

Starting Your Own UAS Program

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Class Objective

- Provide foundational knowledge and resources for launching a drone program within a mountain SAR organization.
- Questions/Discussion:
 - Who is already using drones in their SAR team?
 - Please give us a brief overview of what you are doing and your future plans.
 - Who is already FAA Part 107 certified?
 - Who flies drones recreationally, and what are you flying?
 - Who is seriously considering using UAS with their SAR team?
 - What is your status/progress?
 - Who is just curious about SAR drones and simply wants to know more?

Key Concept to Always Remember

Don't adapt your mission to your drone.

Adapt your drone operations to match the missions you actually have.

Our General Class Outline (Open to discussion & interests)

- Introduction to UAS in Search and Rescue
- Regulatory Basics
- Program Planning & Organizational Buy-In
- Equipment Selection and Funding
- Discussions and Video Examples
- Q&A, Wrap-Up, What's in the next two classes.

Overview of Drones in SAR Video

Examples

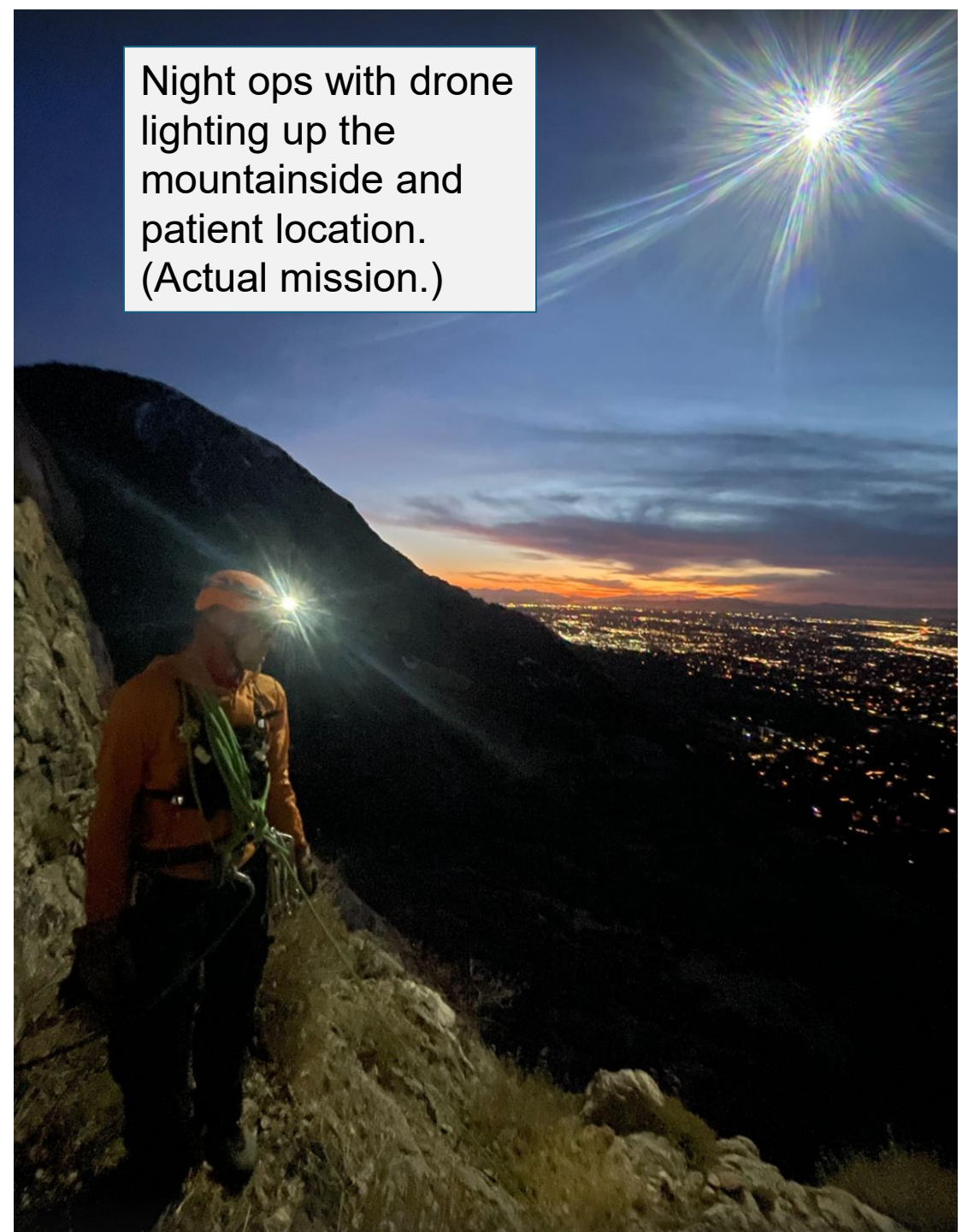
- General videos showing short clips of our operations and actual flight mission footage.

