Flying to the Future – Unmanned Aircraft Systems Integration in Alaska

What is a UAS?


Unmanned Aircraft System (UAS)
Aircraft
Payload
Crew; Pilot, Payload
System Integration & Engineering
Command & Control
Data Link

UAS Variety

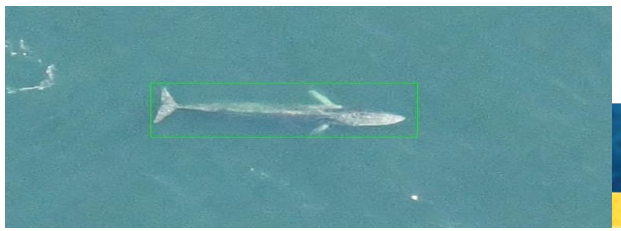
https://store.dji.com/guides/mavic-mini-hands-on-review/

https://skyfront.com/perimeter-8/

https://www.aerospacetestinginternational.com/news/flight-testing/hawk30-high-altitude-drone-reaches-new-heights-during-test-flight.html

The Alaska Center for UAS Integration (ACUASI)

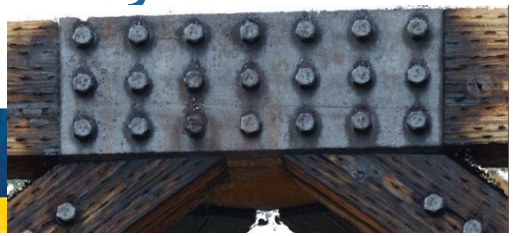
- ACUASI is the University of Alaska's UAS Research Program
- Our missions include:
  - Assisting the FAA in the safe integration of UAS into the National Airspace System
  - Supporting UAS users
  - Conducting scientific research



