

AggieAir - A Remote Sensing Unmanned Aerial System for Scientific Applications

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February 14, 2013

What is AggieAir?



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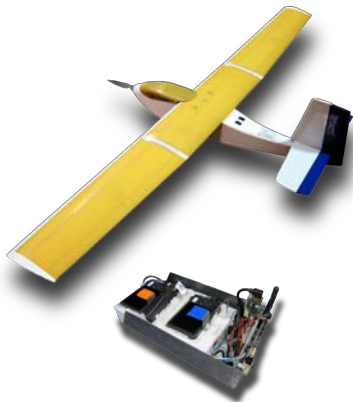


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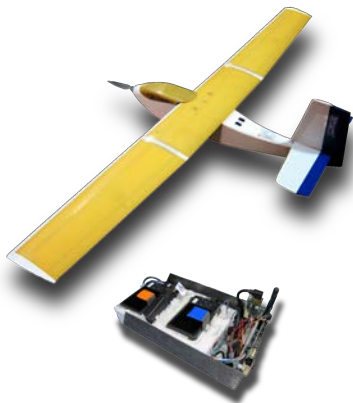
What is AggieAir?

Remote Sensing System, Unmanned Aerial System, Co-Scientist, Co-Farmer, etc.



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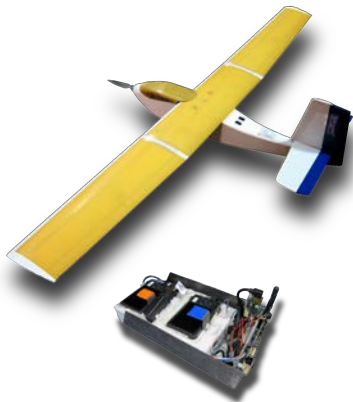


Built for Ecological Applications

- Launch, land and fly in remote areas.
- Simple setup and operation.
- High temporal and spatial resolution.
- Generates orthorectified mosaics.
- Quality scientific data.
- Methods to turn data into science.

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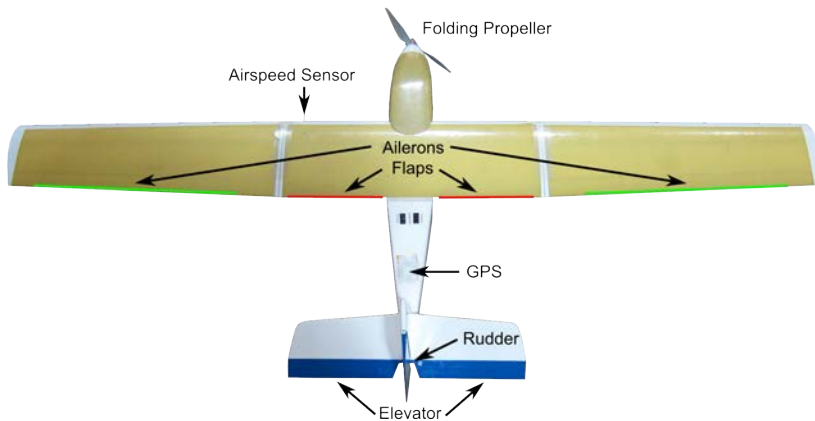
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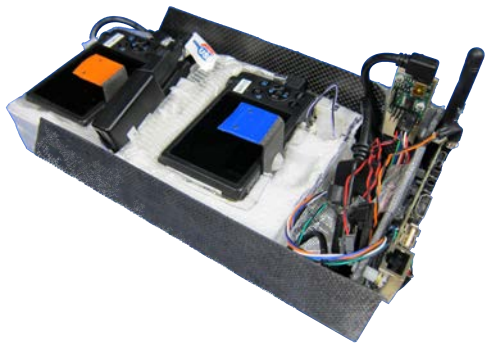
Minion

