmanned aircraft equipment.

MDT wants to investigate expanding into an unmanned aircraft rental program where they would rent unmanned aircraft to agencies with proper pilots. Challenges that could arise in creating a rental program include logistics for state agencies to access unmanned aircraft, pilot training and licensing issues, and ownership or establishment of rental rates.

There are both low and high levels of unmanned aircraft use at state agencies with some using them more than others. Surveyed agencies report having varying uses for unmanned aircraft and how often they use them. For example, FWP and MDT reported their unmanned aircraft may see flight once or twice a month. It should be noted that FWP stopped flights while UAS policy is being created. MSU and UM, whose flights are based on research, will vary on volume but activity can be classified as weekly. DOJ expects their unmanned aircraft flights to become routine as more staff are trained to use them during vehicle crash investigations.

Additional Unmanned Aircraft Opportunities Exist for State Agencies

We surveyed state agencies currently using unmanned aircraft in their operations to determine how these aircraft are being used. We interviewed agency staff regarding unmanned aircraft use. We also reviewed information from other states and interviewed officials from those states regarding how they use unmanned aircraft in their operations. We used this information to conduct a comparison of Montana state agency unmanned aircraft use to agencies in other states. This comparison was conducted to determine if there were additional uses and benefits Montana agencies have yet to realize. We were able to make comparisons for MDT, DOJ, and DEQ. A few examples of additional unmanned aircraft use include: using infrared technology to identify adverse man-made chemicals, to create thermal imagery, and to conduct Light Detection and Ranging; conducting retaining wall and confined space inspections, live-feed disaster response for flooding, earthquakes, fire events over highways; and avalanche surveying. These other uses do not encapsulate all potential uses for an unmanned aircraft, but they do highlight that Montana can apply them to areas beyond current use.

Departments of Transportation and law enforcement agencies across the United States are the main users of unmanned aircraft technology. However, there are still areas in which other entities can use unmanned aircraft in their operations. It should be noted that Montana agencies have room to grow, but before new operations are considered, agencies must first ensure that privacy, security, and flight rules and regulations are followed at all times.

Risks Associated With Unmanned Aircraft Implementation

Our work determined there are also risks of unmanned aircraft use that need to be considered. The first risk relates to public privacy and potential negative perception of state agencies using unmanned aircraft. For example, private citizens can be concerned if a UAS is being used by government agencies near their homes. Secondly, computer networks and data collected by unmanned aircraft can be at risk when unmanned aircraft are connected to state computer networks for data transfer. Lastly, there are potential safety issues with unmanned aircraft. For example, a pilot losing control of an aircraft during its flight increases the risk of collisions with people, other aircraft, or structures. An injury to a third party or their property could leave the state vulnerable to lawsuits. While risks can never be fully mitigated, agencies should take steps to reduce these risks. We provide more information regarding these risks and how to mitigate them later in the report.

CONCLUSION

Unmanned aircraft use comes with both risks and benefits. However, as use increases, state government will have to consider and address risks including data security, public privacy, and negative public perception of state agencies using unmanned aircraft in their operations. To fully weigh the benefits and risks of unmanned aircraft usage a proper analysis should be conducted.

Central Resource Needed Prior to Agencies Expanding or Implementing Unmanned Aircraft Programs

Our work found eight state agencies are currently using or have plans to incorporate them into their operations. We also found other agencies that expressed interest in incorporating unmanned aircraft in the future. Overall, this is a technology that is likely to grow in use within Montana state government. Currently, it is difficult to access information on Montana unmanned aircraft usage and requirements because there is no central resource or informational outreach.

The legislature has limited knowledge on which state agencies are using unmanned aircraft and how they are using them. State agencies are currently not required to report unmanned aircraft numbers or how they are being used to any oversight body, including the legislature. Additionally, Montana does not have any requirements when it comes to oversight of unmanned aircraft usage at state agencies. However, agencies are in favor of a coordinated effort.

