

Drone Use in Public Works Departments

Tailored for: NCTCOG Public Works Seminar

Presented by: Trent Lewis, FPC, PondMedics

TODAY'S TOPIC

*What data are we collecting and
using from our sUAS data collection?*

Hydrographic Survey General Applications

- Aquatic vegetation mapping/control
- Safety, rescue and emergency use
- Fisheries management
- Boating and fishing
- Fisheries/wildlife habitat development

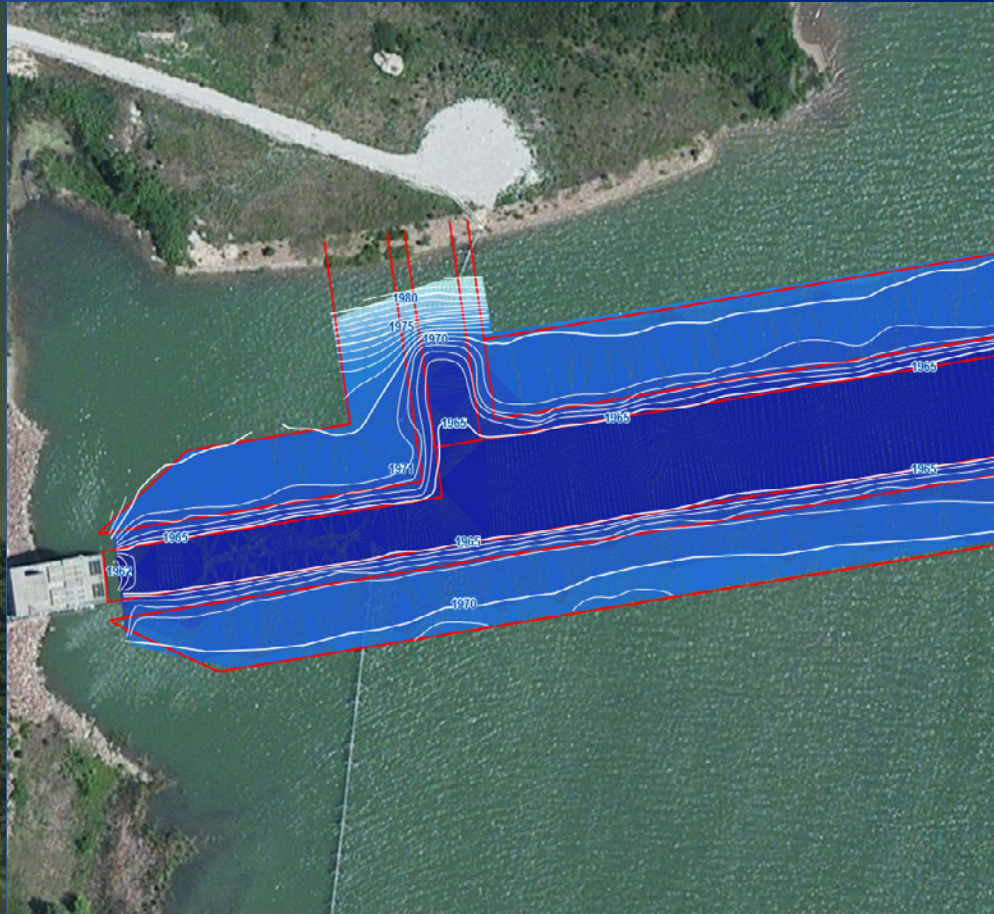
Hydrographic Survey Applications for Engineers

- Planning, permitting and modeling
- Dredging planning, EOC and verification
- River-crossing utilities
- Renovation planning and execution
- Sedimentation monitoring (over time)
- Land use planning
- Construction and excavation
- Water volume calculations (strapping tables)

Hydrographic Survey Clients

- Urban storm water systems – cities, developers, existing communities, dam safety
- Drinking water suppliers – intakes, lagoons, sediment basins
- Safety and rescue operations – fire/police
- Environmental consulting – wetlands, lakes, wildlife
- Reserve studies – projecting dredging needs
- Dredging verification
- In-house – modeling, planning, permitting

