

2019 UDOT RESEARCH PROBLEM STATEMENT

*** Problem statement deadline is Feb. 6, 2019. Submit statements to UTRAC@utah.gov. ***

Title: UAS-based survey and visualization of backcountry airstrip sites in Utah

No. (Office Use): 19.05.11

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Select ONE Subject Area Materials/Pavements Maintenance Traffic Mgmt/Safety Structures/Geotech
 Planning Perf Mgmt/Data Analytics Public Transportation Other

1. Describe the problem to be addressed:

The topic of unmanned aircraft systems (UAS; drones) as tools for data gathering and transportation planning is a rapidly growing concept. The Division of Aeronautics at UDOT is actively working with many stakeholders to adapt this new technology and use it to maximize the economic potential of Utah's airspace and airports. In many fields such as geology, forestry, and agriculture, UAS has facilitated accurate and effective geospatial data acquisition. The acquired data can be processed to generate 2D and 3D maps containing information such as topography, surface condition, vegetation, and human amenities.

Utah's backcountry airport system includes more than 100 dirt airstrips in remote areas of Utah which are difficult to access via automobile. Since the recession, many of these airstrips fell into disrepair and have yet to regain the popularity they once enjoyed. By supporting a variety of activities such as recreation—not only flying but also hiking, fishing, hunting, camping, etc.—, wildland research, firefighting, and land and resource management, backcountry airstrips provide important economic, social, and environmental benefits for surrounding regional communities. **This will enhance connections and make rural areas more resilient economically and socially.** It is, however, highly difficult for airstrip visitors to find enough information on those sites (e.g., access/egress, flight, and amenities). This lack of information may hinder maximizing the utility and economic potential of the airstrip sites. UAS can survey larger geographic areas efficiently and reliably and can thus be an appropriate tool to survey, assess, and visualize Utah's backcountry airstrip sites.

2. Write the project objective (25 words or less):

This project aims to explore the utility of UAS on surveying, assessing, and visualizing the physical environments and potentials of backcountry airstrips in Utah.

3. Explain why this research is important:

(In response, consider addressing specific UDOT goals, applicability in Utah or other states, etc.)

Revitalizing backcountry airstrips can contribute to the Utah economy. Tourism plays a significant role in Utah's economic health, especially in the northeast and southeast regions of the state, where most backcountry airstrips are located. With technology advancements in aviation and growing interests in tourism and recreation, some previously neglected backcountry airstrips are seeing increasing numbers of visitors. However, there is a shortage of data on the physical and recreational environment of those sites. As a result, backcountry aviators—both in-state and out-of-state—are still left with limited information, and airstrip operations and maintenance plans have not been developed.

This project, by surveying, assessing, and visualizing landing zones and surrounding recreational sites, will help UDOT identify effective investments and facilitate the preservation & promote/increase the utilization of airstrip sites as: access points to remote trails/roads; enhance the safety of emergency landing sites, and create connections to future bike/ped paths/trails under the [Governor's 1,000 miles campaign](#). These economic and mobility aspects will contribute to the UDOT strategic goal, "optimize mobility," and Division of Aeronautics missions, "Grow Utah's Economy" and "Promote Aviation as an Alternative Means of Transportation." As a transportation mode, aircraft provide perhaps the lightest footprint to access these lands. Utah Office of Tourism and Office of Outdoor Recreation in Utah Governor's Office of Economic Development have also shown interest in this project as a way to manage recreational recourses and promote tourism visits and spending.

Currently, many state aviation agencies, including those in Washington, Oregon, Idaho, and Montana, provide comprehensive information on their airstrips (e.g., location, runway info, hazards, contact, and amenity features). Appropriate and timely information on those remote sites can significantly improve intention to visit and visitor satisfaction as they can explore more

opportunities, establish a clearer itinerary, and avoid potential hazards in advance. This would ultimately yield increased safety, economic, and environmental benefits.