Agencies See Need for Shared Unmanned Aircraft Resources

Our survey asked agencies about their current resource levels for their unmanned aircraft program. Six of the eight agencies responded that a statewide shared resource would benefit their program. For example, agencies expressed interest in areas such as information and data exchange, shared equipment, policy development, pilot training, and communication with the FAA. Each agency was asked what statewide shared resources their unmanned aircraft program would benefit from. Agency responses included unmanned aircraft federal and state standards and regulations information, pilot training, assistance with FAA communications, information and data exchange between state agency unmanned aircraft programs, and sharing of unmanned aircraft and pilots during emergency situations. After identifying agency needs we looked to other states to see what oversight they had in place.

Another shared resource we researched was the potential for a UAS motor pool for the state of Montana. There were concerns that agencies would not be able to use UASs in a timely manner. For example, DOJ uses UASs for crash scene investigations and instead of using their own UAS, they would have to go through the rental process. For agencies with limited need, a UAS pool or rental program could potentially be beneficial.

Best Practices Identified in Other States

We contacted other states to identify potential best practices for unmanned aircraft oversight at the state level. We found other states have more defined reporting requirements for their unmanned aircraft programs, including specific requirements set forth in state law. For example:

- Illinois state law requires law enforcement agencies using unmanned aircraft to report the number of aircraft they have to the Illinois Criminal Justice Information Authority. The Authority then makes a report available online with information about every law enforcement agency that owns an unmanned aircraft.
- Nevada law requires the Nevada Department of Public Safety to include information regarding registered unmanned aircraft on its website. The department also must report to the legislature about public agency use of unmanned aircraft.
- In North Carolina, any agency can start an unmanned aircraft program on their own accord. However, their legislature passed a law in 2014 that put the North Carolina Department of Transportation in charge of administering all unmanned aircraft programs and permits for government and commercial use of unmanned aircraft. North Carolina requires agencies to pass an additional test on North Carolina-specific unmanned aircraft laws.

- In Ohio, the Governor's Office put the Ohio Department of Transportation (ODOT) in charge of unmanned aircraft activities. This includes exploring federally-approved unmanned aircraft flight test sites to help implement unmanned aircraft use safely and effectively across Ohio government. In 2013, the Ohio Unmanned Aircraft Systems Center was created under ODOT. Agencies can have their own unmanned aircraft related polices but the center has flight manuals, checklists, standard policies, and a safety review board.
- The Utah Department of Transportation (UDOT) oversees unmanned aircraft use in the state. UDOT developed statewide unmanned aircraft policy and procedures state agencies must follow. Agencies in Utah have created their own policies as well to address specific operations at each agency.

Overall, we found other states have been more proactive than Montana has in establishing their unmanned aircraft programs.

A recent national research publication outlines ways to effectively deploy unmanned aircraft programs in state and local government. This publication discusses the trends of unmanned aircraft use in government, getting unmanned aircraft programs started, and ongoing program needs. The report also discusses the emergence of best practices to deploy and operate unmanned aircraft in the public sector. While there is not a "one size fits all" solution, state government must first identify a strategy for deploying and operating unmanned aircraft. This strategy should include developing requirements for individual agencies to procure and operate unmanned aircraft, partner with an outside provider, or coordinate unmanned aircraft with another state agency.

We found other states and national research showed some state government agencies have created "Unmanned Aircraft Divisions," responsible for overseeing all agency unmanned aircraft activities, while other state agencies have dispersed unmanned aircraft responsibilities across multiple divisions. Unmanned aircraft best practices also indicate it is important to identify opportunities to pool data, training, and maintenance. Federal and state laws and regulations are constantly being updated and public-sector leaders should monitor ongoing changes in regulations and laws governing the use of unmanned aircraft. There should be a means for ensuring agencies using unmanned aircraft understand and comply with these federal and state laws and regulations. Best practices indicate a UAS central resource is beneficial for integrating unmanned aircraft into state operations.

Options Exist for Placement of Central Resource

Due to the lack of a specific location outlined in best practices Montana has some options for the placement of a UAS central resource. When interviewing other states about their UAS central resource location, we found that the state chose to place the

resource with the subject matter expert. In North Carolina, Ohio, and Utah, these experts were located within the Department of Transportation. Another possible location would be through the university system. For example, North Dakota UAS Authority, which is comprised of all subject matter experts from the state, is administratively attached to the University of North Dakota. Legislation in other states such as Texas and Nevada have designated their Departments of Public Safety to keep track of unmanned aircraft activity at agencies and report to the legislature. In Michigan, the legislature put together an unmanned aircraft task force to decide how the state should proceed with UAS integration into agency operations. This task force reviewed Michigan's needs and made recommendations to the legislature on how to proceed.

