



Lighting R&D Projects Update

RPA S5: Visual Guidance

Presented to:
IESALC Spring Government Contacts Meeting

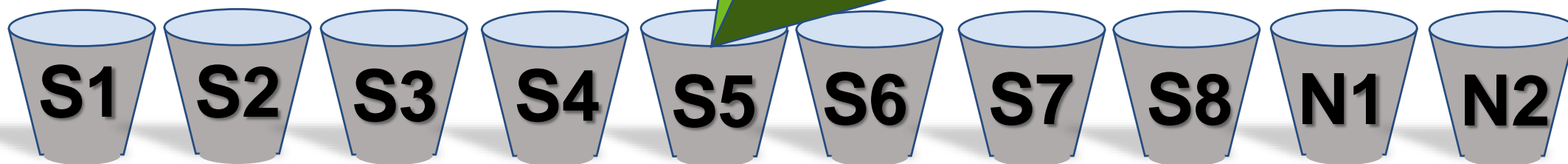
Darian Byrd
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Airport Technology Safety Research Project Areas (RPA)s

- S1 – Airport Planning and Design
- S2 – Airport Safety Data Mining
- S3 – Aircraft Rescue and Fire Fighting
- S4 – Wildlife Hazards
- S5 – Visual Guidance
- S6 – Runway Surface Safety Technology
- S7 – Airport Safety and Surveillance Sensors
- S8 – Unmanned Aircraft Systems Integration
(transitioning to UAS/New & Emerging Entrants)
- N1 – Airport Noise
- E1 – Airport Environmental

Example: RPA S5 Sub RPAs and Projects

- S5.1 Lighting Infrastructure
 - **Project: Solar Lights**
- S5.2 Signs, Markings, Paint
 - **Project: EMAS Signage**
- S5.3 Lighting Innovations
 - **Project: 3D-Printed Optics**
- S5.4 NAS Visual Aids
 - **Project: PAPI Baffling**
- S5.5 Wrong Surface Landings
 - **Project: Lighted X**



EMAS Signage Simulation



Recommendations

- Expand efforts to educate pilots about the function of EMAS and how to identify its presence for a particular runway
- Include EMAS overrun experience in pilot training simulations
- Consider the use of EMAS signage at both the departure end for takeoffs and the end of the runway for landings as a reminder of its presence
- Consider inclusion of EMAS into preflight and approach discussions
- Examine effectiveness of EMAS representation in flight preparation materials

Lighted X



NIST Research

- NIST testing was performed using a scale model in a laboratory setting in complete darkness
 - Nighttime simulation with 20 pilot participants
- The scale model was configurable to allow for a number of different LX RCM arm lengths, lamp configurations, effective intensity ranges, as well as LED and incandescent configurations
- The NIST findings were presented to the FAA on October 1, 2019
 - The NIST laboratory experiment concluded that a larger 28-ft LX RCM would be far more recognizable at 1.5 nautical miles (nm) than the standard size for both incandescent and LED RCM fixtures
 - NIST concluded that a minimum daytime intensity of 2,000 cd as defined in the AC was too high, caused glare, and made the X-shape difficult to recognize
 - Optimal nighttime visibility occurs at intensities between 100 cd and 300 cd for both the LED and incandescent lamps.

ATR Research

- AAS tasked the Airport Technology Research and Development (ATR) Branch with the following tasks
 - Evaluate NIST findings in a live setting in both daytime and nighttime conditions
 - Investigate the effectiveness of variations to the standard Lighted X method and novel lighting systems to indicate temporary runway closure
- ATR Planned Approach
 - Evaluate NIST results
 - Ground-based testing to identify likely intensities and eliminate unlikely intensities, evaluate the two size form factors, and gather information regarding ideal flash rates
 - Live flight testing is planned to follow the ground-based testing, leveraging the initial findings
 - Runway conspicuity live-flight testing
- Planning to do ground-based testing in July 2023 at the Naval Air Warfare Center Aircraft Division (NAWCAD) in Lakehurst NJ