UDOT is committed to safety: “Zero Crashes, Injuries and Fatalities” (in UDOT strategic goals) and “Ensure a culture of safety” (in Division of Aeronautics missions). By surveying and visualizing landing zones to accurately identify usable lengths and widths, surface type, prevalence of rutting, intrusive vegetation, and surface direction and slope, this project could also encourage and direct backcountry aviators to safety resources.

In addition to its economic impacts, informed decision-making on airstrip use could provide other social and environmental benefits. These include, but are not limited to, enjoying connected recreation sites, minimizing flights’ impacts on wilderness areas, enabling land and natural resource research, and efficient access to respond to wildfire or other natural disasters. The use of UAS, as a cost-efficient and reliable tool of photogrammetry, can facilitate multiple data acquisition—not only geological data but also access/egress routes, recreational points of interest, human activities, etc.

4. List the major tasks:

1. Develop and test a survey tool of backcountry airstrip sites using UAS and GIS
2. In selected sites, survey the landing zone to identify usable lengths, widths, surface type, prevalence of rutting, intrusive vegetation on landing surface, and landing surface direction and slope of grade
3. In selected sites, identify potential points of interest within a determined radius of the landing surface to include, but not limited to: hiking trails, mountain biking trails, camping areas, fishing areas, swimming areas, hunting areas, and other areas of recreation and tourism. For this task, field survey data will be supplemented by pilot interviews through Utah Back Country Pilots Association
4. For each site, create informative maps of geospatial and recreational environments
5. Synthesize the survey data, maps, and pilot interviews to discuss effective dissemination of the research outcomes and implications for infrastructure investment and airstrip operations and maintenance

5. List the expected deliverables (reports, manual, specification, design method, training, etc.):

1. Final project report containing literature review, survey process, analysis findings, and planning recommendations
2. Tutorial of tools to survey and visualize backcountry airstrip sites in Utah
3. Informative graphics and maps of each airstrip site including its geospatial and recreational environments

**6. Describe how the research results will be implemented:
(In response, consider addressing UDOT leader support, process or standard improvement, etc.)**

The informative maps and graphics for each airstrip will be shared with state agencies (UDOT, Utah Office of Tourism, and Office of Outdoor Recreation in Utah Governor’s Office of Economic Development), incorporated with future state wide active transportation plan(s), county and municipal governments, and private organizations such as Utah Back Country Pilots Association (UBCP). In particular, UBCP would help disseminate informative documents as well as research findings to their members and the general public through their website. An increase in interest in backcountry flying has resulted in a growth of membership in pilot organizations. With increased membership comes the potential for increased revenue to support backcountry airstrips. Greater membership also translates into increased influence with public policy makers in multiple aspects (e.g., safety, economic, and environmental impacts).

Proving the UAS survey tool’s effectiveness and contribution to airstrip planning (e.g., effective investment, maintenance, and preservation), this project could be extended to a full survey of backcountry airstrips in Utah (approximately 100). Many backcountry airstrips are located on federal land and several are located in wilderness areas. The research findings could assist legislative supports for backcountry airstrip advocates and state agencies to work with federal land managers to keep backcountry airstrips open and maintained.

7. Requested from UDOT: \$50,000 (or UTA for Public Transportation) Other/Matching Funds: \$0 Total Cost: \$50,000

8. Outline the proposed schedule, including start and major event dates:

This research is anticipated to take approximately 18 months to complete, according to the following schedule:

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| 2019 | Jul–Aug: | Establish and meet with technical advisory committee to refine scope, timeline, and deliverables. |
| | Sep–Dec: | Develop and test survey tool of backcountry airstrip sites using UAS and GIS. |
| 2020 | Jan–Jun: | Conduct field surveys of multiple airstrip sites to collect data on their geospatial and recreational environment. |
| | Mar–May: | Interview backcountry pilots to complement UAS-collected GIS data and explore policy implications. |
| | Jul–Aug: | Prepare interim report and receive feedback from technical advisory committee. |
| | Aug–Oct: | Create informative graphics and maps for each airstrip site. |
| | Nov–Dec: | Prepare a draft report and presentation summarizing the project’s results and implications. Receive feedback from technical advisory committee. Revise and submit a final project report, a survey tutorial, and graphics. |