Currently, Montana has subject matter experts across the state.

- As with other areas that affect a majority of the agencies in Montana, the Department of Administration is an option for placement of the central resource.
- MDT has experience working with the FAA. Currently the Engineering Division at MDT is working on an unmanned aircraft rental program and has recently started incorporating flights into operations.
- The University of Montana's Autonomous Aerial Systems Office has experience working with the FAA and following regulations involving Part 107 and Certificate of Authorizations.
- Through the use of a task force or SITSD work group, the state can get together all subject matter experts to be involved in determining the best location for the UAS central resource. Currently Kreh Germaine, CIO, DNRC is heading an Information Technology Manager's Council workgroup to address UAS policy.

Presently, Montana has no central resource providing oversight of unmanned aircraft use by state government agencies. We found this has led to inconsistent unmanned aircraft policies between agencies and does not ensure consistent knowledge of unmanned aircraft regulations. These inconsistencies increase the risk of not following unmanned aircraft flight requirements, safety concerns when operating unmanned aircraft, or infringing on citizen privacy. There is also no process or resource where state agencies should report their number of unmanned aircraft, their flight activities, or how these aircraft are being used by state government agencies. There is no oversight on how unmanned aircraft policies have been or are currently being developed and if they meet or will meet the expectations of public officials, including the Governor and the Legislature. Montana should designate a central resource that is responsible for establishing state policy regarding unmanned aircraft use, ensuring federal and state regulations are met, and providing public outreach regarding state government unmanned aircraft activities.

RECOMMENDATION #2

We recommend the Governor's Office designate a central unmanned aircraft resource to provide oversight and coordinate statewide unmanned aircraft efforts and ensure agencies report on unmanned aircraft numbers and usage.

Chapter IV – Agency Unmanned Aircraft Operations and Coordination

Introduction

This chapter addresses our objective to evaluate state agency unmanned aircraft programs and determine if clear guidance is provided at the statewide level to ensure proper use and transparency. This chapter addresses several areas including unmanned aircraft outreach, operational policy, and information technology (IT) best practices related to unmanned aircraft.

We found a lack of statewide guidelines for implementing unmanned aircraft into agency operations. Additionally, because unmanned aircraft collect data and can be connected to state of Montana computer networks, they should be considered a state IT asset. However, there is not a structure in place to ensure IT best practices are followed for unmanned aircraft, including procurement and data security policies. This chapter provides recommendations in each of these areas.

Montana's Unmanned Aircraft Information and Outreach Is Limited

Since no public or governmental information to identify which state agencies operate unmanned aircraft is available in Montana, we surveyed individual agencies. Through the survey work, we determined state agencies either are currently using unmanned aircraft in their operations or have used them in the past.

When reviewing other states, we discovered that information about unmanned aircraft usage could be found on their websites. Oregon, North Carolina, Utah, Ohio, North Dakota, Texas, California, Idaho, Wyoming, and Nevada all have information available online on how to operate an unmanned aircraft in their state. These webpages contain information on federal and state regulations, workshop dates and locations, contact information, agency unmanned aircraft activities, and policy templates. This allows for easy access by other state agencies, local government, citizens, the legislature, and other states.

There have been instances where other states' legislatures tasked a department to help other agencies with unmanned aircraft. These departments have put on workshops to provide transparency and information to other state agencies, citizens, commercial operators, and other states. For example, the North Carolina Department of Transportation's program holds a one-day regional workshop once a quarter where agency staff and other individuals can receive training and information on unmanned

aircraft. The Michigan Unmanned Aircraft Systems Task Force report recommends the development of an education and outreach strategy to address coordinated educational outreach efforts for local governments, law enforcement, and other users. These outreach programs help state agencies identify potential uses of unmanned aircraft and the necessary steps to establish such programs. Not only are these outreach programs a benefit to state agencies, but they also benefit local governments and private citizens.

Montana has neither designated a subject matter expert on unmanned aircraft nor designated a central location for unmanned aircraft information. Therefore, state agencies are left to develop their programs from the ground up, creating duplication and upfront time researching federal and state requirements. Having information readily available on unmanned aircraft will help ensure consistent information is available to state agencies and provide easy access to those wishing to operate in Montana.