- Material: Kevlar
- Takeoff Weight: 14 lbs
- Payload Weight: 4 lbs
- Wingspan: 8 feet
- Flight Time: 45-60

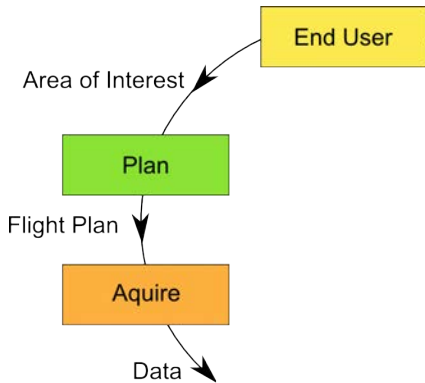
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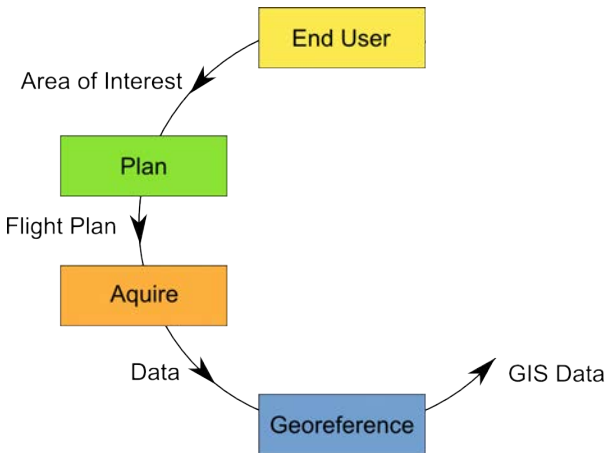
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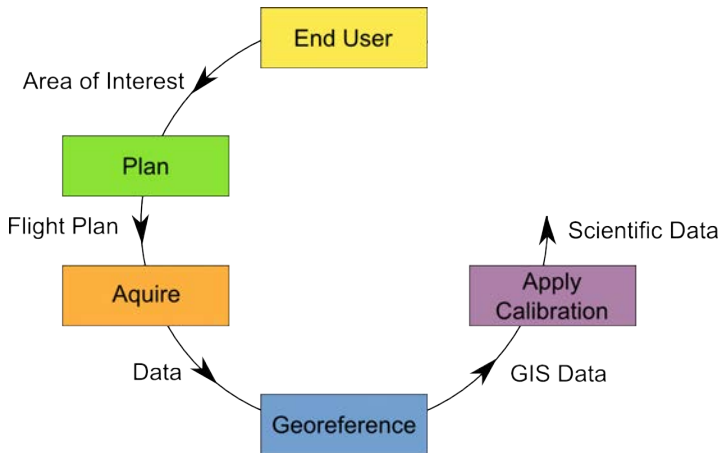
How is AggieAir Different?



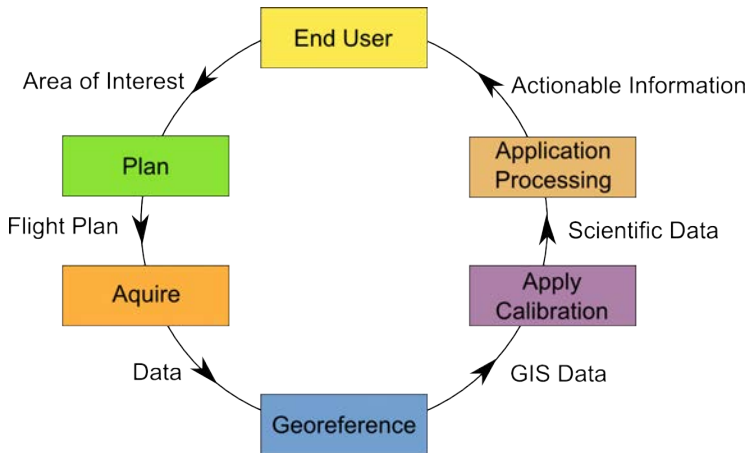
How is AggieAir Different?



