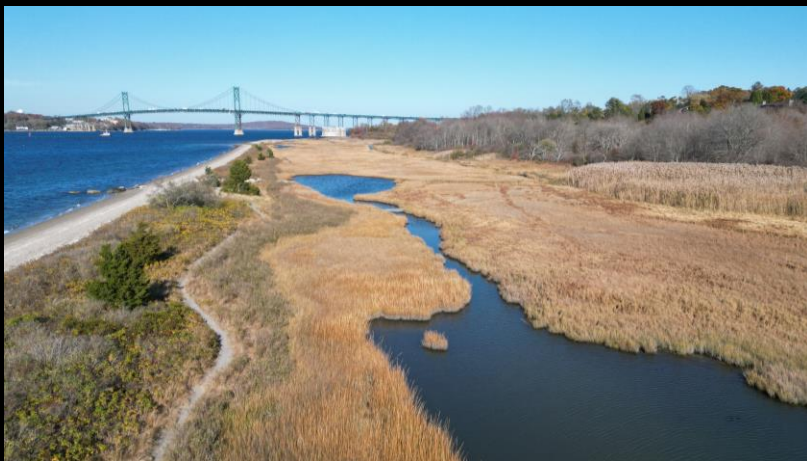




# Stewardship Takes to the Skies: Drones as a Tool for Land Conservation

Sean Grandy, Stewardship Manager, Aquidneck Island Land Trust

Adam Yorks, Stewardship Director, Sakonnet Preservation Association

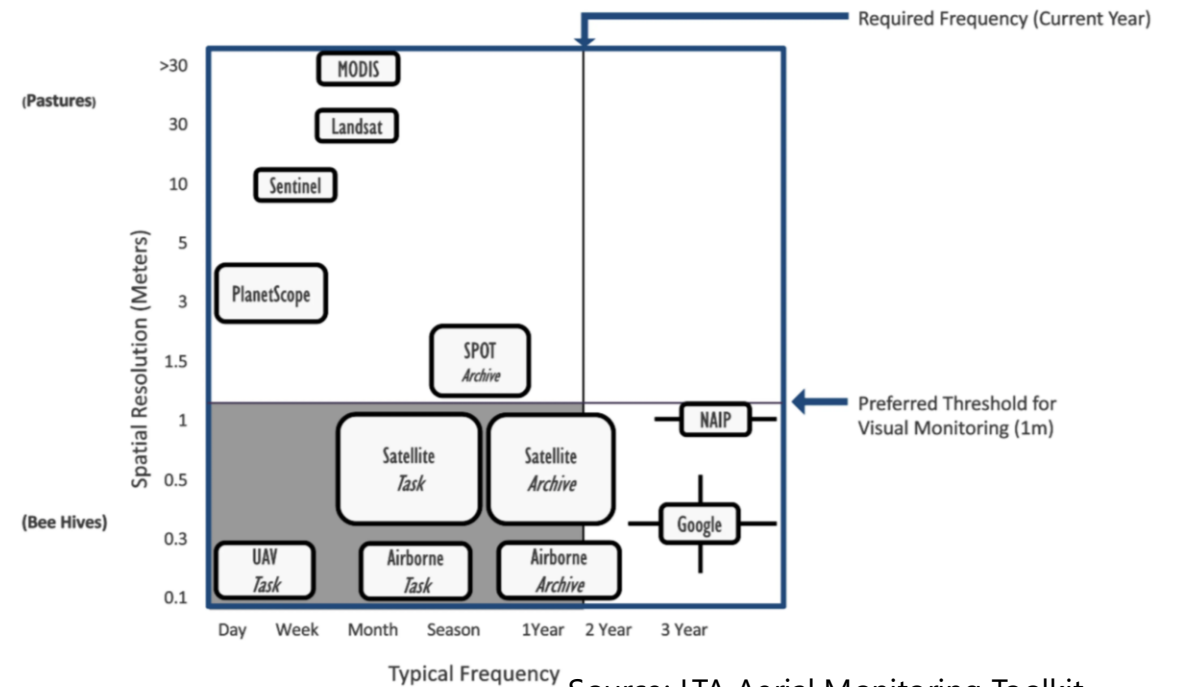
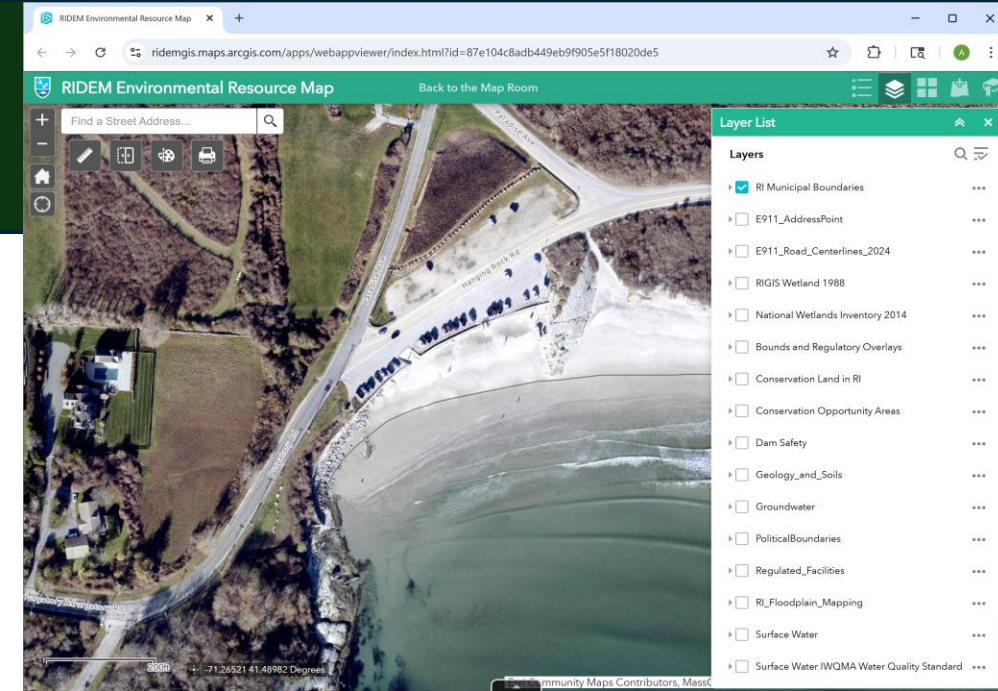




# Introduction

# Helpful Monitoring Resources

- RIDEM Environmental Resources Map
  - Web map includes a wide variety of aerial imagery available through RIGIS, ranging from historic 1939 imagery to recent Fall 2025 high resolution aerial imagery. Extremely helpful for remote monitoring or planning in-person visits.
- LANDSCAPE
  - Conservation project and data management software
- LTA Remote Monitoring Toolkit
- Community Volunteers
- And, of course, drones.....



