“Drones for Good”
The Game-Changing Promise for Wildland Fire

Presented to the OSTP Subcommittee on Disaster Reduction

Mark L Bathrick
Director, Office of Aviation Services - Boise, Idaho

https://www.doi.gov/aviation/uas
DOI UAS Program - *Metrics That Matter*

- **2nd only** to DOD in size, scope, reputation.
- **Unique** FAA-granted authorities.
- **$50M** saved on one fire mission.
- **1/7th** the time, **1/10th** the cost RoT.
- **Leader** in domestic sUAS testing.
- **First** to identify commercial drone manufacturer cybersecurity issue, first to address.
- **Leads** the Interagency Committee on Aviation Policy (ICAP) UAS Subcommittee.
- **Selected** to Federal UAS Executive Committee (ExCom).
- >**40** favorable news articles.
- >**14,000** successful flights.
- **Zero** complaints from public.
- **Zero** accidents.
- **Zero** additional OAS funding/pers.
- **Two** national level UAS-related awards.
- >**400** fleet UAS, available call-when-needed contract for fire, SAR, natural resources.
- **21** separate Federal, State, Local agencies/governments have reached out to OAS for sUAS program development support.

1 NOAA, NASA, DHS, CBP, ID F&G, CO DPS, AK DoF, USFS, LAFD, Chicago, OR DoF, WA DNR, USACE, NSF, USDA, GSA, USDOT, ID DoI, USCG, CalFire, DC
**Fire & sUAS**

- Precision Fire Boundary Mapping
- Fire Behavior Detection
- Danger & Escape Route Detection
- Tactical
- Divisional
- Strategic

- Ground-to-Ground Voice, Video, & Data Relay
- Atmospheric Monitoring
- “In-Your-Hand & On-Demand” Products
- Outcome Effectiveness Measurement
- Traffic Management
- Airborne Targeting Support
- Personnel & Equipment Location

2017 = 707 flights, 71 fires
Means to collect, distribute, access, and analyze the >24X amount of data collected.

What do the trends/connections mean relative to previous trends, current expectations, established standards?

Supports actionable decisions with measurable impact.

Trends and connections in collected data.

Weak Links: People & Processes

MLB, Office of Aviation Services
The Game – Changing Potential of Optionally Piloted Aircraft (OPA).

Day VFR

“X” helicopters in direct attack and resupply support ~8 hours = 100%
Manned aircraft only