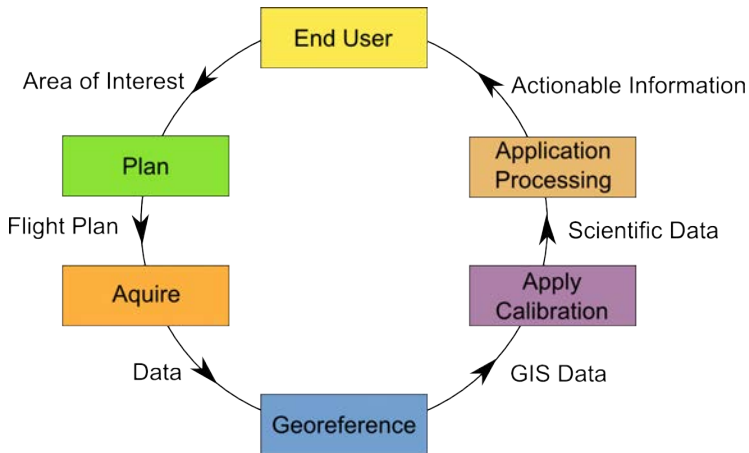
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How is AggieAir Different?



Experience and Vision to Close the Loop for
Scientific Applications

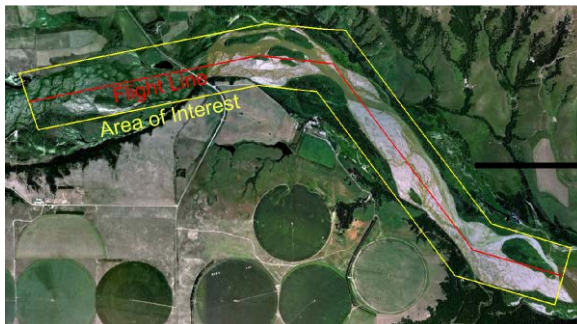
Outline

- 1 Introduction
- 2 Data Acquisition
- 3 Data Processing
- 4 Science
- 5 Future Developments

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Program the Aircraft with a Flight Plan