LANDSCAPE

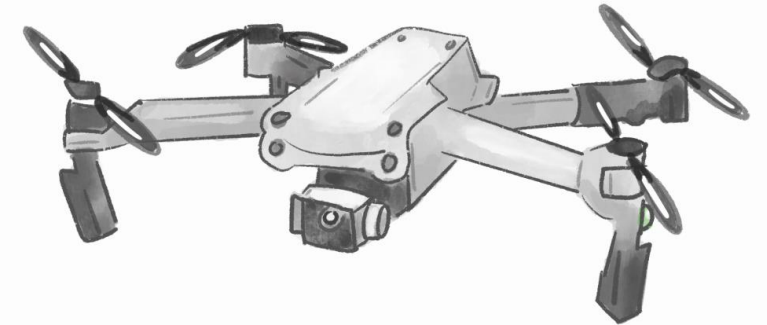
Source: LTA Aerial Monitoring Toolkit

# What's a drone?

One definition: *A small autonomous-capable remote sensing platform*

## What Can Drones Do for Land Trusts?

- Monitor conservation easements & detect violations from the air
- Survey remote, difficult, or sensitive properties safely
- Create orthomosaics, 3D terrain models & baseline documentation
- Map invasive species, vegetation health & wetland boundaries
- Capture compelling aerial imagery for outreach & social media

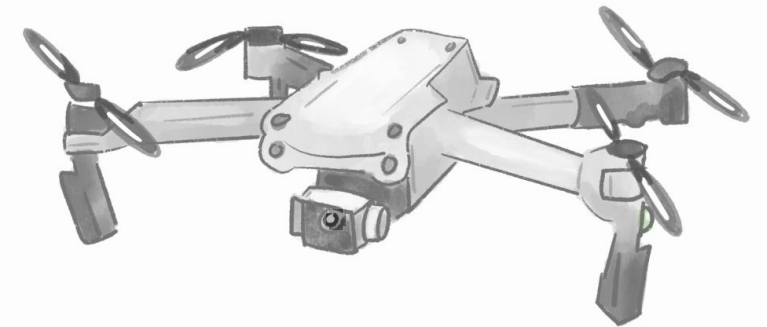


Gif credit: Erica Sloniker \ TNC

[\*\*Taking Flight:\*\* How drones amplify conservation efforts](#)

# Key Onboard Sensors

- **RGB Camera** – High-resolution visible-light photos & video for documentation
- **GPS/GNSS + IMU** – Geolocates every image; enables precise mapping & flight paths
- **Barometer/Altimeter** – Measures altitude for stable flight & accurate elevation data
- **ToF/Obstacle Sensors** – Time-of-Flight sensors for collision avoidance & depth perception
- **More advanced drones: Multispectral camera**– Captures NIR & red-edge bands for NDVI vegetation health analysis, **LiDAR** – Laser pulses create 3D point clouds; penetrates canopy for terrain models, **Thermal/IR** – Detects heat signatures for water mapping & wildlife surveys



Gif credit: Erica Sloniker \ TNC

# What a drone isn't

## Not Fully Autonomous

- Requires a licensed remote pilot for every flight; cannot think or decide on its own
- It is a tool, not a teammate – it only does what the operator directs

## Not a Complete Sensor Platform

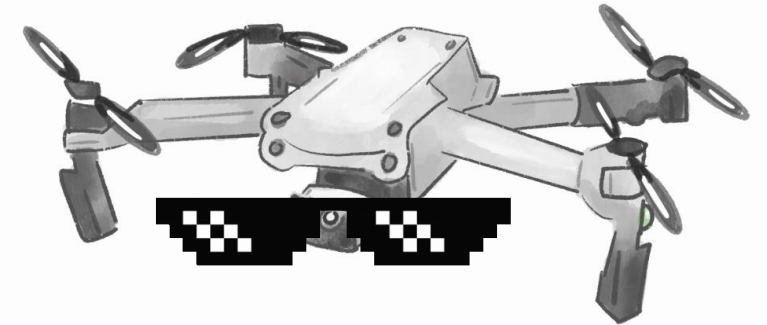
- Consumer drones lack temperature, humidity, air quality, and audio sensors
- Standard optics are wide-angle – limited zoom, no microscopic detail
- Cannot ID plant species or soil composition without expert interpretation

## Not an All-Weather Platform

- Cannot fly safely in high winds, rain, snow, or fog
- Battery limits flights to ~30 min; large properties may need multiple flights

## Not a Replacement for Boots on the Ground

- Cannot collect samples, install signage, or remove invasive plants
- Aerial imagery supplements – but does not replace – in-person site visits



Gif credit: Erica Sloniker \ TNC



## Drone Use in Stewardship

# Monitoring Encroachments



RIGIS Spring 2021 Aerial Imagery



RIGIS Spring 2022 Aerial Imagery



On-the-ground visit: photo taken September 2, 2022 facing northeast from southwest corner



Drone photo taken from the east, looking westward at encroachment area on December 4, 2024.



RIGIS Spring 2025 Aerial Imagery



Drone photo taken from the north, looking southward at encroachment area on November 12, 2025.



RIGIS Spring 2025 Aerial Imagery



Drone  
photo, taken  
November  
12, 2025.