Limitations in Mountain Operations

- Loss of signal and Line-of-sight
- Ridgeline winds
- Communications between drone ops location and main ICP
- Multiple ridgelines between pilot and search area
- Portability of drone and batteries (and any charging options)
- Internet access for live transmission (FlightHub2, etc.)

Primary Uses

- Search
 - Grid search
 - Cliffside / hard to reach area search
- Patient Assessment
- Route Assessment
- Guiding Ground Teams (spotlight in the sky)
- Situational Awareness for Command Staff
- Pre-scouting possible helicopter access for landing or hoist



Night ops:

Challenging litter
evac illuminated
by drone. (Actual
mission image.)



Patient Care
Illuminated by the
drone, team
member
headlamps are off.

(Actual mission.)



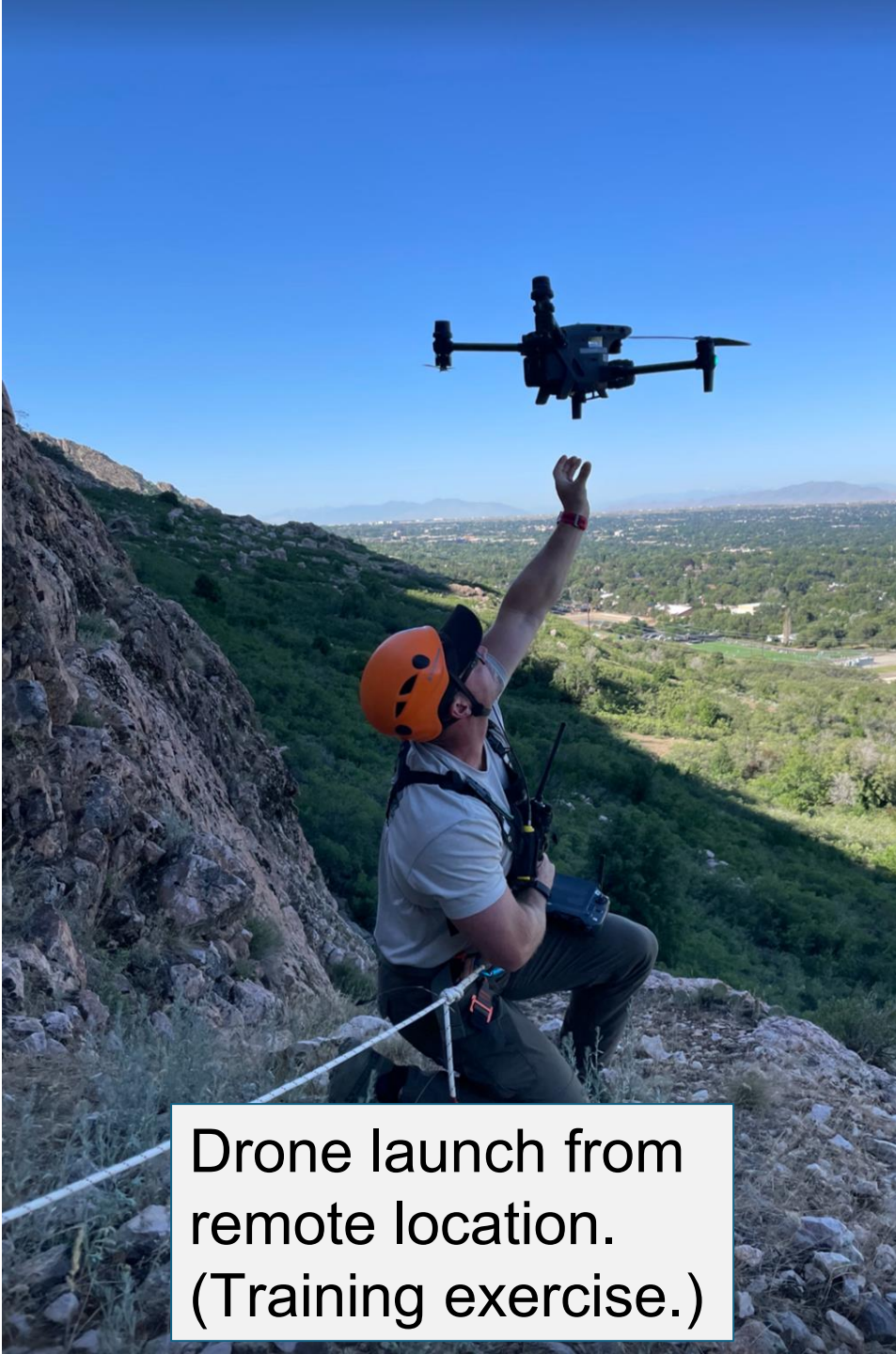
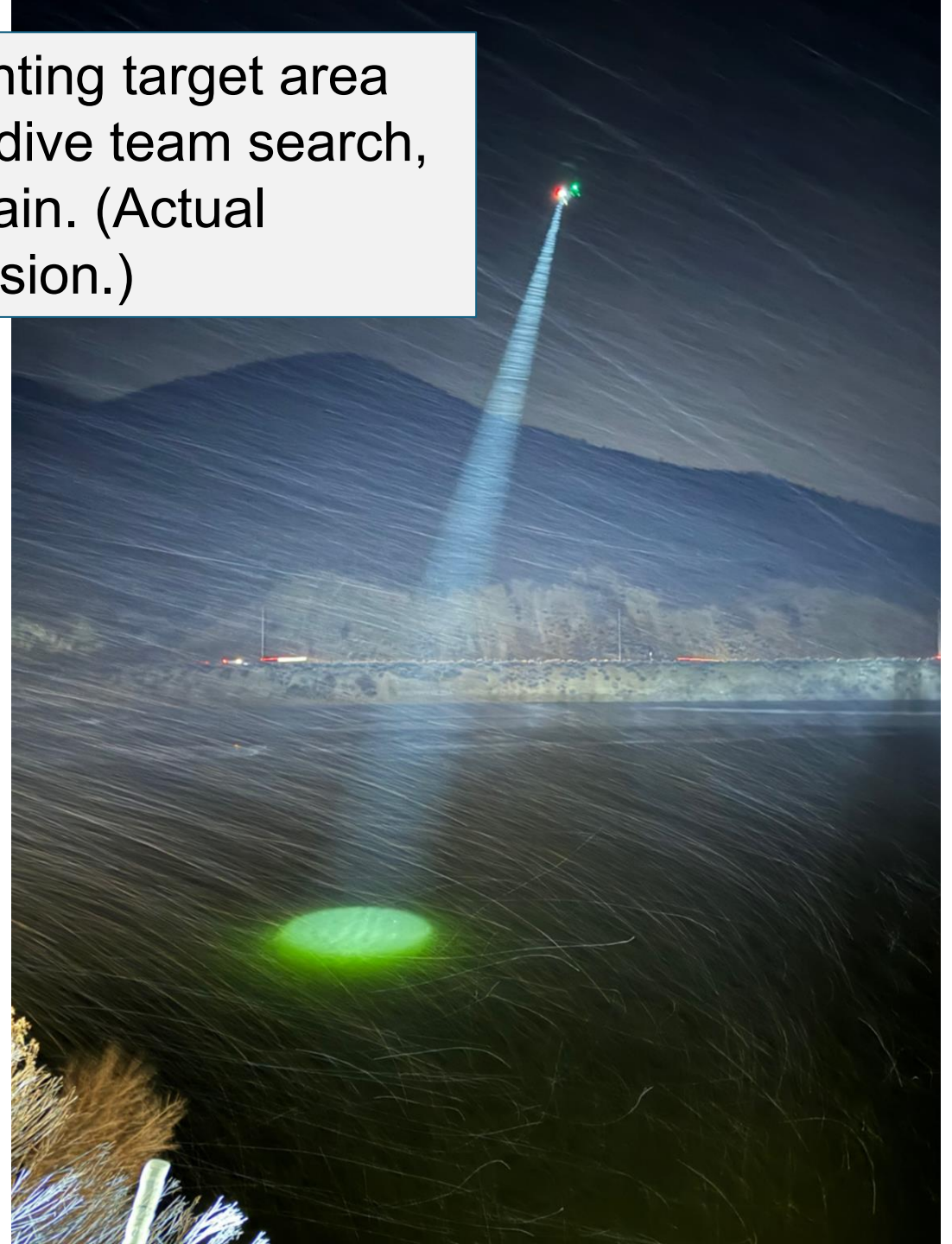
Drone lighting patient
egress.

