Aerial Information System (AIS) Lab and **Unmanned Aircraft Systems (UAS)**



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Presentation Overview

- AIS unmanned aircraft system (UAS) lab Current flight rules
- UAS platforms and sensors
- Recent forestry remote sensing projects

AIS Lab Flights 2015-20

- Erath Vineyards, Amity, OR

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 Search and rescue, USCG
 Tree growth Corvallis, OR
 Ship wreck Dominican Republic
 Tree seedling productivity Dorena, OR
 Rain forest canopy measurements Brazil
 Sea turtle surveys Maui, HI
 Vineyards Shea Vineyards, Newberg, OR
 Tree seedlings Northern AZ
 Riparian structure Springfield, OR
 Geo-thermal topography Brady Hot Springs, NV
 Elk population surveys Various locations, OR
 Whale measurements Newport, OR
 Bridge inspections Independence, OR

- whate measurements Newport, OK Bridge inspections Independence, OR Vineyards Mosel Valley, Germany Herbicide efficacy Hyslop, OR Riparian Restoration South McKenzie River, OR Madrone blight King's Valley, OR

FAA Small UAS Rules (Part 107)

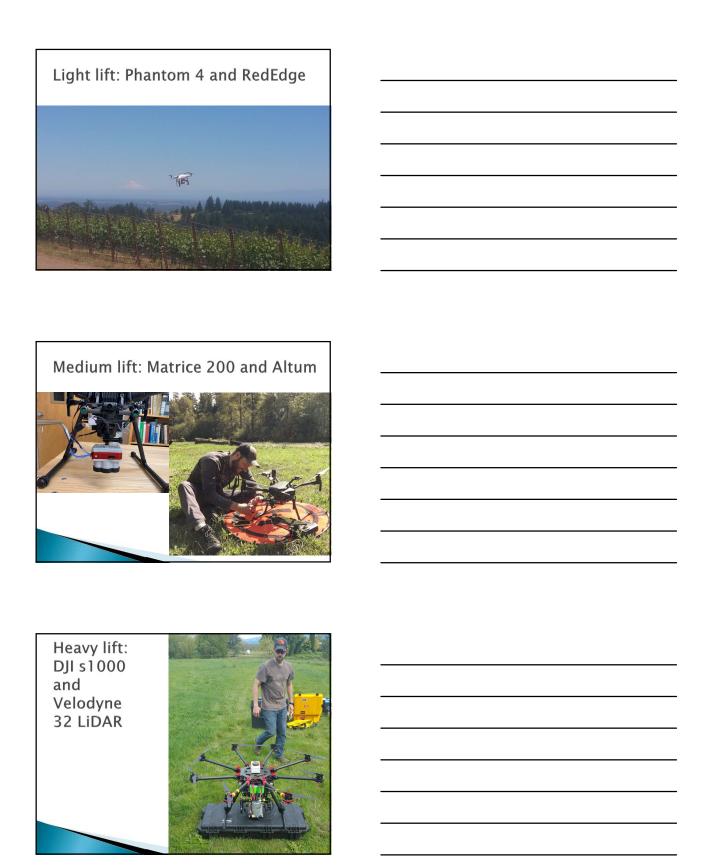
- Effective Aug. 29, 2016
- Platform must weigh less than 55 lbs
- > Visual line of sight, daylight only
- Max altitude 400' AGL
- Not above other people
- No separate observer
- Operations in Class B, C, D, and E airspace are allowed with Air Traffic Control permission
- G airspace is open

FAA part 107 Pilot Requirement

- "Remote pilot in command" established
- Pilot must have a remote pilot airman certificate with a small UAS rating or be under the direct supervision of a person who does
- Remote pilot airman certificate
 - Pass an aeronautical knowledge test
 - Retest every 24 months
- Be cleared by Transportation Security Administration
- · A regular pilot's certificate also works

FAA part 107 Pilot Exam

- ▶ Remote Pilot Certificate
- ▶ 2.5 hours 60+ questions
 - 70% + is a passing score
- https://www.faa.gov/regulations_policies/ha ndbooks_manuals/aviation/media/remote_pil ot_study_guide.pdf
- 3DR exam prep site
 - https://3dr.com/faa/study-guides/
- METARs, Aeronautical Charts, Rules



South McKenzie restoration	
Madrone disease and blight	
SWWP seedlings & climate change	

Flight and Processing Software

- Mapping
- Google Earth Pro
- Mission planning and navigation
- Universal Ground Control System (UGCS) Mission Planner (Pixhawk)
- DJI Ground Station (DJI)
- Processing and Structure from Motion (SFM)
 - Agisoft Photoscan, Pix4d

 - Point cloud processing
 LidR, Fusion, CloudCompare
- Viewing, raster manipulation, and analysis
- ArcGIS Pro (Raster Math)

Spatial Indices

- The combination of raster spectral bands
- Color = red + green + blue
- Many different indices are possible
- Normalized differential vegetation index
 - A measure of greenness
 - · Uses near infrared (NIR) that is beyond human vision
 - (NIR Red) / (NIR + Red)
- Color infrared
 - False color
 - Near infrared + Red + Green