# Difficult to Monitor Properties



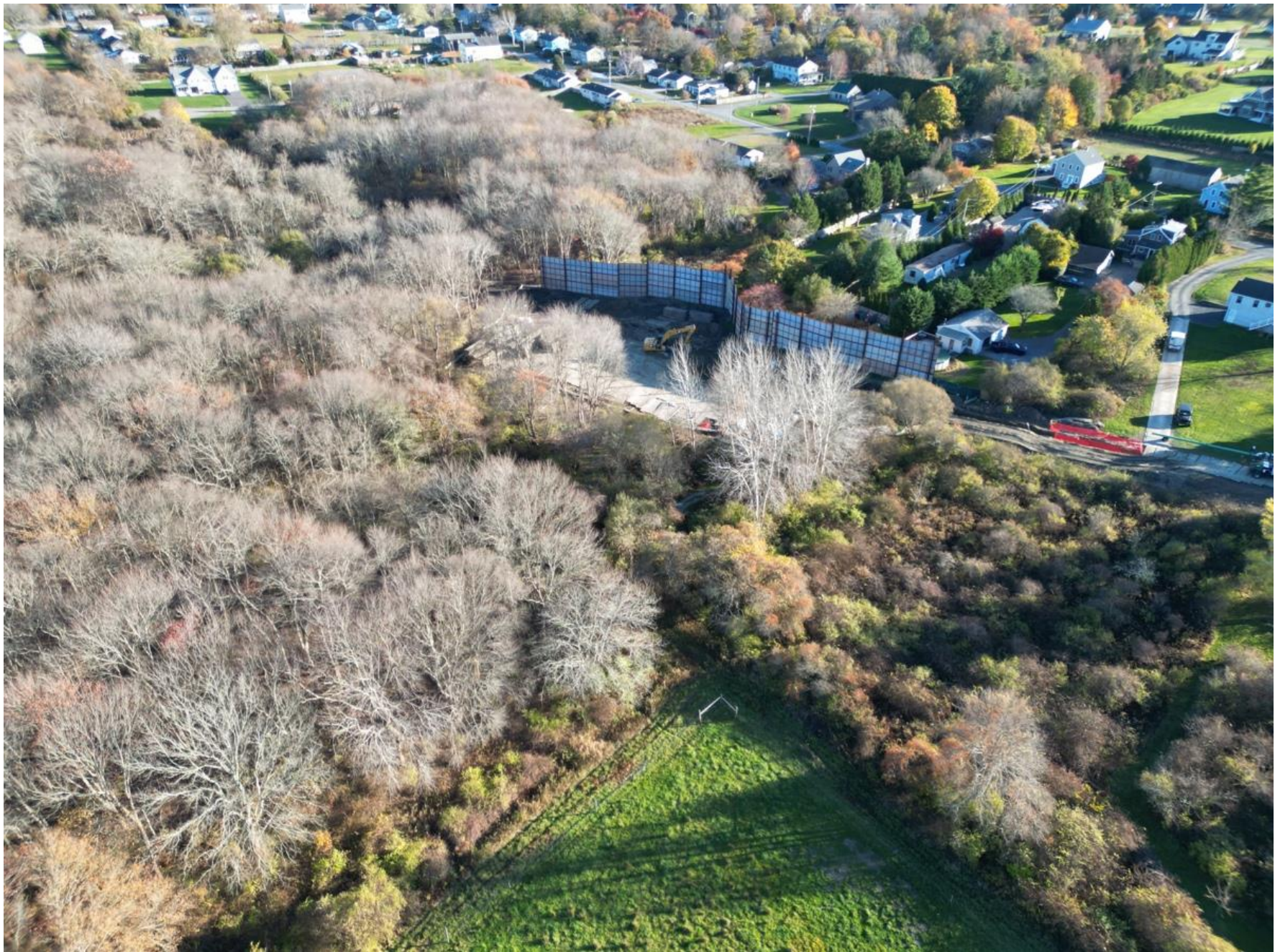
Aquidneck Farms



Swan Farm Conservation Easement – Portsmouth, RI  
124.38 Acres

# Annual monitoring drone photos from November 8, 2024





## Drone Imagery

### BASELINE DOCUMENTATION REPORT Portsmouth-Greenvale Vineyards (Wapping Rd) Portsmouth, Rhode Island



Drone Photo 5  
(D5):  
View looking  
northeast along  
eastern boundary  
of Premises and  
Out Parcel 3 and 2



Drone Photo 6  
(D6):  
View looking  
northwest across  
vineyards and  
stonewalls

Figure 11: Photo Point Map

### BASELINE DOCUMENTATION REPORT Portsmouth-Greenvale Vineyards (Wapping Rd) Portsmouth, Rhode Island



Portsmouth-Greenvale Vineyards (Wapping Rd)  
Photo Point Map



- Approximate Boundary
- Ground Photo Point
- Drone Photo Point (Approximate Location)