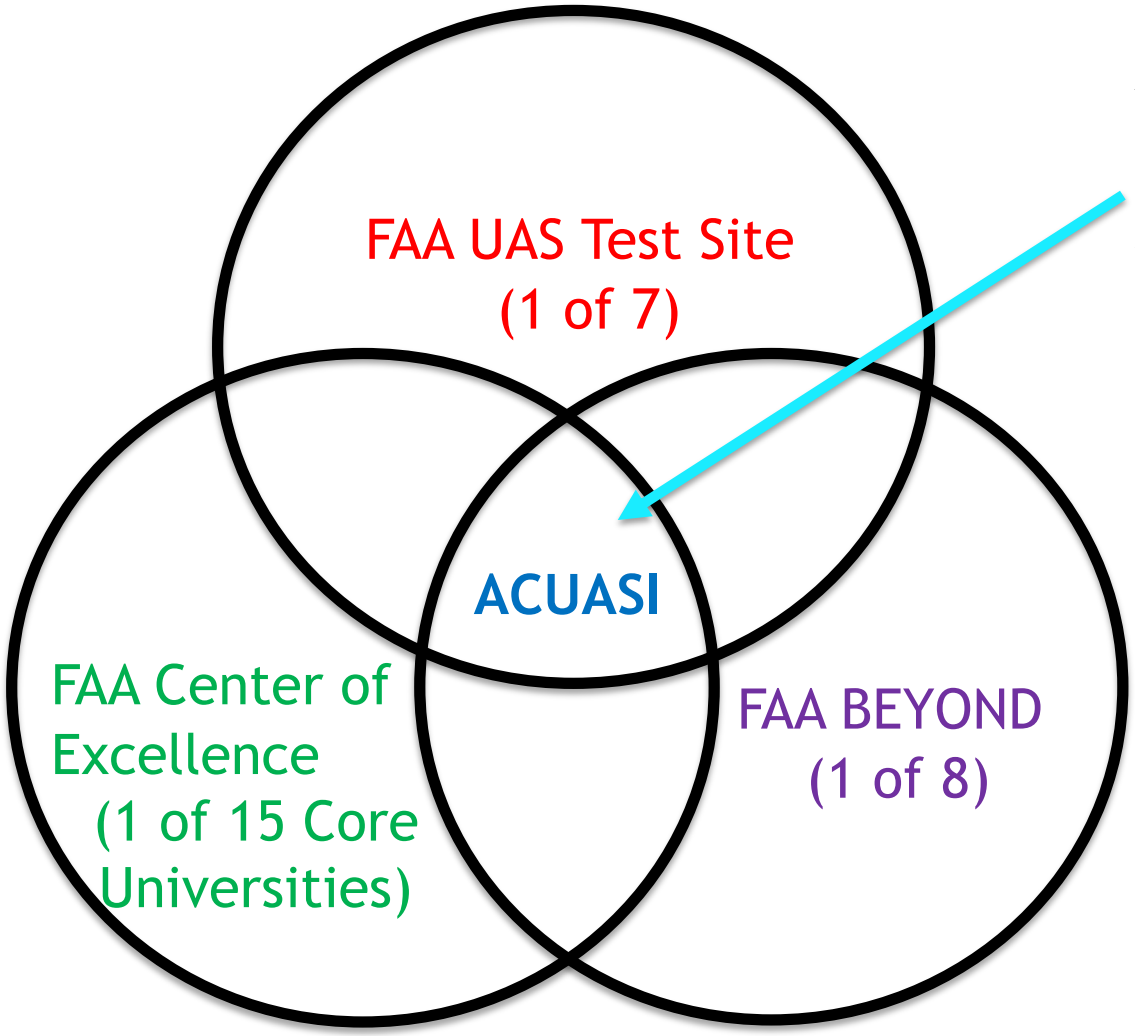
ACUASI

Key Partner - State of Alaska Department of Transportation & Public Facilities (ADOT&PF)

- ADOT&PF is working with the Federal Aviation Administration (FAA) to enhance UAS access to Alaskan airspace
- ADOT&PF operates airports across Alaska
  - Facilitating UAS integration at airports
  - Providing ingress and egress from Coastal Launch Sites to Permanent Areas in the Arctic
- ADOT&PF operates UAS for a wide variety of infrastructure monitoring use cases



FAA Recognition of ACUASI's Expertise



ACUASI is the only organization in the country with all three programs

FAA Center of Excellence for UAS Research (ASSURE)

- Involved in multiple projects focused on:
  - Ensuring safety of cargo operations
  - Minimizing risks from operations at airports
  - Safely flying Beyond Visual Line of Sight (BVLOS) of the Pilot in Command

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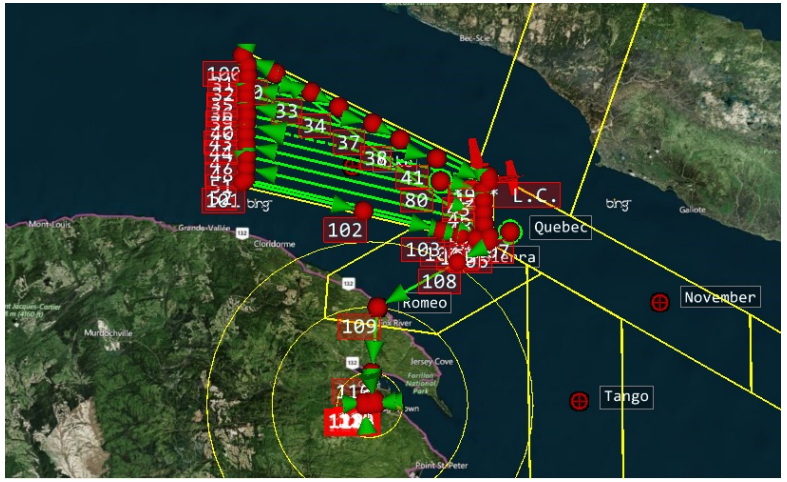
Essential for many scientific missions, but almost impossible under current FAA rules and regulations

Transport Canada Operations



- Development of Concepts of Operations (CONOPS) for operating at airports
- Road and land surveys
- Marine mammal surveys (Beluga Whales in Inuvik, North Atlantic Right Whales in Gaspé)
- Channel marker locations
- Automatic Identification System (AIS) ship identification

Inuvik Infrastructure Images

Tsiigehtchic NWT – 3 Aug 2019 (3,500 ft)