Bungee Launch

Introduction

○○○

Data Acquisition

○○●○○

Data Processing

○○○○○

Science

○○○○○○○○

Future Developments

○○○

Data Acquisition

Launcher

Acquire Imagery

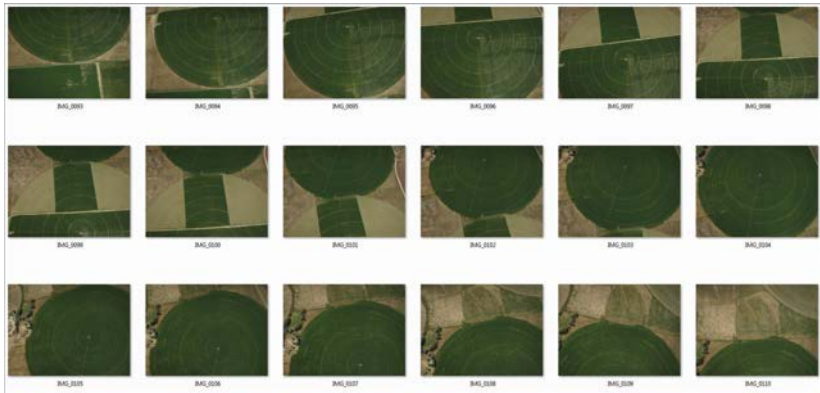
Ground Control Station

Skid Landing

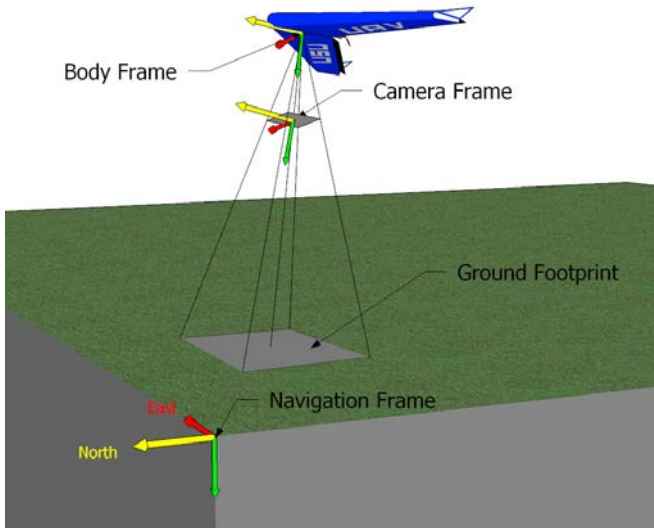
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Raw Images



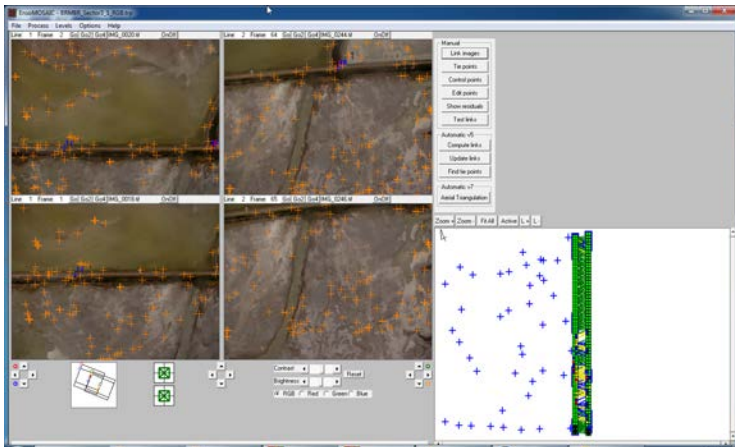
Direct Georeference



Direct Georeference



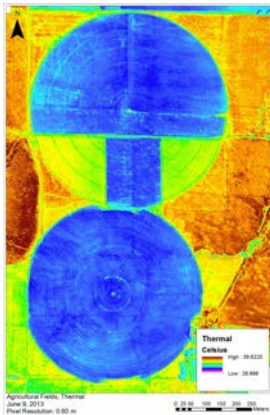
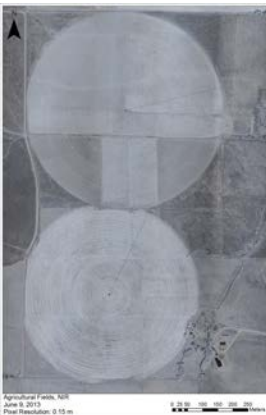
ENSOMosaic



ENSOMosaic



Multispectral



Image/Mosaic Specifications

Flight Altitude (Above Ground)	@200m	@500m	@1000
Swath Width	190m	475m	950m
VIS-NIR Ground Resolution	0.06cm	0.15cm	0.30cm
Thermal Ground Resolution	0.30cm	0.75cm	1.5m

Image Specifications

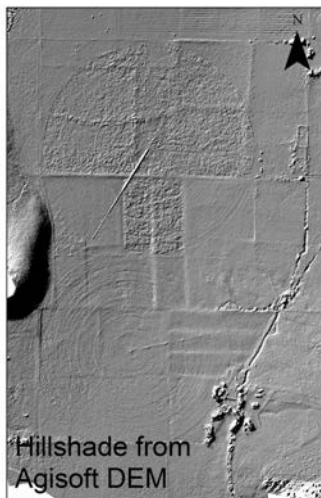
Area Coverage with 1 flight

- 3 Square miles
- 10 miles of river or road
- Can fly multiple UAVs simultaneously