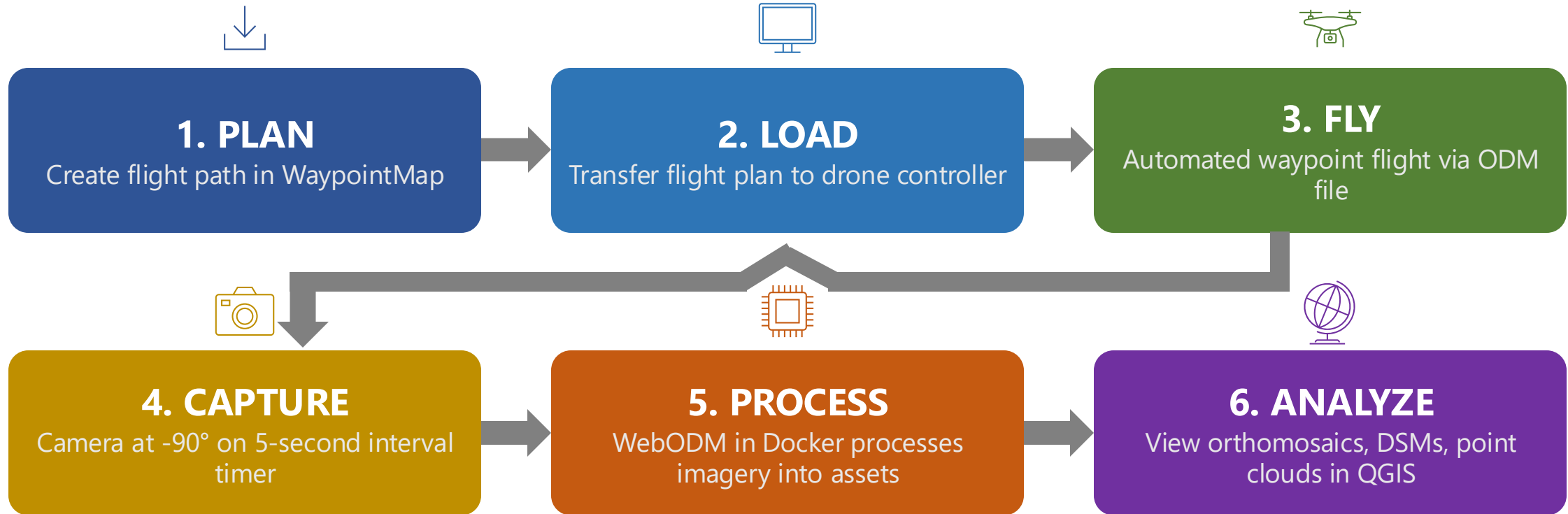
0 50 100 200  
Feet

Data: RUGIS 2024 March Aerials  
Portsmouth, P/L 65/7  
Premises: 13 Acres



# Orthomosaics

# From Flight Plan to Finished Map: The Photogrammetry Workflow



*Mostly open-source workflow: WaypointMap\* + WebODM (Docker) + QGIS*

# Case Study: Forestry Invasives Management



## Stand Map



### Legend

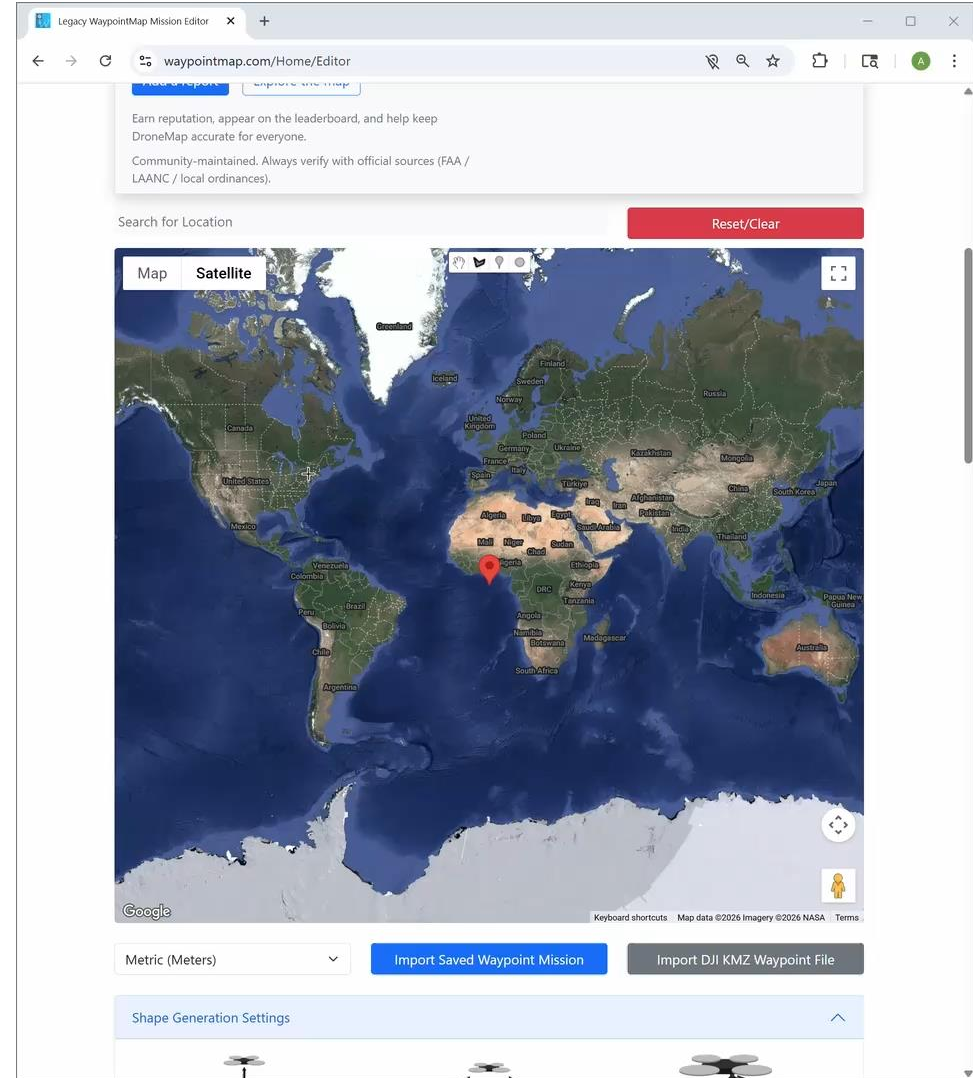
- Duffield & Yeatman Boundary
- Stands

0 400 800 1,200 ft



Project: Sakonnet Preservation  
Town: Little Compton  
County: Newport  
State: Rhode Island  
Date: 11-12-25  
Prepared By: W.T. Mueller FC&M, Inc.

Data Sources: RIGIS, RIDOT 2016, 2024 Orthophotography, USGS EarthExplorer



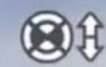


N Mode

Calibrate gimbal

96

26'24"



2

Press flight pause button on remote controller to exit current feature



JPEG 9999+ 1/5000 1.716m 0.1  
12MP WB 5700K ISO 120 EV 0:00.0 PRO 0.1

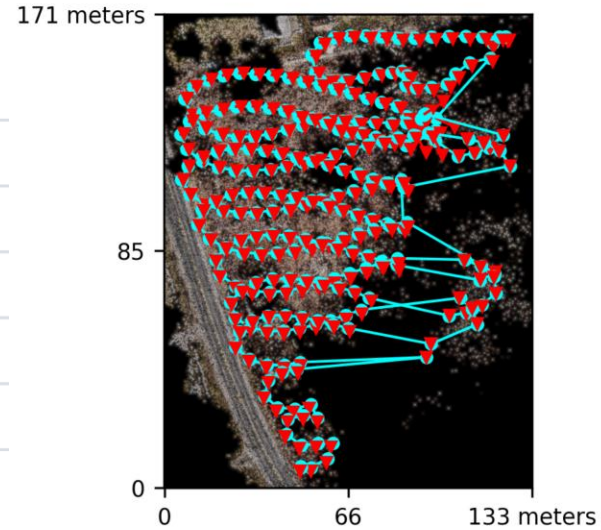
00:00/00:00  
0



# OpenDroneMap Assets

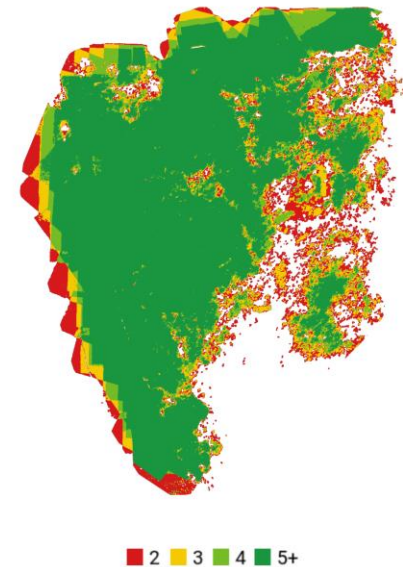
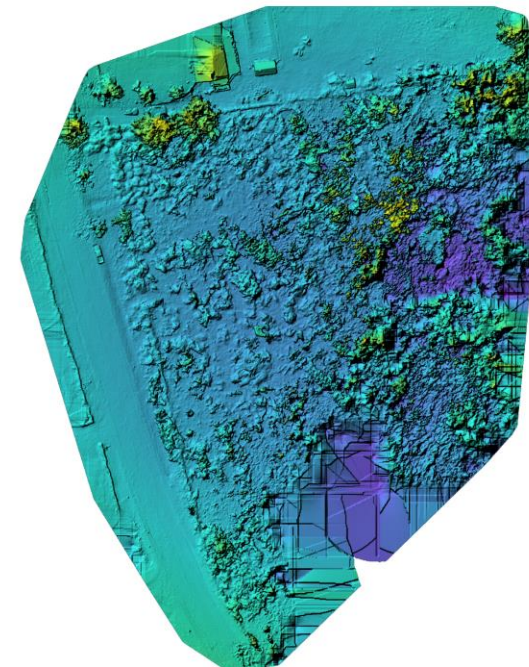
## Dataset Summary

Date	18/03/2026 at 16:03:08
Area Covered	0.018644 km <sup>2</sup>
Processing Time	1.0h:3.0m:17.0s
Capture Start	18/03/2026 at 11:15:37
Capture End	18/03/2026 at 11:32:52



## Processing Summary

Reconstructed Images	266 over 346 shots (76.9%)
Reconstructed Points (Sparse)	112022 over 130379 points (85.9%)
Reconstructed Points (Dense)	25,505,029 points
Average Ground Sampling Distance (GSD)	1.0 cm
Detected Features	9,009 features
Reconstructed Features	1,321 features
Geographic Reference	GPS
GPS errors	1.55 meters