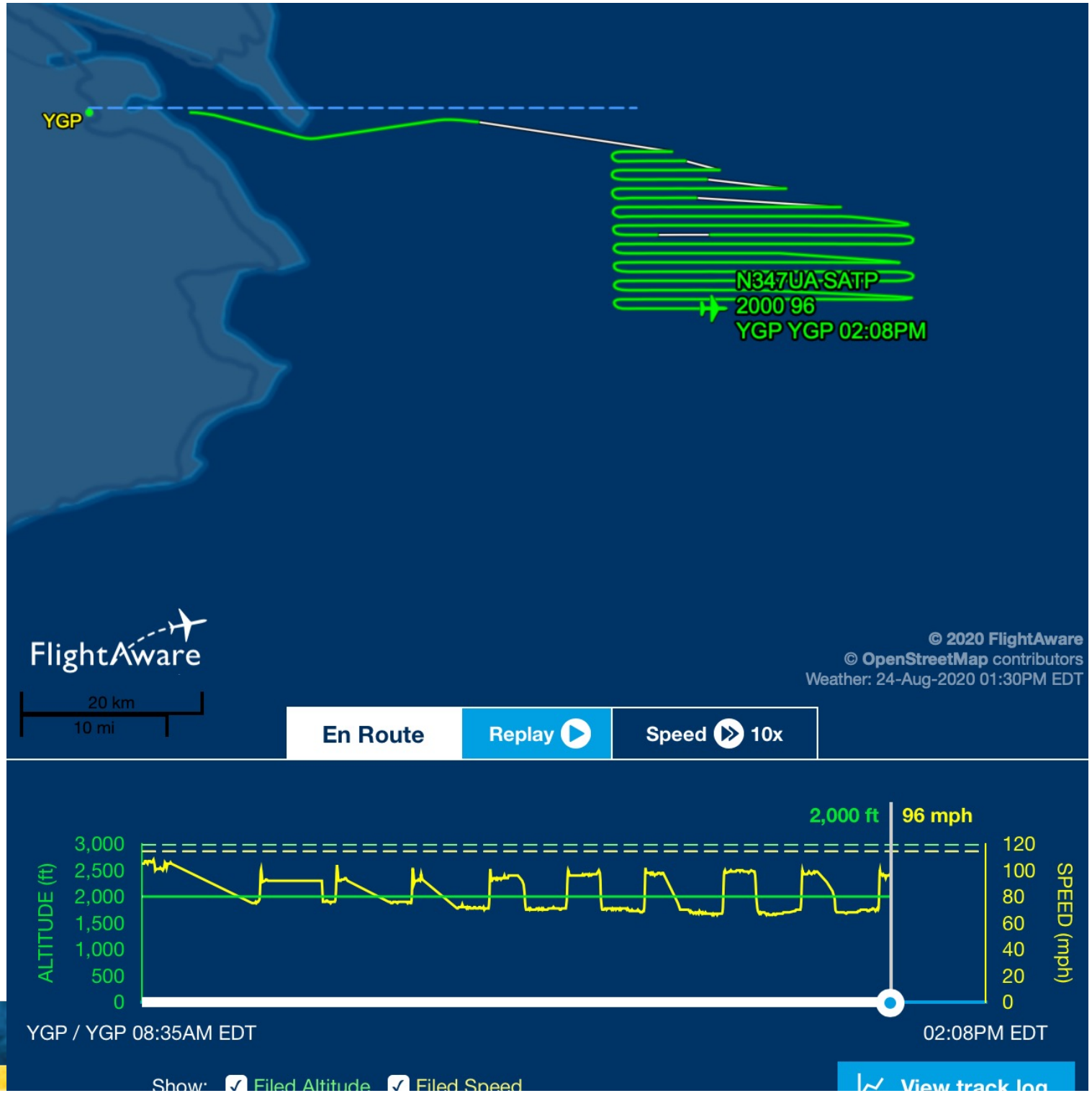
ITH – 1 Aug 2019 (3,000 ft)

Quarry – 3 Aug 2019 (1,500 ft)