Solar Powered Lighting at GA Airports

Background on Solar Powered Lighting Systems at Airports

- Solar technology has matured and now presents an opportunity for airports
- FAA Airport Technology Research and Development Branch (ATR) is examining solar powered lights as an alternative to standard lighting at General Aviation (GA) airports
- ATR is evaluating:
 - Suitability and reliability of solar powered lighting systems
 - Compliance with safety standards
 - Mitigation strategies and optimum siting requirements
- FAA guidance will then be provided on the installation and use of solar powered light systems

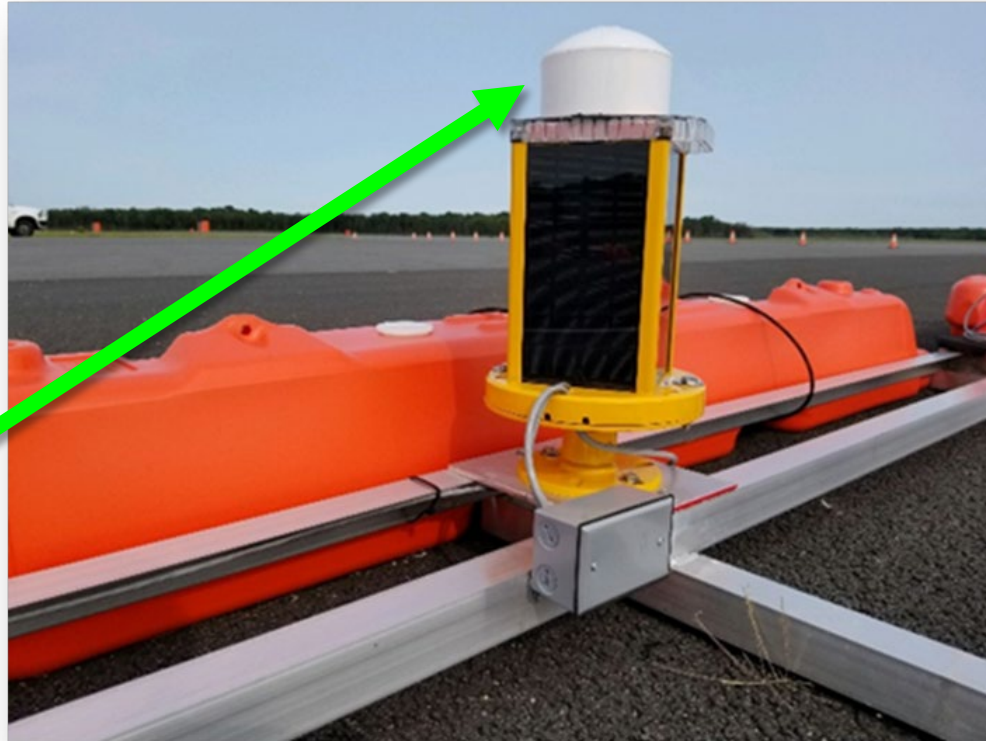
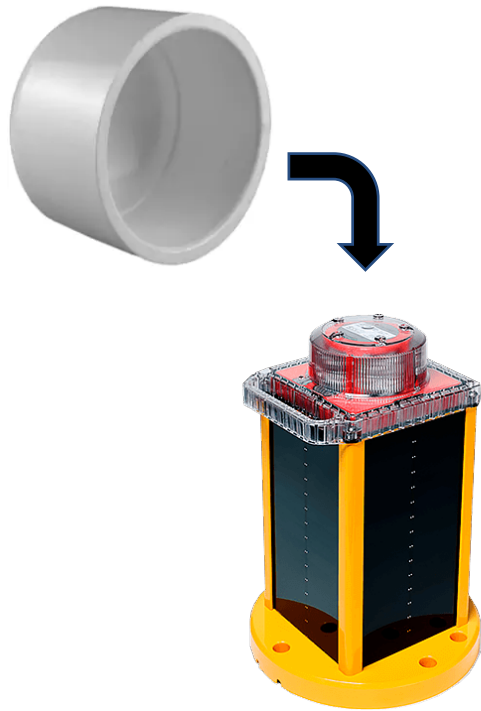
Solar lighting is an efficient lighting solution for small, remote, or off-grid General Aviation (GA) airports