Night

2X

Winds Temp Rh

Day IFR

3X

2017:
~10M acres
$3B suppression
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<tr>
<th>Wildfire Task/Mission</th>
<th>Traditional Firefighting Methods</th>
<th>Current UAS Capabilities</th>
<th>Future UAS Vision</th>
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<td><strong>Fire Boundary Mapping</strong></td>
<td>1. IR equipped airplanes (only 2) produce rough perimeter. 2. Shape file derived from a low level helicopter flight with a handheld GPS.</td>
<td>Use small UAS to fly perimeter and then export the flight log to build the shape file.</td>
<td>Automatic mapping using long endurance UAS that can automatically detect and map the progress of the incident.</td>
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<td><strong>Tactical Situational Awareness (module level)</strong></td>
<td>Done through on the ground lookouts or through verbal relay from Air Tactical Group Supervisor (ATGS) to the ground firefighters</td>
<td>Small UAS can be embedded with the crews eliminating the need for lengthy verbal relay and actually provides better situational awareness (SA) to firefighters.</td>
<td>Long endurance UAS will transmit data to lightweight rovers embedded with the crews. These aircraft can be tasked in real time to look at whatever target on the ground the firefighter wants. There will always be a need for embedded small UAS.</td>
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<td><strong>Division Level Situational Awareness</strong></td>
<td>Done through relay with ATGS or from gaining a high point for observation.</td>
<td>Medium endurance UAS can be launched and deliver data to the Division Supervisor.</td>
<td>Division Supervisor will have access to rover units and be able to direct task a sensor to be able to look at whatever target on the ground they desire.</td>
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<td><strong>Strategic Level Situational Awareness</strong></td>
<td>Done through situation reports delivered to a multi agency coordination group that then decides the allocation of scarce resources.</td>
<td>Current UAS can provide intel during times when decision makers did not used to have that ability. Night and low vis events are a good example of this.</td>
<td>Use of high altitude long endurance UAS with powerful sensors will allow managers to look at and assess multiple incidents cross a geographic area. This will help them to make better decisions based on the actual conditions they are seeing on the fires.</td>
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<td>Initial Attack (IA)</td>
<td>Crews may or may not have access to aerial suppression / retardant delivery assets when the fire is first discovered.</td>
<td>Embedded UAS provide aerial intelligence for crews that may not have access to a helicopter or if an ATGS is not on scene. So far the number is low relative to the total number of fire resources.</td>
<td>IA resources will have small UAS available like any other part of their equipment. Existing crew will be trained in UAS use and the need for helicopter recons for the IC’s will be met through UAS. UAS or Optionally-Piloted Aircraft (OPA) capable of delivering cargo/water will become a new tool for IA.</td>
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<td>Extended Attack (EA)</td>
<td>Crews and equipment build fire line around the perimeter or use natural barriers to stop the fire.</td>
<td>UAS provide SA not previously available to managers. Growing, but integration is still relatively small.</td>
<td>UAS/OPA will deliver water/cargo 24/7 and will free fire crews to be more efficient and thus increase production. Fire managers will know at all times the location and rate of spread of the fire.</td>
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<td>Communications Relay</td>
<td>Done through vulnerable analog mountain top repeaters.</td>
<td>UAS are available that can supplement the repeaters system, but are not currently used.</td>
<td>UAS will provide voice, data, video relay through a variety of platforms. Meshed network radios will turn each person into a data relay node. Allowing for much better connectivity for firefighters. “In-Your-Hand &amp; On-Demand” location data and situational awareness will be available to every firefighter.</td>
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<td>Emergency Extraction</td>
<td>Done with a small number of exclusive use aircraft or with state cooperators. Limited availability at night.</td>
<td>DOI is issuing RFI’s for UAS or Optionally-Piloted Aircraft (OPA) that can carry large payloads.</td>
<td>UAS/OPA will be capable of extracting an injured firefighter 24/7 and delivering them to the nearest care.</td>
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<td><strong>Equipment Repositioning</strong></td>
<td>Equipment is moved by helicopter or truck to the needed location. Crews then carry things like pumps/hoses to emplace them where needed. Limited to daylight and good visibility.</td>
<td>DOI is issuing Requests for Information (RFI’s) for various sized cargo unmanned aircraft. Testing is planned for 2019.</td>
<td>Cargo will be delivered via UAS and things like hose-lays will be nearly automated so the necessary equipment is laid out for the firefighters, reducing their workloads. Can be accomplished 24/7 and in reduced visibility.</td>
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<td><strong>Aerial Ignition</strong></td>
<td>Done with low level manned helicopter flights. Hazardous: 2 helicopters, 5 lives lost in this mission in 13 years.</td>
<td>DOI has 2 payloads for aerial ignition using UAS. Testing will be completed by this fall and will be available to DOI bureaus.</td>
<td>Medium endurance aircraft will be able to carry both EO/IR cameras but also an aerial ignition device that allows for mission flexibility.</td>
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<td><strong>Aerial Supervision</strong></td>
<td>ATGS relays to firefighter on the ground what they are seeing via radio. Very little to no data-linking currently occurring – labor intensive, voice comms reliant.</td>
<td>UAS can provide “eye in the sky” direct to firefighters, freeing up the ATGS to manage the tactical aerial assets.</td>
<td>Fire managers will be able to directly task resources using data derived from UAS. Eventually there will be fully autonomous firefighting capability from detection to tactical delivery of water/retardant and gear.</td>
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Needs

1. Funding to complete transition of DOD-derived Optionally-Piloted Aircraft (OPA) technology to wildland fire Initial, Extended Attack, Resupply, and Emergency Extraction missions ($10M).

2. FAA certification criteria for heavier UAS (>55 lbs) for suppressant, retardant, supplies, emergency extraction missions.

3. Executive attention to encourage continued development and adoption of UAS and OPA technology across the interagency community.
Thank you,

Questions?

Mark L Bathrick
Director, Office of Aviation Services
Boise, Idaho
Email: Mark_Bathrick@ios.doi.gov
UAS Homepage: https://www.doi.gov/aviation/uas

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