Images captured using Nikon D850
45 Megapixel Camera with 50 mm Lens

BVLOS Marine Mammal Operations over the St. Lawrence Seaway

UAS tracked by normal flight tracking software

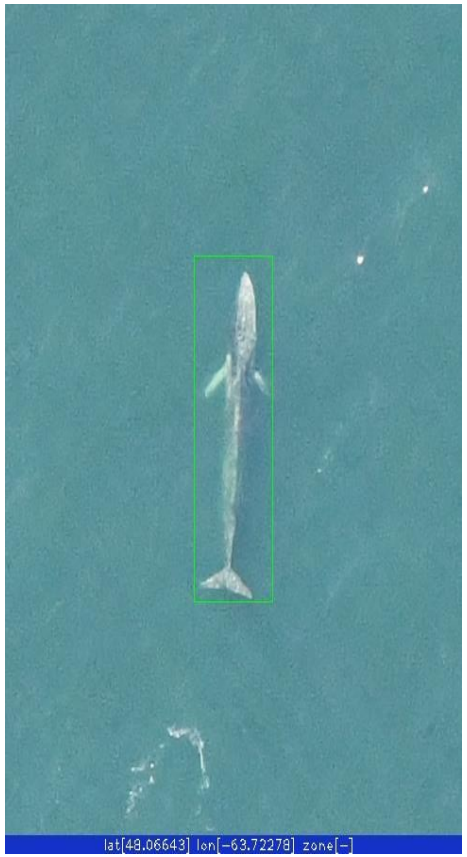


UNIVERSITY OF ALASKA FAIRBANKS

Gaspé Artificial Intelligence (AI) Whale Images

AI Detected NARW
22 Sept, 2019 (2000 ft)

AI Detected Whale
6 Sept, 2019 (2000 ft)