3D Photogrammetry



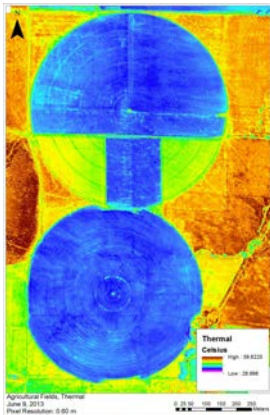
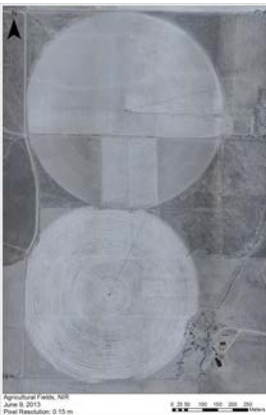
0 50 100 200 300 400 500
Meters



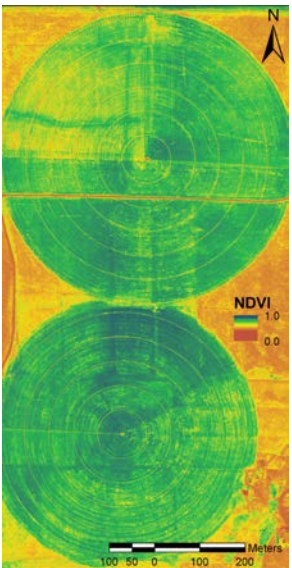
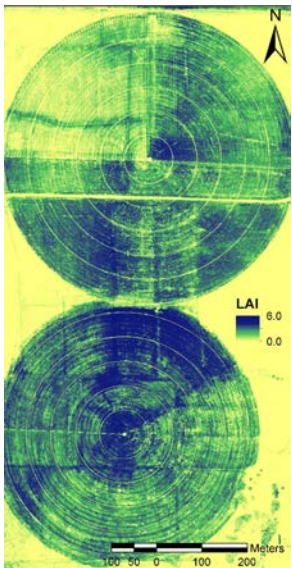
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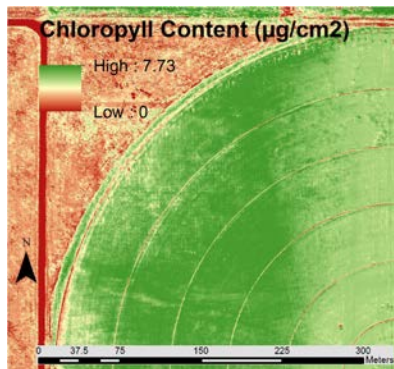
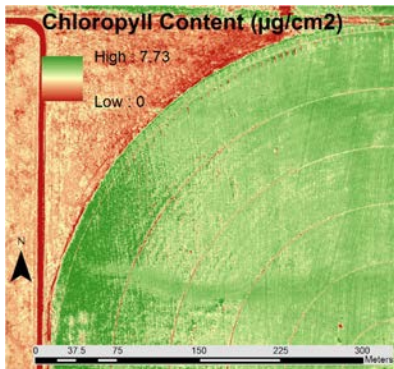
Precision Agriculture



Precision Agriculture

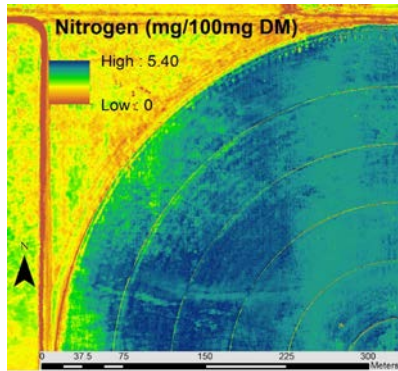
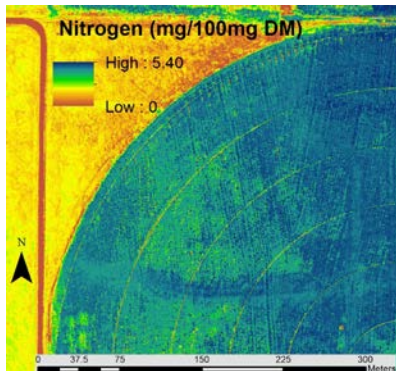