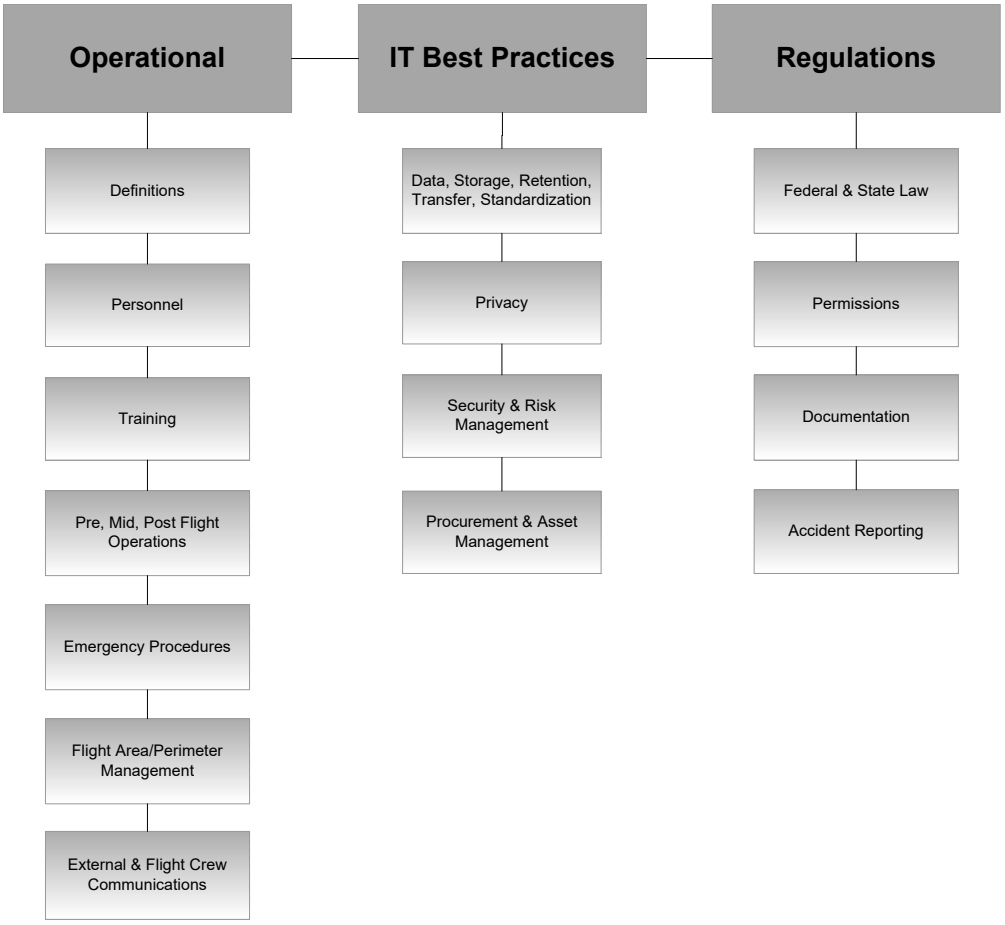
RECOMMENDATION #3

We recommend the Governor's Office ensure information is available to state agencies, the public, local government, and legislators on the application, viability, regulations, and best practices of unmanned aircraft.

Improvements to Unmanned Aircraft Operational Policy Needed

Unmanned aircraft policy can be broken down into three different areas: operational, Information Technology (IT) best practices, and regulations. Figure 2 (see page 31) illustrates the elements of these policy types.

Figure 2
Elements of Unmanned Aircraft Policy



Source: Compiled by the Legislative Audit Division.

Having consistent policy ensures all relevant areas related to unmanned aircraft are covered (such as state and federal compliance). Unmanned aircraft policy at each agency differs based on intended uses but best practices indicate there should be a consistent template or starting point for these policies.

Most Agency Unmanned Aircraft Policy Is Currently in Draft Form and Fragmented

Each agency surveyed provided us with an established or draft unmanned aircraft policy except for the Department of Fish, Wildlife & Parks, who reported staff were still working to create policies. At the time of the audit, the Department of Justice (DOJ) and Department of Transportation (MDT) were the only agencies to have their own finalized policy, outside of Federal Aviation Administration (FAA) requirements.