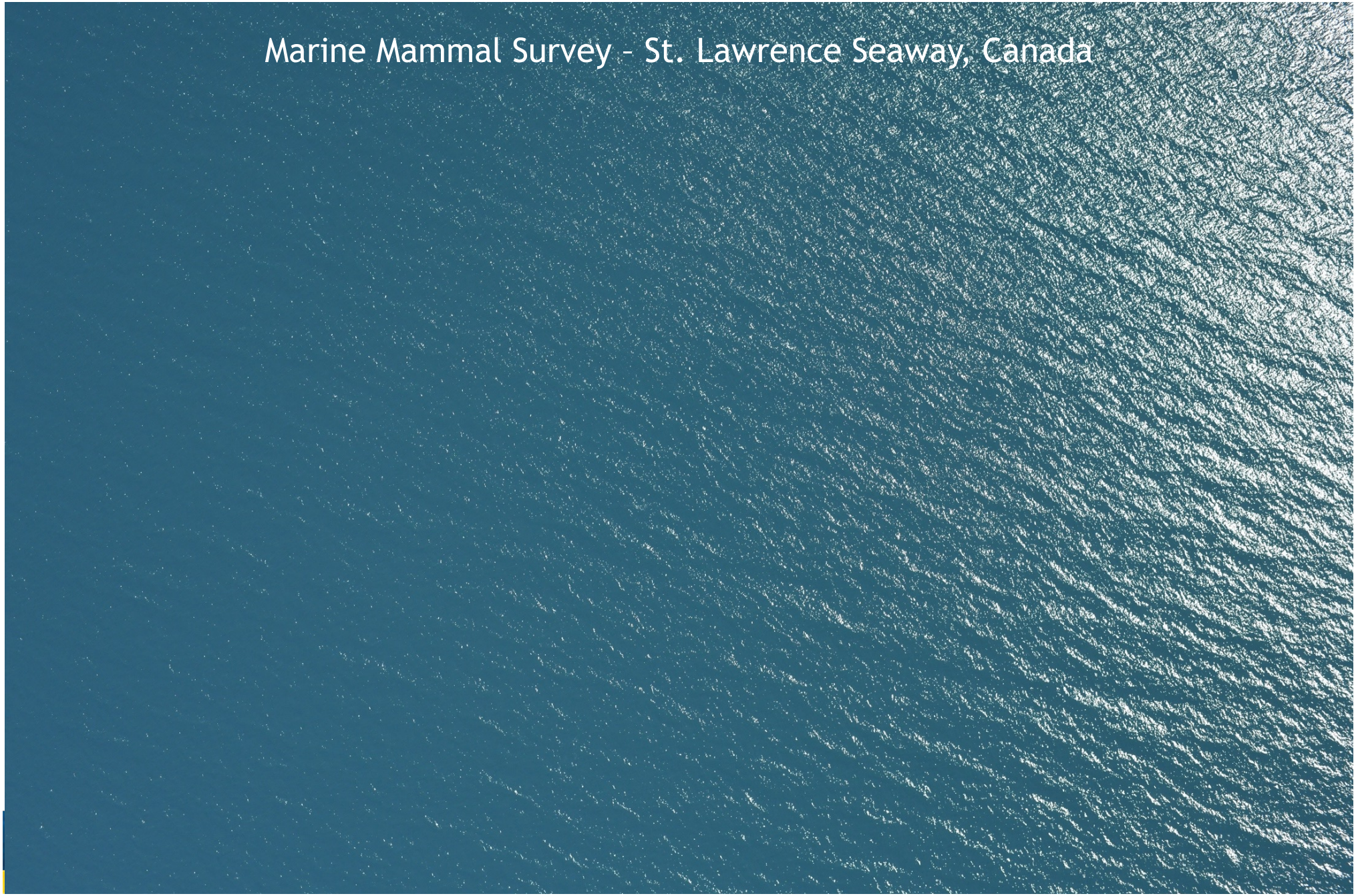


AI Detected Submerged Whale
6 Sept, 2019 (2,000 ft)

AI Detected Submerged Whale
28 Aug, 2019 (4,000 ft)

Images captured using Nikon D850 45Mp Camera with 35 and 50 mm Lenses

Original Photo - August 15, 2020



Artificial Intelligence-Identified Whale in Previous Image

Scientific Outreach

Transport Canada
@Transport_gc

Follow

The right of way goes to the #RightWhale! Our #drone is taking off in #Gaspé, #QC to monitor the #NARW population with @FishOceansCAN

12:00 PM - 30 Aug 2019

Testing Technology Required to Advance BVLOS Operations

- Detect and Avoid (DAA) systems – systems either onboard the aircraft or on the ground that identify aircraft near the UAS and either alert the UAS pilot to avoid or autonomously move to avoid the aircraft
- UAF has conducted two DAA flight test campaigns at the Poker Flat Research Range
- Intruders – manned helicopter and fixed-wing and small UAS (and bonus F15s)

First FAA-approved, no-human-eyes-on-the-aircraft, BVLOS waiver under the small unmanned aircraft rule (Part 107)

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

CERTIFICATE OF WAIVER

ISSUED TO

Issued To: University of Alaska Fairbanks
Responsible Party: Nicholas Adkins
Waiver Number: 107W-2019-03901

ADDRESS –

Address:
2160 Koyukuk Dr.
Fairbanks, AK 99775

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard and special provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED

Small unmanned aircraft system (sUAS) operations beyond the visual line of sight of the remote pilot in command (PIC) and Visual Observer (VO), in lieu of visual line of sight (VLOS).

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

14 CFR § 107.31 — Visual line of sight aircraft operation,
14 CFR § 107.33(b) and (c)(2) — Visual observer, and

STANDARD PROVISIONS

1. A copy of the application made for this certificate shall be attached to and become a part hereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Administrator of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.

