Unmanned Aerial Systems in the Fire Service: Concepts and Issues

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Overview

– # of fires and # of firefighter deaths
– UASs – shorten decision cycles?
– FAA’s role
# of fires and firefighter deaths

There is a correlation but.....
Fires and Firefighter deaths last 12 years
78% variance unexplained

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Deaths</th>
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<tr>
<td>2013</td>
<td>1240000</td>
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</tbody>
</table>

Correlation and Regression - 2

- Sample size, n: 12
- Degrees of freedom: 10
- Correlation Results:
  - Correlation coeff, r: 0.4644492
  - Critical r: ±0.5759826
  - P-value (two-tailed): 0.12822
- Regression Results:
  - Y = b0 + b1x:
  - Y Intercept, b0: 10.67642
  - Slope, b1: 0.0000531
- Total Variation: 2920.667
- Explained Variation: 630.0259
- Unexplained Variation: 2290.641
- Standard Error: 15.13486
- Coeff of Det, R^2: 0.215713
What about Yarnell fire? was it an outlier?

59% unexplained
UASs, why not?
UAS Concerns

• Shut down operations if UAS is in the fire area (Pearce, South Australia County FD, 2014).
• Dangers to manned aircraft “if the drone is sucked into the rotor...curtains for the helo” Gabbert, 2014).

• Line of sight
• Below 400ft
• Right to privacy
• Expensive
• Development quicker than rules to govern NY
• FAA regulations
FAA and drones

Use of UASs

– Personal
– Business (Special Airworthiness Certificate)
– Government agencies (Certificate Of Authorization)

– 2015 deadline for rules for integration of drones in US airspace
– Test locations through 2017
FAA Test sites through at least 2017

Figure 1. FAA UAS test sites established in 2014. “Test Sites”. FAA, Unmanned Aircraft Systems (2014c).
Why UAS can help the fire service

• ....Anything we can do to increase the decision cycle (Davis, 2013).
• Situational awareness
• Command and control
• Infrared technologies
• Not just fire - Hazmat
• Use to extinguish fires
Video Demonstrations

• http://knowbeforeyoufly.org/ FAA

• InSitu A20
  https://www.youtube.com/watch?v=7bbasMvXZJo

• http://effaustin.org/2014/09/city-approves-austin-fire-department-drone-study/ Austin FD

• The Raven 1:30-4
  https://www.youtube.com/watch?v=VzX01Hc1R7g
Conclusions

- Relationship of # of fires and fire fighter deaths is not adequate alone
- Each fire is a dynamic situation
- Need tools to improve situational awareness/command and control and faster decision cycle (Davis, 2013)
- FAA test sites
- Fire service testing
Recommendations

– Need real time experimentation
  • Air worthiness, command and control, crash avoidance
  • Communication of operator with local ATC
  • “visibility of drones”

– Measure Fire Chief attitudes toward UASs

– FAA and fire service need to work together

– Drone developers
  • Easy to deploy and operate
  • Small drones could be used in large structures
Questions?

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**Hidden URLs**


https://www.youtube.com/watch?v=nZsUL6kzdzps
REFERENCES


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