We reviewed both finalized and draft policies provided by each agency to evaluate the level of consistency between these policies. Each policy we reviewed is briefly described below:

- MDT policy outlines when unmanned aircraft may be used to conduct MDT business (cost efficiency, improved data quality, etc.) and procedures for training, maintenance, safety, operation, and flight data.
- DOJ's Montana Highway Patrol Division has unmanned aircraft policy detailing how to obtain digital aerial photographs, video, and data in support of crash investigations, crime scene investigations, and any other purpose authorized by a district commander.
- The Department of Environmental Quality (DEQ) has an unmanned aircraft policy manual in draft. The draft policy outlines appropriate uses for unmanned aircraft, the appointment and responsibilities of an Unmanned Aircraft Manager, data retention requirements, unmanned aircraft request process, flight procedures including pilot qualifications and responsibilities, and visual observer qualifications and responsibilities.
- The University of Montana (UM) currently has draft policy describing how the university acquires and operates unmanned aircraft efficiently and safely. UM also has a dedicated unmanned aircraft office called the Autonomous Aerial Systems Office (AASO), and a webpage describing how students and staff can operate unmanned aircraft. AASO provides centralized oversight for UM and coordinates the campus' unmanned aircraft operations. This includes ensuring unmanned aircraft and pilots meet federal requirements and providing guidance for incorporating unmanned aircraft into research activities.
- Montana State University (MSU) has draft policy stating users must follow all FAA rules and guidelines and outlines the type of unmanned aircraft use allowed on MSU property. MSU's draft policy also includes a requirement for operators to provide proof of unmanned aircraft insurance and where to obtain this insurance.
- The Department of Livestock (DOL) has draft policy outlining the uses of unmanned aircraft operations and responsibilities of flight personnel. Included in the draft are the pre-, mid-, and post-flight requirements and checklists with maintenance and monthly reporting duties.
- The Department of Natural Resources and Conservation (DNRC) has draft policy which includes procedures for procurement; administration; management (reports, timekeeping, and documentation); and aircraft accidents, incidents, and hazards.

While our policy review identified agencies addressing specific pieces of best practice policy, we did not identify an agency that addressed all aspects including operational, IT best practices, and regulations. Despite most of unmanned aircraft policy across state agencies being in draft form and fragmented, agencies continue to use unmanned aircraft in their operations. Without proper policy or law in place, it is difficult to

determine if state agency unmanned aircraft use is appropriate. There is potential for duplication of effort. Agencies are individually spending time creating policy when a coordinated effort would reduce time required for policy creation. Additionally, there is potential for conflicting unmanned aircraft policy across agencies.

Other States Provide More Guidance Related to Unmanned Aircraft Policy

When reviewing other states, we found that specific departments were designated with developing policy related to state and local use of unmanned aircraft, helping provide guidance to agencies in developing more consistent unmanned aircraft policies and procedures. We also found policies and procedures in other states covered most relevant areas related to unmanned aircraft operations within state government. These polices included personnel duties, training requirements and schedules, and pre, mid, post flight operation guidelines. Examples of policies developed in other states include:

- The North Carolina Department of Transportation provides agencies an unmanned aircraft privacy best practice document and a template that includes standard operating procedures.
- The Ohio Department of Transportation (ODOT) was tasked by their legislature to reach out to other agencies about potential unmanned aircraft use. Each agency has a specific unmanned aircraft policy but ODOT has a standard template and relevant information on policy, aircraft, and privacy.
- The Utah Department of Transportation provides unmanned aircraft policy advice to any agency requesting assistance. This help comes in the form of policy templates and guidance on how to best perform specific unmanned aircraft activities at the agency.