Components

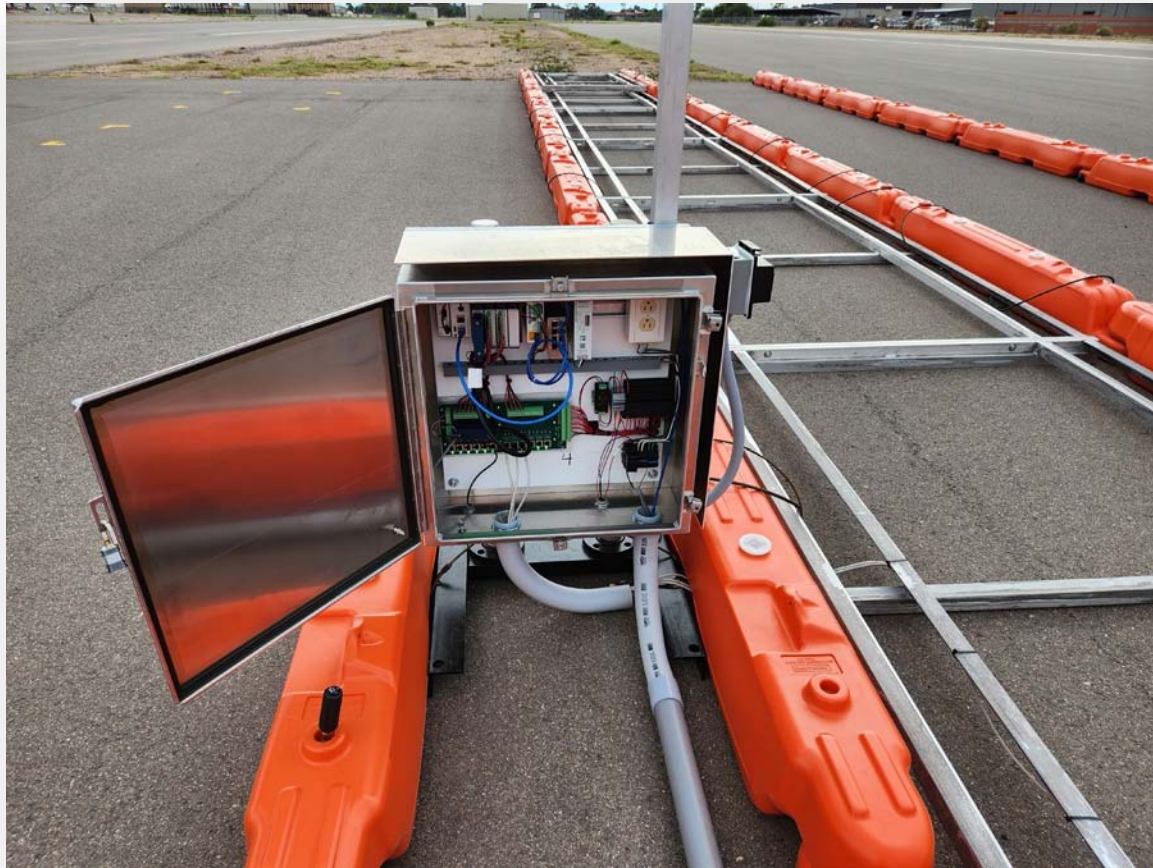
- Airfield Components (total of 46):
 - L-861 Runway Edge/Threshold Lights
 - L-861T Taxiway Edge Lights
 - L-810 Obstruction Lights
 - Elevated Runway Guard Lights
 - Wind Cones
 - Airfield Guidance Signs
- Each component is “decentralized” i.e. each component has its own solar panel and battery charging system
- Two manufacturers
 - SPX
 - AvLite