# Mapping Wetland Vegetation



RIGIS LiDAR Shaded Relief  
March 2022



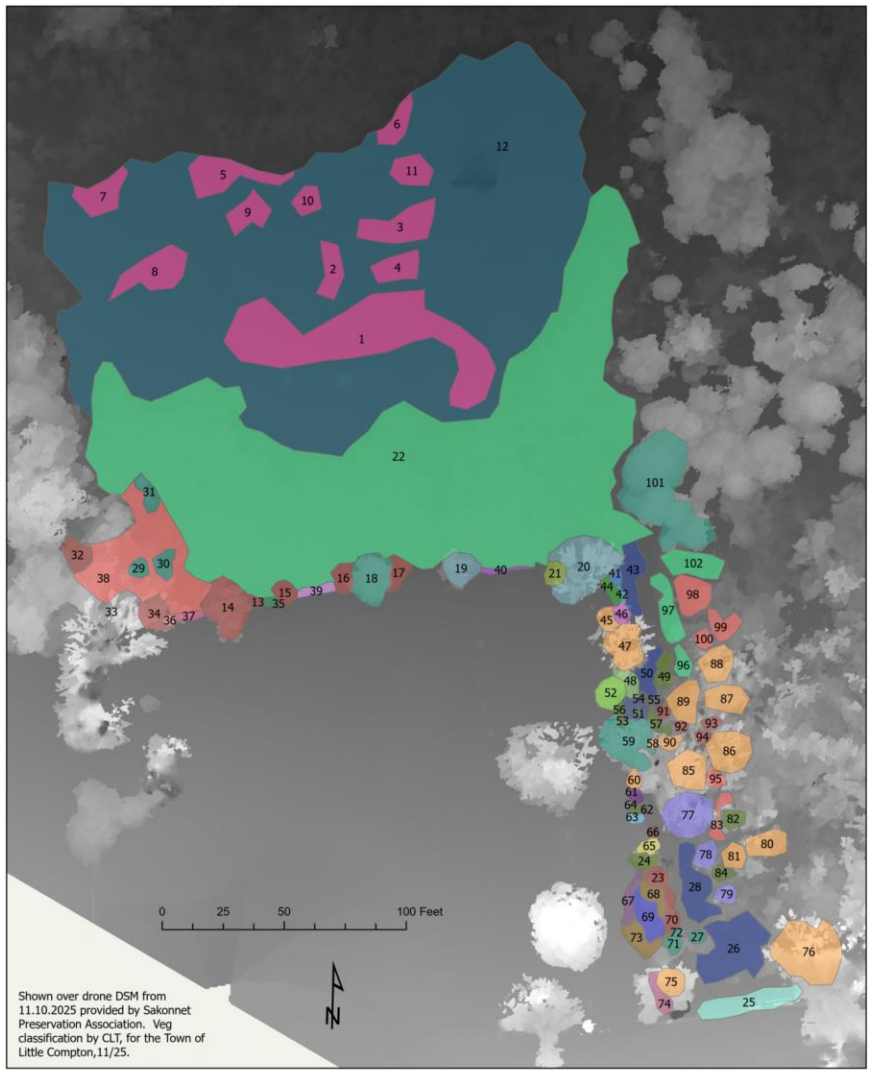
RIGIS Aerial Imagery  
Spring 2025



Surface elevation



Phenological Characteristics



Shown over drone DSM from 11.10.2025 provided by Sakonnet Preservation Association. Veg classification by CLT, for the Town of Little Compton, 11/25.

+

+ vegetation survey

**The Ponderosa, 2025 Veg Classification**

CommonName	CommonName
Arrow-leaved Tearthumb	Morrow's Honeysuckle
Asian Bittersweet, Poison Ivy	Multiflora Rose, Morrow's Honeysuckle, Asian Bittersweet, Poison Ivy
Autumn Olive	Multiflora Rose
Blackberry	Multiflora Rose, Bullbrier
Blue Flag	Poison Ivy, Asian Bittersweet
Broad-leaved Cattail	Pussy Willow
Common Reed	Red Maple
Common Reed, Multiflora Rose	Red Maple (Dead?)
Common Winterberry	Reed Canary Grass
Goldenrod	Sedge, Sensitive Fern
Goldenrod, Blackberry, Sensitive Fern, Swamp Rose, Climbing Hempvine	Small Bayberry
Gray Willow	Speckled Alder
Gray Willow with Asian Bittersweet, Poison Ivy	Speckled Alder with Multiflora Rose
Gray Willow, with Swamp Rose, Poison Ivy, Morrow's Honeysuckle	Speckled Alder, with Common Winterberry, Morrow's Honeysuckle, Swamp Rose, Asian Bittersweet
Green Ash	Swamp Rose
Japanese Knotweed	Swamp Rose, Morrow's Honeysuckle
	Swamp Rose, Morrow's Honeysuckle, European Privet
	White Water Lily

# Documenting a CE violation



2024-2025 Winter Imagery from RIGIS

June 13 2025 Drone Orthomosaic

June 26 post excavation



June 28 dirt replaced



August 14 planted buckwheat



October 21 native seed & straw mats



# Drone Use in Communications



An aerial photograph of a rural landscape. In the background, a large body of water is visible under a cloudy sky. The middle ground features a golf course with a clubhouse and several green fields, some of which have hay bales scattered across them. A dense forest of green trees runs through the center of the image. In the foreground, there are more fields, some of which appear to be dry or harvested, and a dirt road winding through them. The overall scene is a mix of agricultural and recreational land.

**Swan Farm**

**Newport National Golf Course**

**Newport National Golf Course**

**Welch**

**Tibbets (Town of Middletown)**

**Albro Woods (Town of Middletown)**

**Boulevard Nurseries (Town of Middletown)**

# Highlighting a New Trail

- Glen Farm Stables Trail
  - Opened to public in Winter of 2025
  - Added an additional mile to the Sakonnet Greenway Trail (for a total of 11 miles)
  - Strategies to highlight