Precision Agriculture



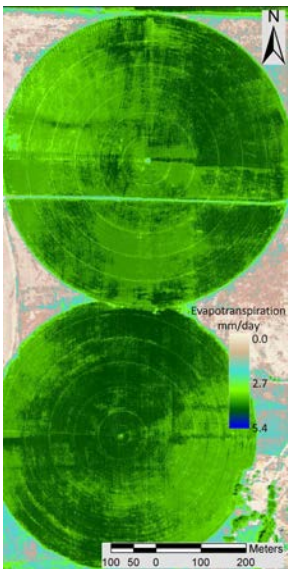
Chlorophyll maps 5 weeks after germination and during early flowering

Precision Agriculture

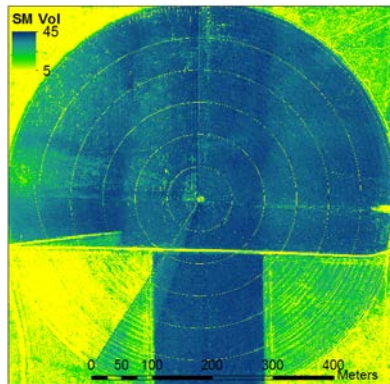
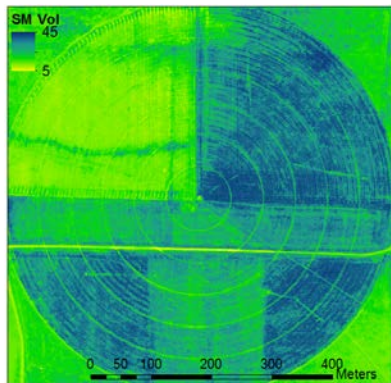


Nitrogen maps 5 weeks after germination and during early flowering.

Precision Agriculture

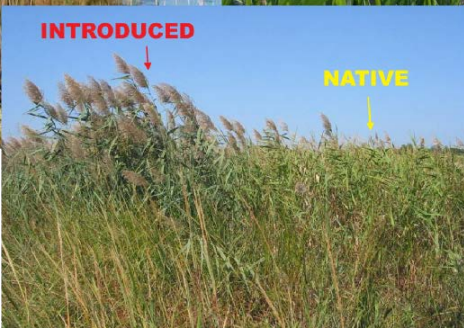


Precision Agriculture

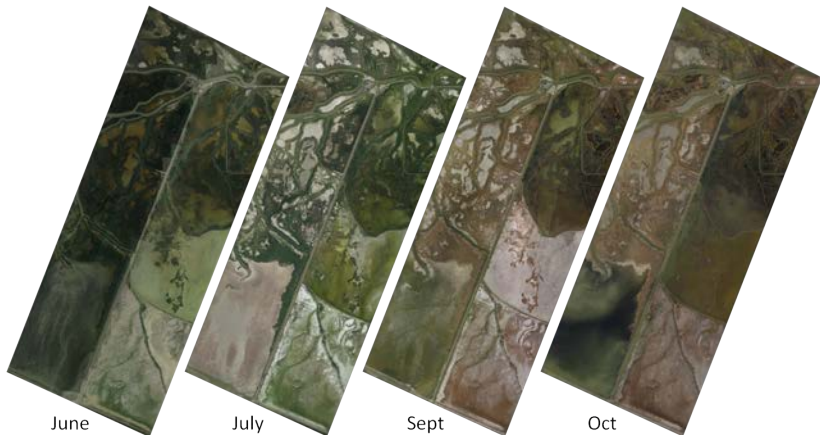


Soil moisture maps in May and June.