Lights are baffled

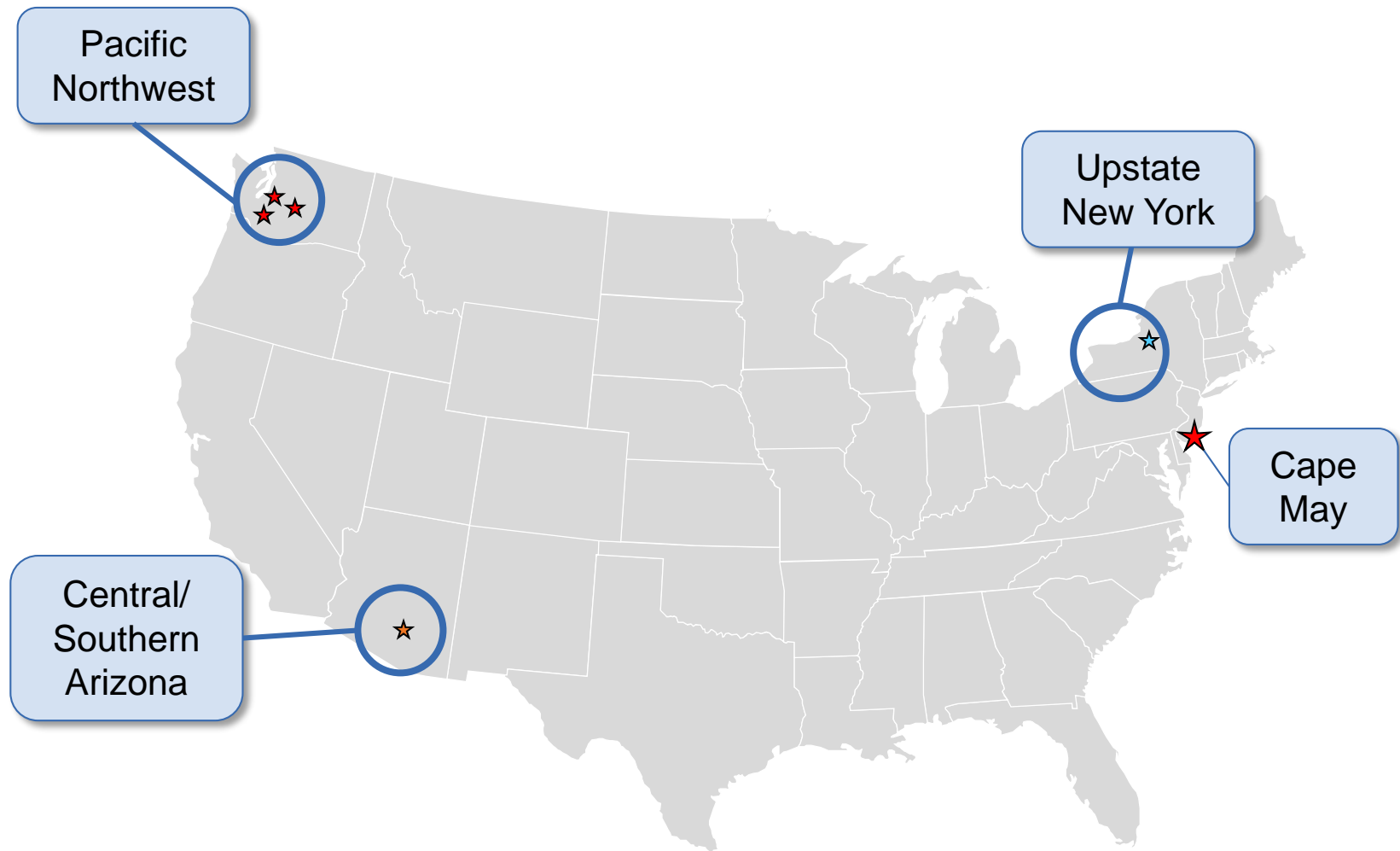


Field and Vault DAQ Boxes



Proposed Test Sites and Candidate Airports

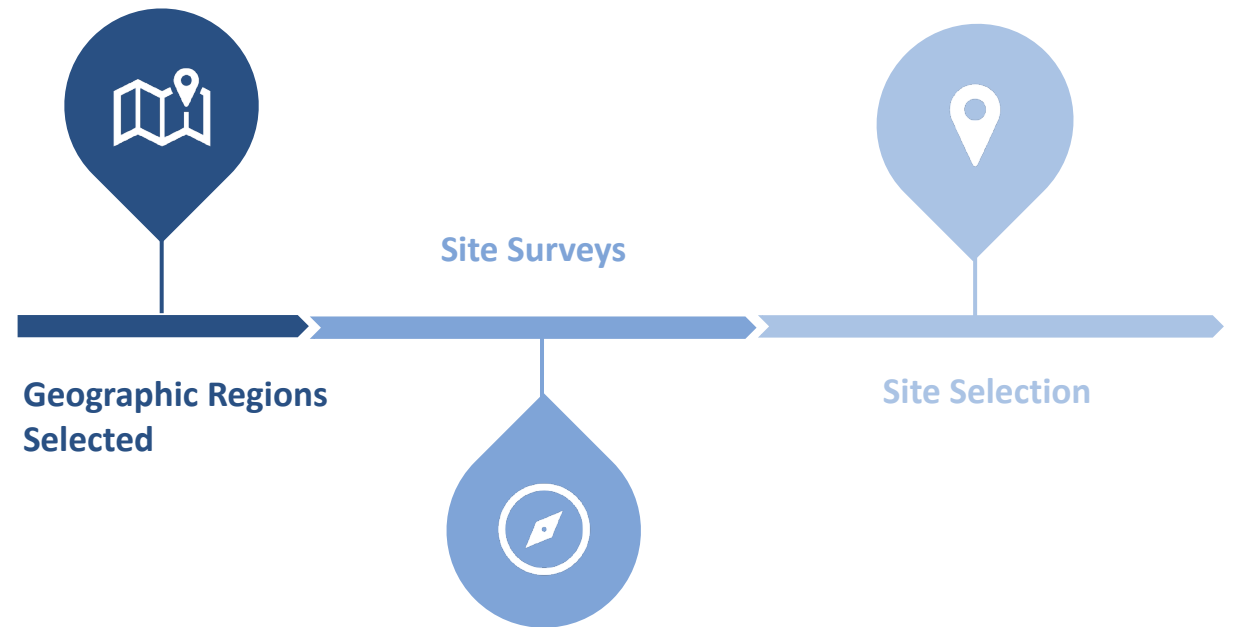
1. **Cape May (WWD)**
2. Central Upstate New York
 - **Penn Yan (PEO)**
3. Central Arizona
 - **Casa Grande (CGZ)**
4. Pacific Northwest
 - Tacoma Narrows (TIW)
 - Puyallup(PLU)
 - Olympia (OLM)



Evaluation of Solar Powered Lighting Systems on Airports

Research Request: Conduct research to evaluate solar lighting Systems at 4 GA airports in diverse geographic regions based on varied solar insolation, ambient temperature range, and snow fall.

1. **Geographic regions selected**
2. **Site Surveys:** conduct surveys at candidate GA airports in each region to identify most suitable locations
3. **Site Selection:** Select one GA airport from each region for evaluation
4. **Timeframe:** Conduct evaluations over a sufficient period of time to allow for assessment of seasonal solar insolation and related battery charging capabilities.



Cape May Installation



Solar Powered
Devices Located on an
Abandoned Section of
Former Runway 14-32.



Cape May Installation

Solar Device Test Beds will have a combined foot print of approximately 100 feet x 70 feet.



PEO Test Bed Full Installation



PEO Test Bed February



Casa Grande Municipal Subset Installation



Casa Grande Full Municipal Installation






Early Findings from Cape May and Penn Yan Data Analysis




- Performance during Winter months is critical
- Missed Radio Commands
 - Low voltage missed commands
 - Radio issue (Simultaneous missed commands)
- Low Voltage Disconnect
- Battery age/condition plays a large role in performance
- Battery Life Compact vs Standard vs Large
- Photocell control vs radio control

Current Status

In Progress

-  Site visits to each of the three candidate airports in Washington State
-  Procurement of equipment for Washington State test array
-  Publishing Data Analysis Report reflecting 1 year of data collected at WWD and PEO

Next Steps

-  Selection and installation of candidate airport in Washington State region
-  Installation of Washington State array
-  Analysis of Casa Grande data collection

Questions?

Contact the FAA Program Manager

Darian Byrd

(609)485-4995

darian.a.byrd@faa.gov

www.Airporttech.tc.faa.gov/