GLEN RD

GLEN PARK

GLEN FARM RD

GLEN PASTURE LOOP

RHODE ISLAND NURSERIES

GLEN FARM STABLES

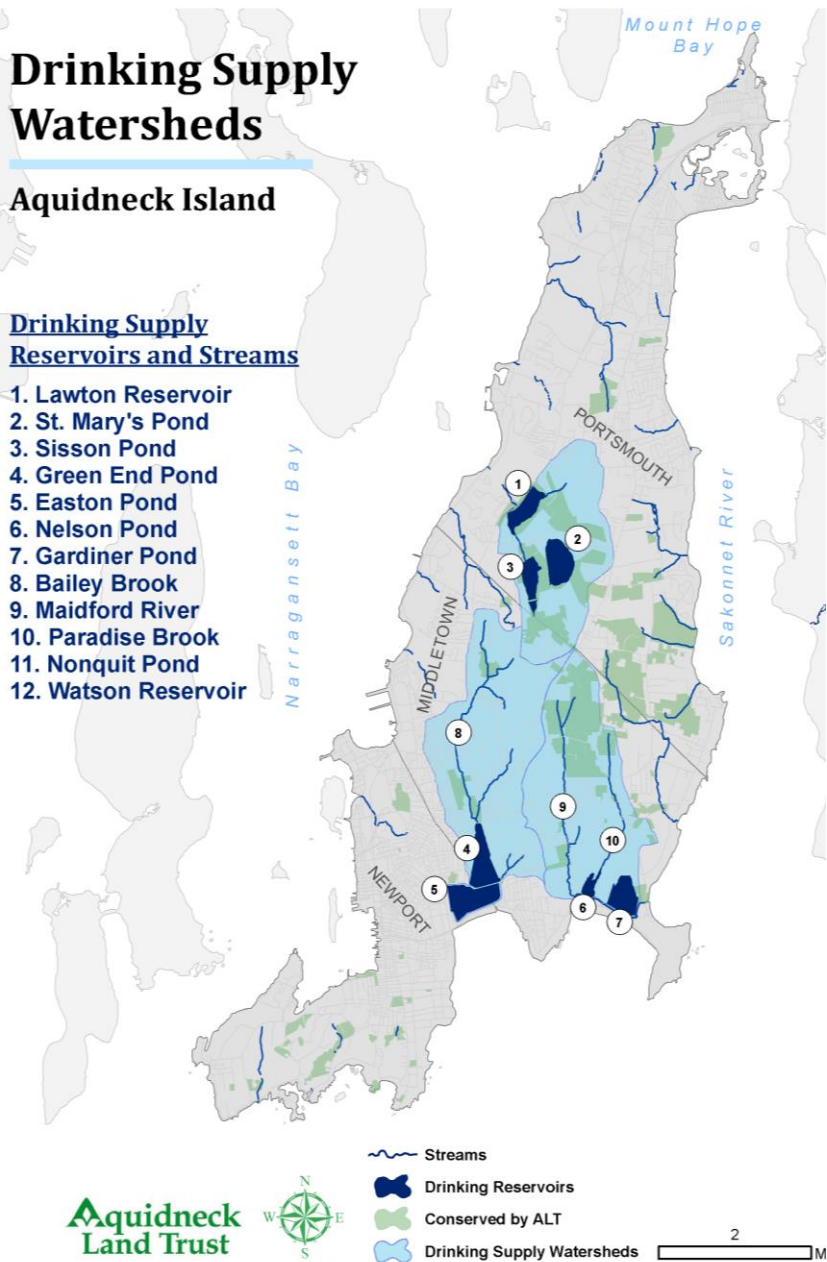
THE GLEN

# Drinking Supply Watersheds

## Aquidneck Island

### Drinking Supply Reservoirs and Streams

1. Lawton Reservoir
2. St. Mary's Pond
3. Sisson Pond
4. Green End Pond
5. Easton Pond
6. Nelson Pond
7. Gardiner Pond
8. Bailey Brook
9. Maidford River
10. Paradise Brook
11. Nonquit Pond
12. Watson Reservoir



# Visualize Watersheds

Between coastal waters and drinking water reservoirs, water resources value is especially important on Aquidneck Island.



# Almy Pond Watershed Workshop

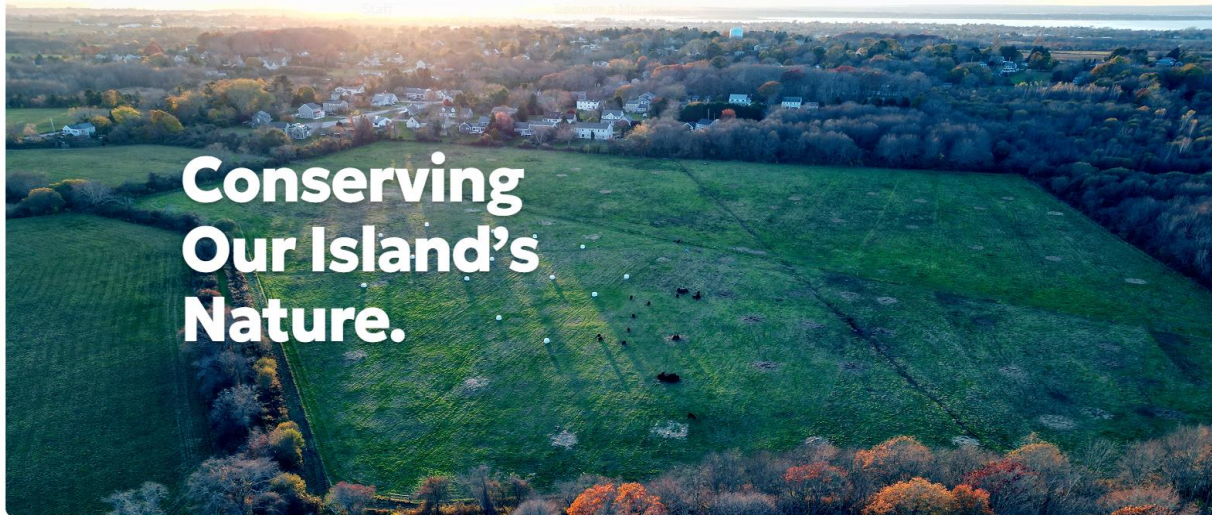






# Emphasize Scenic Value





LANDS PROTECTED IN 2024



**Lazy Lawn**

The 11-acre Lazy Lawn property in Middletown's Paradise Valley adds to connected habitats in the area with its pollinator meadow and wetlands. The Land Trust worked with the descendants of Luisa Gindrat and Samuel Greene Arnold on the deal, who have owned the property since 1843.



**Sullivan Preserve**

The 2.5-acre Sullivan Preserve, donated at the end of 2023, provides salt marsh habitat and a natural buffer to sea-level rise and storm surge. The preserve is part of a 40+ acre contiguous salt marsh and beach ecosystem south of Mt. Hope Bridge. Public access is available via a Coastal Resources Management Council coastal access pathway that runs along the beach.



**Spring Park**

The Land Trust partnered with the Spring Park Committee, City of Newport, and Church Community Housing on Newport's newest park, Spring Park, permanently protecting the historic site. Once a gas station, the park is now a gathering place that celebrates the city's history and religious freedom.



**Zurlo Farmland**

When 25 acres of Zurlo Farmland were about to go on the market off Paquins Lane in Portsmouth, the Land Trust partnered with neighbor Paul Zurlo to conserve the farm. The land, located in the St. Mary's Pond watershed, will be farmed sustainably with rotational grazing of grass-fed cattle by Slate Hill Cattle Co.