(Actual mission image.)



Lighting target area
for dive team search,
in rain. (Actual
mission.)

Drone launch from
remote location.
(Training exercise.)



Use of FLIR

- helpful in both day and night.
- Best used as PIP with Color video / use spotlight on targets identified
- Prior to flight, adjust FLIR camera to known target (red hot/ white hot/ exposures) at altitude
- Varying results based on terrain (tree or brush cover, ambient temp)



Regulatory Basics

- Overview of FAA Part 107
- Recreational vs. commercial operations in SAR contexts
- Public COA (Certificate of Authorization) for agencies
- Local and regional laws, coordinating with other agencies (DoD, Parks, etc.)
 - Resistance to/fear of new technology
 - California Law AB 481 regarding UAS as “Military Equipment”
- Insurance and liability basics

FAA Part 107: Remote Pilot Certification

- Required for anything beyond recreational flying.
- Test is \$175.
- Many online courses and study guides.
- Required for LE and SAR unless operating under a waiver. (COA = Certificate of Authorization)
- Exams are proctored by FAA Knowledge Testing Center (at most flight schools)



Image from
DSLR Pros.com

Local/Regional Laws and Policies

- Resistance to/fear of new technology
- California Law AB 481 regarding UAS as “Military Equipment”
- Laws against Chinese manufacturers
- Laws and policies for parks and private property
 - Resistance to/fear of new technology
 - California Law AB 481 regarding UAS as “Military Equipment”
 - Privacy laws generally apply.

Most of these signs are meaningless.
The national airspace is controlled by the
FAA and DoD, not local authorities or
landowners.
Privacy laws still apply.



Insurance and Liability

- Insure your drones! You ***will*** crash them.
- Make sure your AHJ will cover liability issues.
- May need to explore third party Drone Insurance, consult your agencies' risk management department.



Next: Program Planning & Organizational Buy-In

- Steps to start a UAS program (policy, procedures, funding)
- Buy-in with the rest of your SAR team
- Building a team and training plan
- Working with local authorities and airspace coordination
- Integrating with ICS and mutual aid

Starting Your sUAS Program

1. Define your initial goals and missions. Start small. Be realistic.
2. At least one remote pilot certified to FAA Part 107.
3. Define some basic policies and procedures to start.
4. Obtain a drone and train with it alone at first.
5. Join in with other team trainings with your drone. Share cool videos of them doing awesome training. DON'T FLY TOO CLOSE.
6. Get organizational buy-in and start using your drone(s) on actual missions. Integrate with the ICS system and command.
7. Once you have some success, start working on funding.

Organizational Buy-In

- Drone noise is distracting!
- Ask how you can help.
- Provide valuable support.
 - Search success is best
 - Situational awareness
 - Useful videos
- Join in training missions.
- Be professional.
- Assist with airspace coordination.



MRA Climb Team and drone operations together.