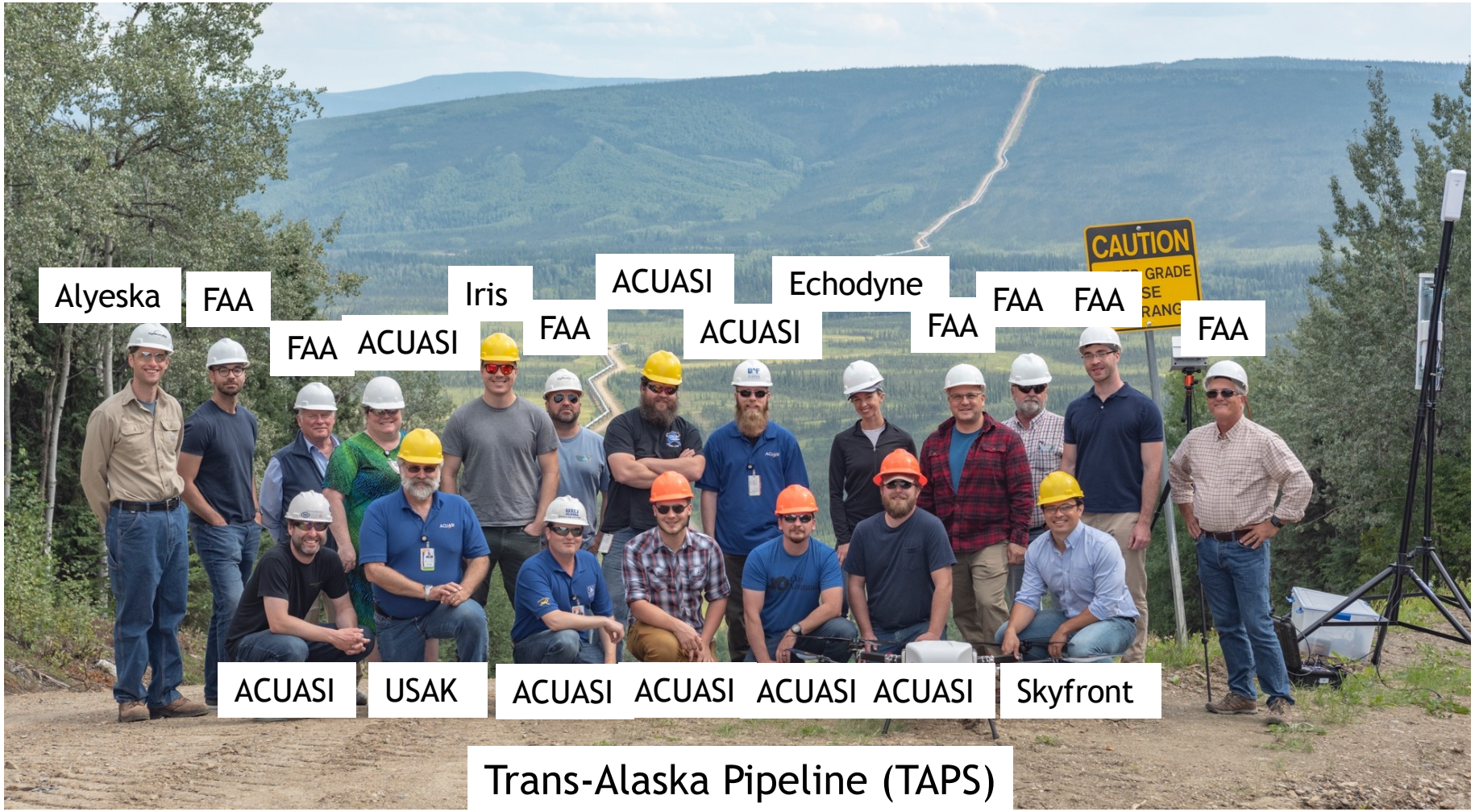
Waiver Specific Special Provisions. sUAS operations beyond the visual line of sight (BVLOS) of the remote PIC and VO(s) may be conducted under this waiver when the operation complies with the following provisions:

OPERATIONAL PROVISIONS

8. Operations under this Waiver must utilize at least one VO. The VO may use unaided human vision or the Detect systems described in the application to identify non-participating aircraft;

9. If not using the Detect systems described in the waiver application, the remote PIC must ensure sufficient VO(s) are used to observe the airspace to detect and track all air traffic or hazards;

First BVLOS in the Nation under the Small UAS Rule - July 31, 2019



Next Steps – Advancing BVLOS under BEYOND

- FAA granted UAF a waiver for operations along a 20-mile section over the TAPS for conducting BVLOS flight testing

- Multiple companies intend to fly the corridor to demonstrate various aircraft, DAA, payloads and other technologies when COVID-19 restrictions are lessened

Cargo Delivery – Think of the scientific applications…

- Goal:
  - To deliver cargo to remote communities via UAS
- Last ‘hundreds of miles’ problem
- UAS can fly when manned aircraft may not be able to (e.g., foggy conditions)
- Cargo carrying BVLOS for hire can only be done under a Part 135 certificate
- Unmanned Systems Alaska, a Fairbanks-based UAS company, has applied for a Part 135 Certificate.

ACUASI Future

ACUASI will continue to lead the way to the safe integration of UAS into the National Airspace System

- ACUASI will be flying large UAS from Alaskan airports to demonstrate UAS capabilities and test concepts of operations
- ACUASI and its partners will be developing the technologies needed to collect scientific data
- ACUASI will be transferring its knowledge to partners in the UAS community


The University of Alaska and its partners will lead the way to routine UAS operations!