Currently, Montana agencies are on their own to develop unmanned aircraft policy. This had led to a duplication of efforts and policy gaps within each agency's policy. In most cases, policy remains in draft form even though unmanned aircraft are being used by many of these agencies. Our work determined other states have more structured administration of their unmanned aircraft programs. This is mainly due to more centralized responsibility for policy development, information gathering on unmanned aircraft activities, and reporting of those activities. For example, we found other states share policy templates to help ensure unmanned aircraft are operated consistently statewide. These templates include sections such as an outline of unmanned aircraft program mission; personnel responsibilities; FAA requirements; privacy and permission requirements; training; pre-, mid-, and post-flight requirements/checklists, emergency procedures, accident reporting; internal and external communication requirements; and references to pertinent state law and FAA regulations. The state of Montana should develop statewide unmanned aircraft policy that serves as the baseline for unmanned aircraft operations by state agencies.

Recommendation #4

We recommend the Governor's Office develop statewide unmanned aircraft policy that ensures regulatory compliance is met at the state and federal level.

Unmanned Aircraft IT Policy Best Practices

IT policy tied to unmanned aircraft is an area that can be easily overlooked when developing policy. IT policy covers various areas such as unmanned aircraft procurement, data standardization, privacy, security and risk management, and asset management. One of the main issues states currently face is the increasing use of unmanned aircraft and the management of data created as a result. The following sections discuss these areas in further detail.

Other States and Best Practices Discuss the Importance of the State CIO's Involvement

Other states have established specific IT policy related to unmanned aircraft use to ensure protection of state assets, including data. For example, Utah requires any unmanned aircraft procurement throughout the state to go through a review by the unmanned aircraft program located with the Department of Transportation. The unmanned aircraft program reviews purpose and return on investment for the purchase, and confirms that the employee at the division requesting the unmanned aircraft has gone through proper training and certification to operate the aircraft. Once this review is done, the purchase goes through the standard technology procurement process. In 2016, Oregon passed legislation requiring public bodies operating unmanned aircraft to establish policies and procedures for the "use, storage, accessing, sharing and retention of data." Ohio, Utah, and North Carolina have also developed unmanned aircraft policy that addresses privacy. These policies include the requirements that any data collected only be related to the scope of unmanned aircraft flights, any data beyond the purpose of the unmanned aircraft flight must be deleted, all collected data is subject to public record laws and standard procedures exist for data collection. Policies also include how to address any violation of privacy.

The National Association of State Chief Information Officers (NASCIO) represents state chief information officers and information technology executives and managers from the states, territories, and the District of Columbia. NASCIO released a report in 2015 on Chief Information Officers' (CIO) role in unmanned aircraft governance. The publication speaks to the importance of a proper governance structure and unmanned

aircraft IT policy. It covers areas related to data standardization and recommends that states define the processes on how agencies obtain information via unmanned aircraft, labeling, storage, retention, usage, sharing, and deletion of unmanned aircraft information. The publication also addresses privacy as it relates to unmanned aircraft use. Unmanned aircraft are not only smaller, cheaper, and quieter than manned aircraft, but their technology allows them to gather more data during their flights. Since the use of technology to gather information can infringe on an individual's right to privacy, states should develop a comprehensive framework related to unmanned aircraft privacy rules. NASCIO recommends states consider the potential consequences of unsecured data collected by unmanned aircraft. States should consider the possibility of unmanned aircraft being hacked and develop procedures to securely store collected data and protect flight control frequencies. Issues of both cybersecurity and information security should be considered. NASCIO recommends state governments maintain an inventory of agency unmanned aircraft ownership, applications, and uses, just as should be done with any technology asset. Lastly, NASCIO states a proper governance structure for unmanned aircraft needs to be in place to fully integrate existing efforts of state agencies, identify policy concerns, formalize internal controls and anticipate issues that may arise.

State of Montana Can Improve Policy for Unmanned Aircraft Procurement

We interviewed state agency staff about procurement practices for unmanned aircraft. Agencies procured unmanned aircraft by researching what aircraft would best fit their needs and all aircraft procured were under $5,000. While standard procurement policy leaves the procurement process up to the agency for purchases under $5,000, unmanned aircraft are connected to the state network, meaning they should be considered an IT procurement which has specific procurement requirements.

The Montana Information Technology Act (MITA) states the Department of Administration (DOA) is responsible for providing centralized management and coordination of state policies for security of data and information technology resources. According to Montana Operations Manual (MOM) policy, information technology is defined as hardware, software, and associated services and infrastructure used to store or transmit information in any form, including voice, video, and electronic data. Policy further states that whenever an IT purchase is made, an Information Technology Procurement Request (ITPR) must be submitted by agencies. An ITPR is then submitted to State Information Technology Services Division's (SITSD) Technical Review Board for review and approval. The ITPR process is in place to ensure information technology is procured at the best price, in the right quantity, and from the right source.