Map Phragmites *Australis*



Map *Phragmites Australis*



June

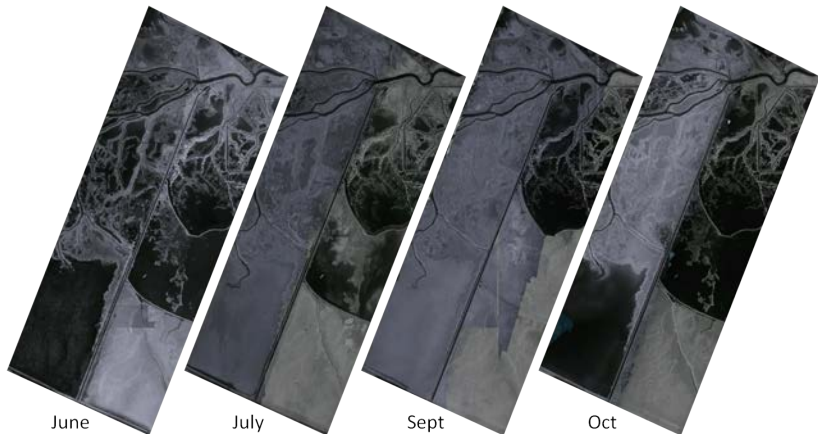
July

Sept

Oct

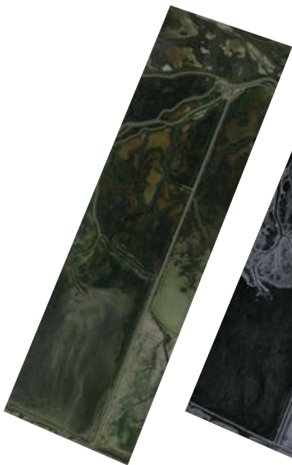
RGB Mosaics of Wetland Area

Map *Phragmites Australis*

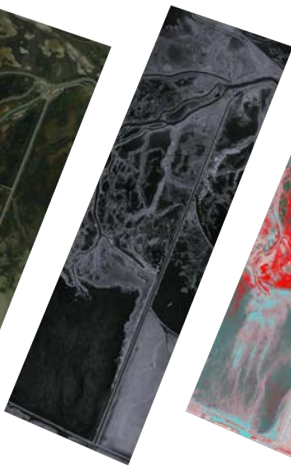


NIR Mosaics of Wetland Area

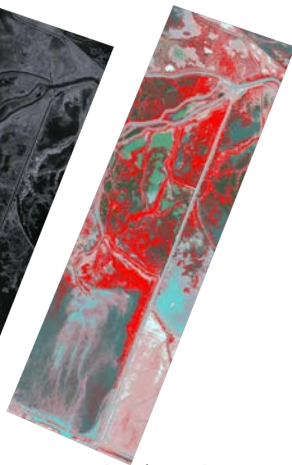
Map *Phragmites Australis*



RGB



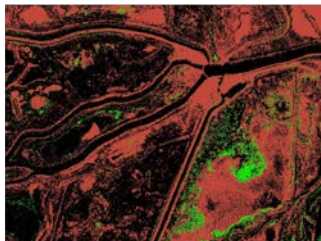
NIR

Non-native *Phragmites australis* (bright red)

Map *Phragmites Australis*



RGB Mosaic

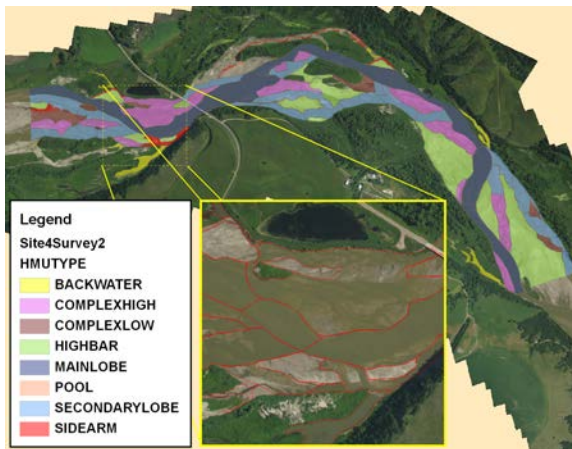


Growth in *Phragmites australis*
from June to September
(Green indicates positive change
of 10% or more)