← Posts



aquidnecklandtrust



❤️ 91 💬 12 ↻️ 🗑️ 5

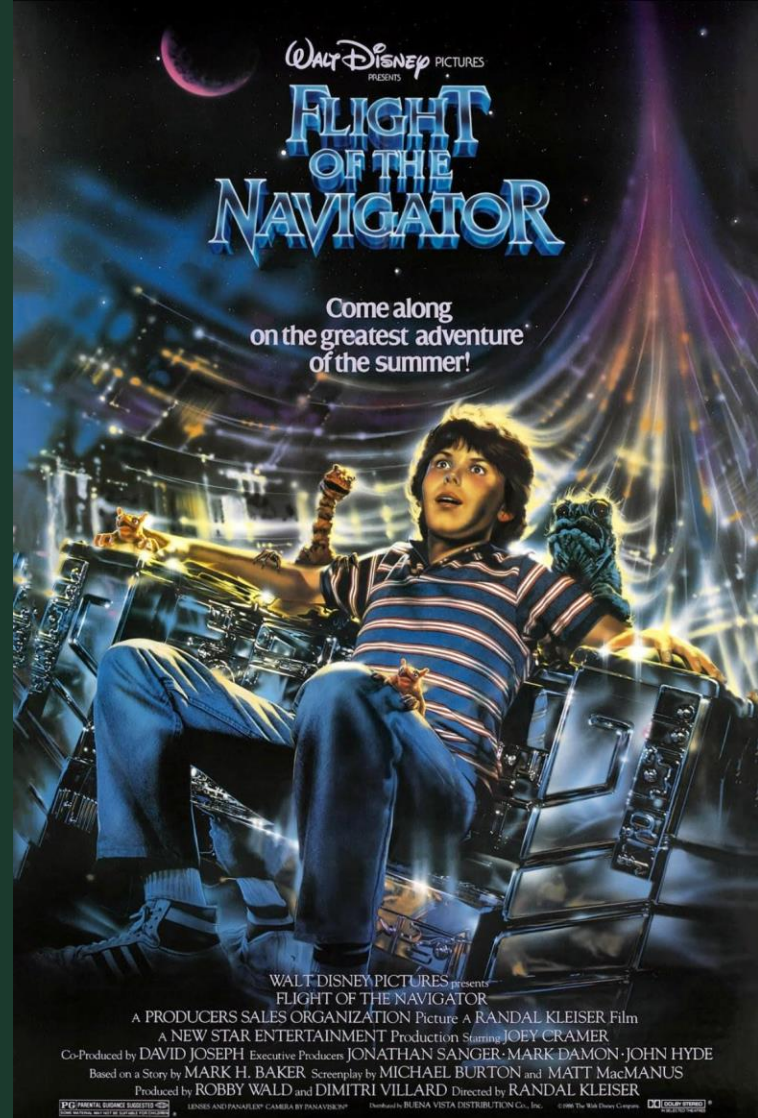


👤 Liked by jesspohlphotos and others

**aquidnecklandtrust** In partnership with the Rhode Island Agricultural Land Preservation Commission and landowners Bill and Nancy Wilson, a 13-acre portion of Greenville Vineyards off Wapping Road is now forever protected as open space!

"We have some of the best farming soils in the state here on Aquidneck Island, yet our farms are under tremendous development pressure. The state has lost 80% of its farmland since the 1940s," said Terry Sullivan, Executive Director of the Aquidneck Island Land Trust. "Our island's working farms are essential to our economy and community. We are thrilled to work with our partners and the Wilsons to save this important tract of farmland on scenic Wapping Road."





Get Started Flying

# Recommended DJI Drone Models (Latest Models)



**DJI Mini 5 Pro**  
**\$759.00**



**DJI Air 3S**  
**\$1,099.00**



**DJI Mavic 4 Pro**  
**\$2,199.00**

# Licensed to Fly (a drone)

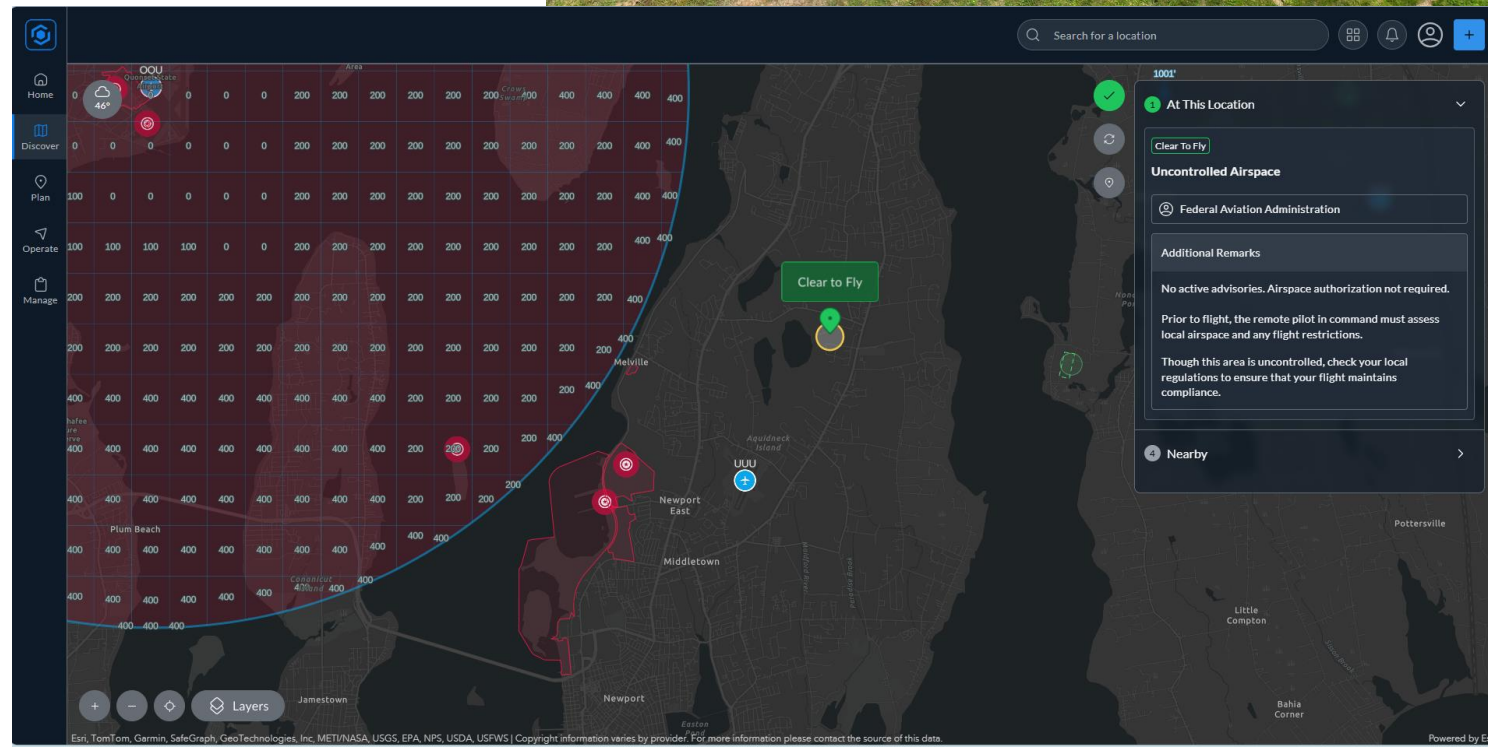
- Commercial Use VS Recreational Use
  - If you will be posting photos to social media, etc. then **you will need to fly the drone under a Part 107 license**, meaning you will need a remote pilot certificate with a small UAS rating from the FAA
- Certification requires passing an exam; will need to be renewed every 2 years
- Other considerations:
  - Register your drone with the FAA
  - Look into liability insurance
  - YouTube is a great resource on learning to fly your specific drone model – DJI RC controller has flight simulator built in