We reviewed unmanned aircraft purchases to determine if they followed appropriate IT purchasing practices. We found ITPRs completed and submitted by agencies for SITSD review were related to unmanned aircraft software acquisitions that assisted in the operation of the aircraft. DEQ submitted three ITPRs in 2018 related to unmanned aircraft and software for preflight checklist, and orthomosaic imagery creation. We did not find ITPRs for the unmanned aircraft themselves. SITSD and agency staff do not believe an ITPR is necessary when procuring unmanned aircraft. However, based on our review of MOM policy and how unmanned aircraft are being used, we believe they are considered an information technology procurement and the ITPR process should be followed when unmanned aircraft are purchased.

Agency Policy Specific to Unmanned Aircraft Data Collection and Storage Varies

Montana does not have unmanned aircraft policy addressing specific data collection, storage, retention, usage, sharing, acquisition, or privacy. Currently SITSD views unmanned aircraft as part of the Internet of Things (IoT). IoT refers to the increasing number of devices that are interconnected via the internet. SITSD also uses the National Institute of Standards and Technology (NIST) General Controls as policy when it comes to these devices. Based on our review of NIST policy, we believe the policy is too broad and does not specifically refer to unmanned aircraft.

While specific state IT policy related to unmanned aircraft use does not exist, individual agencies have addressed some aspects of IT policy within their unmanned aircraft policy. For example:

- DEQ and DOL policy addresses data retention and public access, and mentions privacy.
- DNRC draft policy addresses privacy and civil rights and liberties protections. This draft policy stipulates the agency will follow state of Montana and DNRC policy when it comes to privacy, transparency, reporting, tracking, and data management.
- MDT policy addresses saving flight data and mandates storing videos only when necessary due to size of files.
- DOJ policy states that all files associated with crash scene investigations shall be copied to a storage device and sent to Records Management for preservation in accordance with DOJ policy.
- MSU draft policy mentions areas of campus where there are expectations of privacy.
- UM policy requires a data management and security plan that includes the type of data being recorded during unmanned aircraft operations, who will have access, how the data will be stored, and how it will be destroyed.

While we determined each agency has incorporated some aspect of IT best practices into its respective policy, each policy is missing key aspects and policy requirements are inconsistent between agencies. For example, since unmanned aircraft are connected to state employee work computers and at times to the state network for data transfer, ensuring policy exists related to security and data collection, storage, retention, and privacy is vital. While SITSD has safeguards in place to address instances when devices are connected to the state network, each agency has different IT policy when it comes to connecting devices to employee workstations. As such, state agencies have not developed IT policies requiring appropriate levels of protection of the state network.

Statewide IT Policy Should Be Developed to Address Risks

Without having statewide IT policy related to unmanned aircraft, the state is vulnerable to potential security threats including pre-installed malware, extraction of sensitive data, loss of unmanned aircraft flight aircraft control, and agencies flying unmanned aircraft without proper certifications. Additionally, unmanned aircraft create large amounts of data which can potentially put hardship on the state network and agencies when sharing or downloading information. While agencies are currently collecting information via unmanned aircraft, without consistent IT policy in place to address data storage, the potential for additional resources being needed to re-organize stored unmanned aircraft data exists, along with potential privacy challenges, lawsuits, and security incidents.

Our work found states should have a structure in place that ensures coordination of unmanned aircraft use and development of policy for unmanned aircraft procurement, asset management, data standardization, privacy, and security and management. Since SITSD is the agency responsible for providing centralized management and coordination of state policies for security of data and information technology resources, it will be important for SITSD to be involved in the development of IT policy related to unmanned aircraft and ensure the state's IT assets are protected.

In January 2019, SITSD's Information Technology Managers Council created a workgroup to address unmanned aircraft and IoT needs in Montana. However, at the time of the audit, the group had not met or defined its objectives.

RECOMMENDATION #5

We recommend the Governor's Office work with State Information Technology Services Division to develop statewide policy addressing IT risks on unmanned aircraft data standardization, privacy, security and risk management, procurement, and asset management.