Mapping Fish Habitat

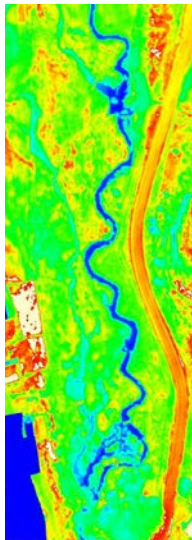


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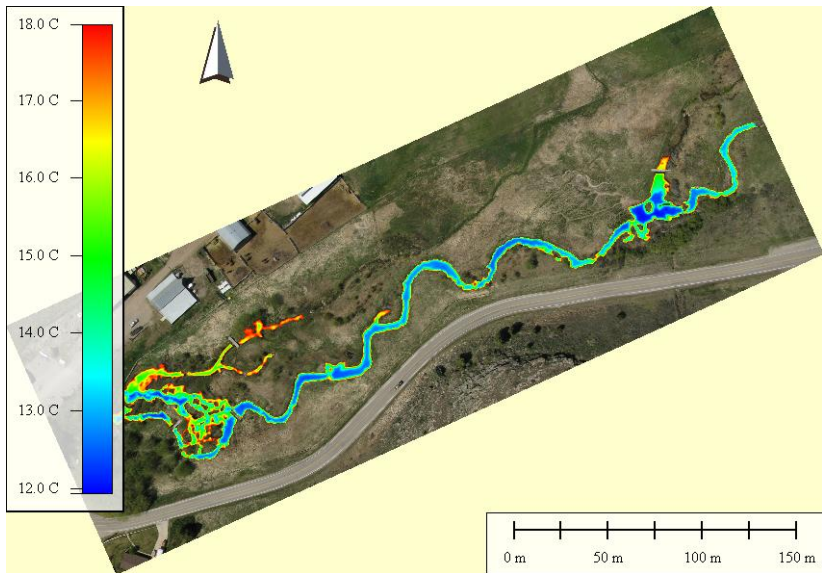


Annotated Mosaic 72hours After Flight

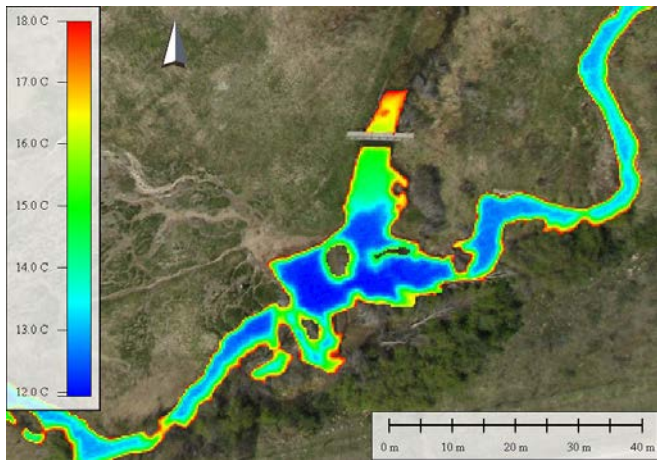
Thermal Refuge



Thermal Refuge



Thermal Refuge



Monitoring/Surveying Construction Sites



Biofuels



Emergency Management: Flooding



Emergency Response Uses

- Preparation
- Ground support
- Documentation

Other Applications

- Airquality
- Forest Fires
- Missing Persons
- Geothermal Mapping
- Mines
- Pipeline Inspection
- Power-pole Inspection
- ...

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Additional Airframes



Fish Tracking



Thank you!



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