Image: Sheri Trbovich

Build a Team

- You can be an “Army of One”, but a team is better.
- Minimum:
 - Remote Pilot In Command (RPIC)
 - Visual Observer
- SOPs are available through MRA’s UAS Committee
- Start a training program
 - Flight skills
 - Search skills
 - Night flying

Local Authorities and Airspace Coordination

- Work closely with your various Agencies Having Jurisdiction (AHJ)
- Integrate with ICS, don't be a lone wolf
- As an FAA certified remote pilot, you know many aviation laws
 - Volunteer to be the helicopter LZ coordinator and get to know their policies.
 - Coordinate with any other aerial assets = airspace deconfliction
- Airspace Deconfliction
 - Time in the air (one aircraft at a time)
 - Horizontal isolation ("You flight north of this canyon, I'll fly south.")
 - Vertical isolation ("You stay above 7,000 feet ASL, I'll stay below 6,500.")
 - Access/Egress routes predefined

Mission Integration

- Maintain coordination with Incident Command
- Remember drones can help with:
 - Missing person search (wide-area and pinpoint). Use best practices!
 - Patient assessment
 - High-angle reconnaissance and terrain assessment
 - Ground team support
 - Avalanche and snow field operations
 - Challenging terrain: mudslides, cliffs, water (swiftwater, surf, floods, lakes/ponds)
 - Overwatch and communications relay
 - Night operations and thermal use

Equipment Selection

- Rotary Wing vs. Fixed Wing
 - Fixed wing has longer airtime but is harder to keep on-station.
 - Rotary wing is the current option of choice.
- Must match your missions
 - Work out of IC → high capability
 - Work out of the field → high portability
- Best current single drone choice is probably one of these:
 - M30T
 - M4T
- Almost ANY drone is better than none.
- Get insurance and spare batteries!



Drone Manufacturer Disclaimer

- We are drone company (and country of source) agnostic. We don't care who makes it, as long as it works.
- At the moment, the generally accepted industry leader is DJI.
- We will jump ship the moment a superior product is produced at a competitive price.
- Our loyalty is to the mission, not to any specific company.
- You should purchase the drone that works best to save lives in your mission area.
- We are 100% against laws that limit your options.

Key Payloads for SAR in Order of Importance

1. Visual camera considerations
 - Optical Zoom
 - Low light performance
2. Thermal camera
 - Resolution
3. Floodlight
4. Payload drop systems
5. Loudspeakers



Ground Control to Major Tom

With apologies to
Daivd Bowie.

- Ground control stations is covered more in the next class.
- Hand controller
- Larger screen via HDMI cable
- WiFi
- Remote broadcast*
 - FlightHub2
 - DroneSense / AXON Air

* Live demo in class #3 today if possible.



Cost Considerations

- If possible, choose a dealer that will provide support.
- Thermal cameras are crucial but expensive.
- Start small to build a reputation then expand.



Best Buy, \$270
Not a great choice,
but better than
nothing.



B&H Photo, \$22,359
Thermal camera, laser
range finder, and many
payload options!

Funding Sources

- PR is everything!!! Start with a successful mission.
- Government & AHJ
 - Emergency Management funds
 - County commissions
 - AHJ options
 - General funds
 - Forfeiture funds
 - Shared resource with LE, Fire, etc.
 - AB109 funds (California)
- Private
 - GoFundMe / Donations
 - PR campaigns w/ local media
 - Walmart Grant (Up to 5k, approval from local manager)



Mission Discussions and Demonstration Videos

- Example of drone deployment in a basic SAR scenario
- Show basic flight patterns and mission types
 - Hasty search
 - Challenging terrain search (cliffs, swiftwater, surf, mudslides, etc.)
 - Night searches



Weber County Sheriff's Office

Search and Rescue Dive Team



SHERIFF

That's all folks!

- Q&A and Wrap-Up
- What's in the next two classes.
 - Using UAS in SAR
 - Tactical and Operational Concepts
 - Maximizing UAS for SAR Operations
 - Advanced strategies and tools
- You can reach out to us at:
 - Captain Kyle Nordfors: uas@mra.org
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