Office of the Governor

Office Response

OFFICE OF THE GOVERNOR
STATE OF MONTANA

A-1

STEVE BULLOCK
GOVERNOR

MIKE COONEY
LT. GOVERNOR

June 6, 2019

RECEIVED
JUN 06 2019
LEGISLATIVE AUDIT DIV.

Angus Maciver
Legislative Auditor
Legislative Audit Division
P.O. Box 201706
Helena, MT 59620

Dear Mr. Maciver:

Thank you for the opportunity to respond to the Legislative Audit Division's report, titled "Unmanned Aircraft Systems (UAS) Deployment and Oversight."

The report provides a thorough overview of UAS use in state agencies. Like with all new technologies, it is important for the State of Montana to realize the potential of UAS while recognizing potential complications that may arise from their use. The ultimate goal of a UAS program is to provide more effective and cost-efficient services while prioritizing Montanans' right to privacy. This report will help facilitate the creation of a successful UAS program for the State of Montana.

The Governor's Office responses to the report's recommendations are as follows:

Recommendation #1: *We recommend the Governor's Office require a cost-benefit analysis be performed before the procurement of an unmanned aircraft by state agencies.*

Governor's Office Response: Concur

The Governor's Office will distribute a memorandum directing all executive agencies to perform cost-benefit analyses before procurement of a UAS.

Recommendation #2: *We recommend the Governor's Office designate a central unmanned aircraft resource to provide oversight and coordinate statewide unmanned aircraft efforts and ensure agencies report on unmanned aircraft numbers and usage.*

Governor's Office Response: Concur

The Governor's Office will facilitate creation of a UAS advisory council, comprised of UAS points of contact from relevant state agencies, by August 1, 2019. Agencies represented on the council will include: Department of Commerce (DOC); Department of Environmental Quality (DEQ); Department of Natural Resources and Conservation (DNRC); Department of Justice (DOJ); Department of Fish, Wildlife & Parks (FWP); Department of Livestock (DOL); Department of Transportation (MDT); Information Technology Services Division (ITSD); Montana State University (MSU); the University of Montana (UM); local governments; law enforcement; and other relevant stakeholders.

Recommendation #3: *We recommend the Governor's Office ensure information is available to state agencies, the public, local government, and legislators on the application, viability, regulations, and best practices of unmanned aircraft.*

Governor's Office Response: Concur

The Governor's Office will task the UAS advisory council with organizing information and resources regarding UAS to be available to state agencies, the public, local government, and legislators within eighteen months of the council's creation.

Recommendation #4: *We recommend the Governor's Office develop statewide unmanned aircraft policy that ensures regulatory compliance is met at the state and federal level.*

Governor's Office Response: Concur

As the report shows, agencies are already in compliance with state and federal UAS regulations. The UAS advisory council will formalize the process of ensuring compliance and will be prepared to provide compliance consultation within twelve months of its creation.

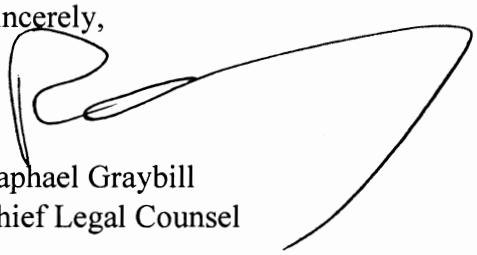
Recommendation #5: *We recommend the Governor's Office work with State Information Technology Services Division to develop statewide policy addressing IT risks on unmanned aircraft date standardization, privacy, security and risk management, procurement, and asset management.*

Governor's Office Response: Concur

There will be an SITSD representative on the UAS advisory council. The council will create statewide policy to ensure the privacy of Montana citizens and security of state data and information in relation to UAS use. Unmanned Aircraft Systems contain powerful technology with high potential for advanced data collection. The council must consider privacy and security as its primary priority and make decisions in consultation with the public and the moral code that governs our state and nation.

I will serve as the main point of contact for the Governor's Office until the UAS advisory council is created and convened. If you have any questions, please contact me at 444-3179 or raphael.graybill@mt.gov.

Sincerely,



Raphael Graybill
Chief Legal Counsel