**Federal Aviation  
Administration**

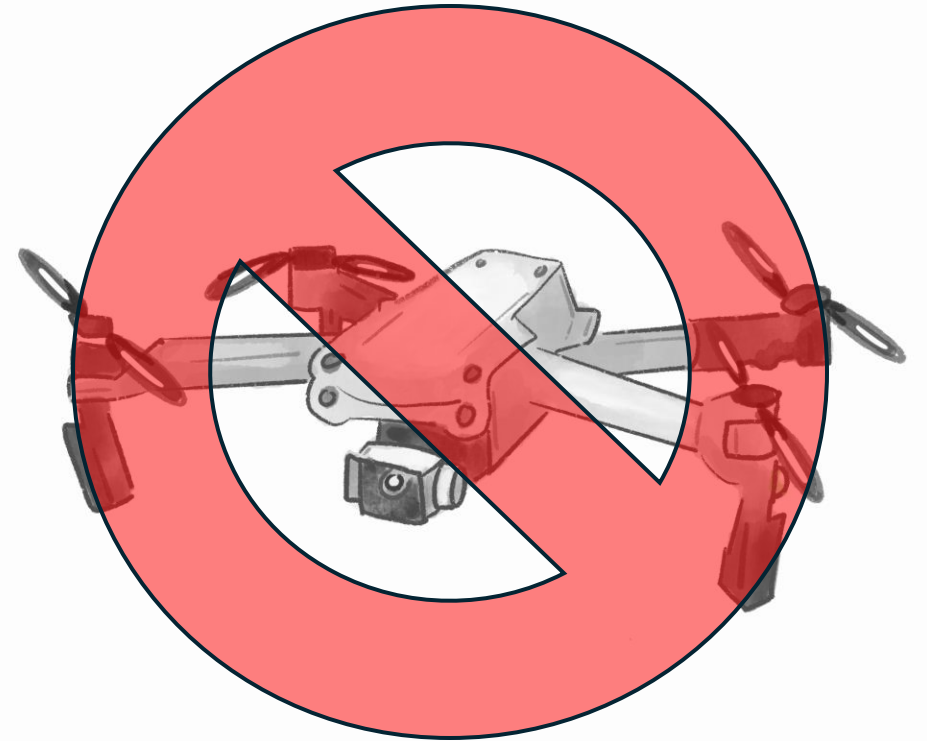
# Tips for Flying

- Check physical condition of drone before each flight (especially propellers), any aircraft firmware updates, settings
- Always check with landowner
- Check B4UFLY Apps: [AirHub® Portal](#)
- Assess weather, potential obstacles on site (obstacle avoidance won't detect everything); beware of aircraft, birds
- Helpful to have others along as visual observers
- Bring extra batteries



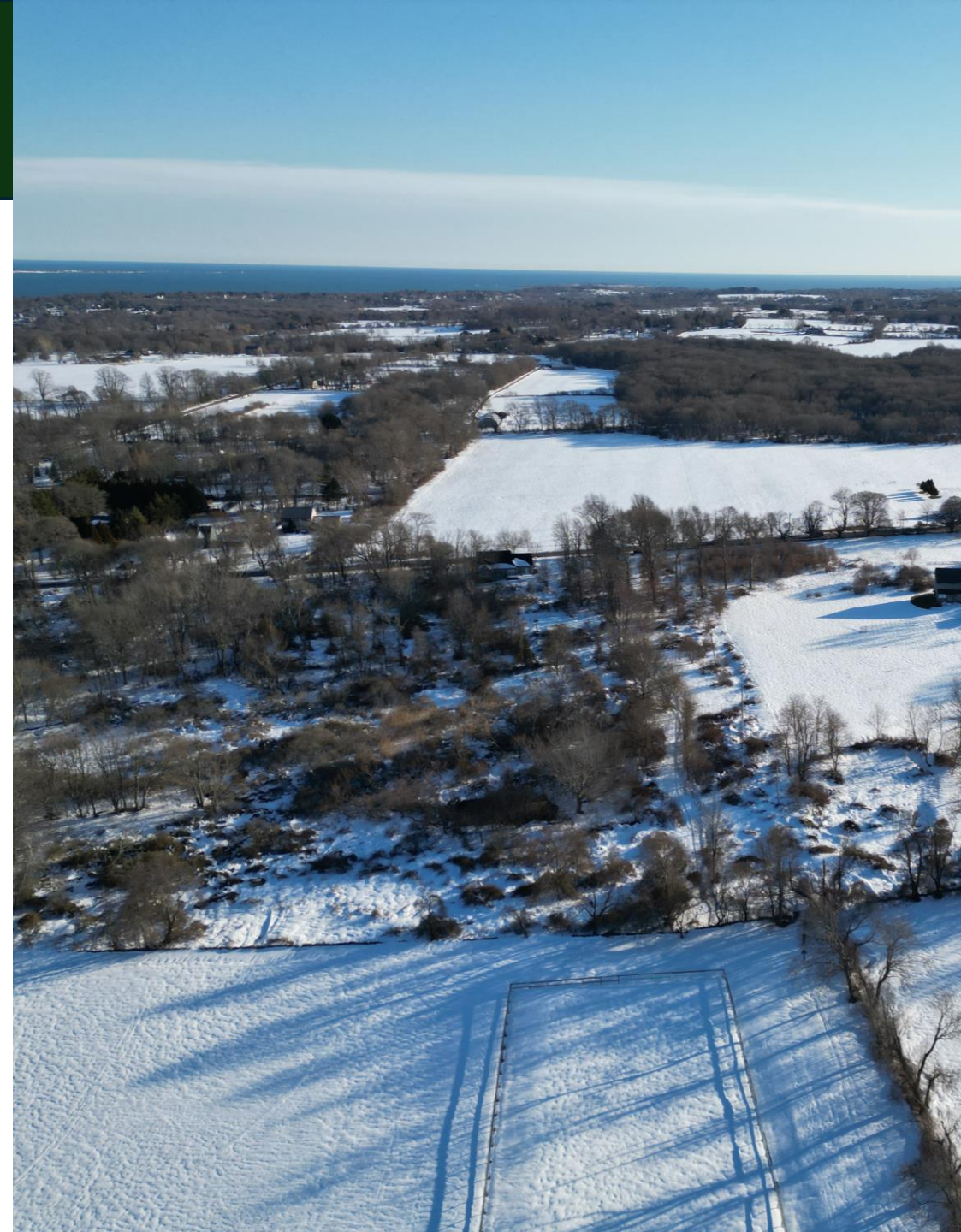
# FCC Foreign-made Drone Ban

- DJI are industry leader with best pricing and most features
- Current models are still mostly available
- Future models are banned currently, though there are exemptions
- Active court case, subject to change
- Domestically produced drones may be competitive in the future



# Conclusions

- Drones can be a relatively affordable and easy-to-use tool for land trusts to use, particularly useful for stewardship (especially monitoring) and communications.
- Even with the federal ban, the technology is likely here to stay and will continue to become more advanced.



# Thank You! Q&A and Live Drone Demo

**Adam Yorks**

*Stewardship Director*

Sakonnet Preservation Association

[stewardship@sakonnetpreservation.org](mailto:stewardship@sakonnetpreservation.org)

**Sakonnet Preservation**

Conserving land  Preserving Little Compton

**Sean Grandy**

*Stewardship Manager*

Aquidneck Island Land Trust

[sgrandy@ailt.org](mailto:sgrandy@ailt.org)



**Aquidneck**  
— Island —  
**Land Trust**