Potable Water Intakes



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Power Plant Lakes

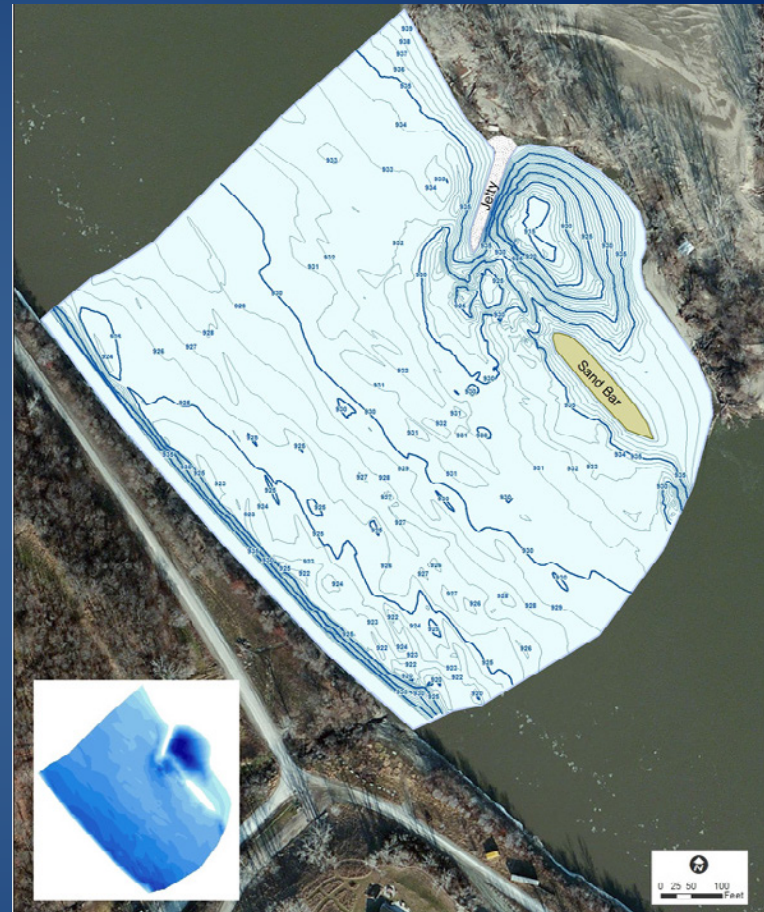
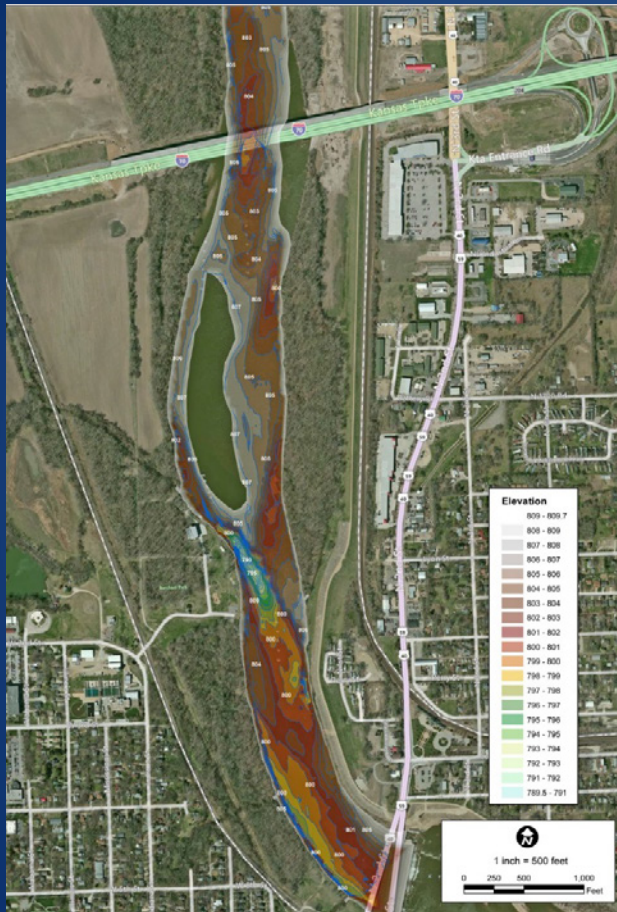


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Potable Water / Utilities



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- Sediment Thickness (ft)
- Minor Water Depth Contour
- Major Water Depth Contour
- Pond

Lake Information:

Area: 1.3 Acres
Max Depth: -5.3 ft
Mean Depth: -3.1 ft
Volume: 1,328,483 Gallons / 4.0 acre-ft

Mapping Information:

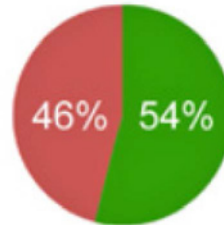
Data Collection Performed: September 2014
GPS: Mapping Grade (sub-foot accuracy)
Points Collected: 660
Lake Level: Full Pool

Estimated Original Design:

Area: 1.3 Acres
Max Depth: -7.6 ft
Mean Depth: -5.8 ft
Volume: 2,456,922 Gallons / 7.5 acre-ft

Estimated Capacity Information:

Pond is 22 years old (built in 1993)
Mean Sediment Thickness: 2.7 ft
Estimated Yearly Sediment Rate: 0.1 ft
54% of Original Capacity Remaining

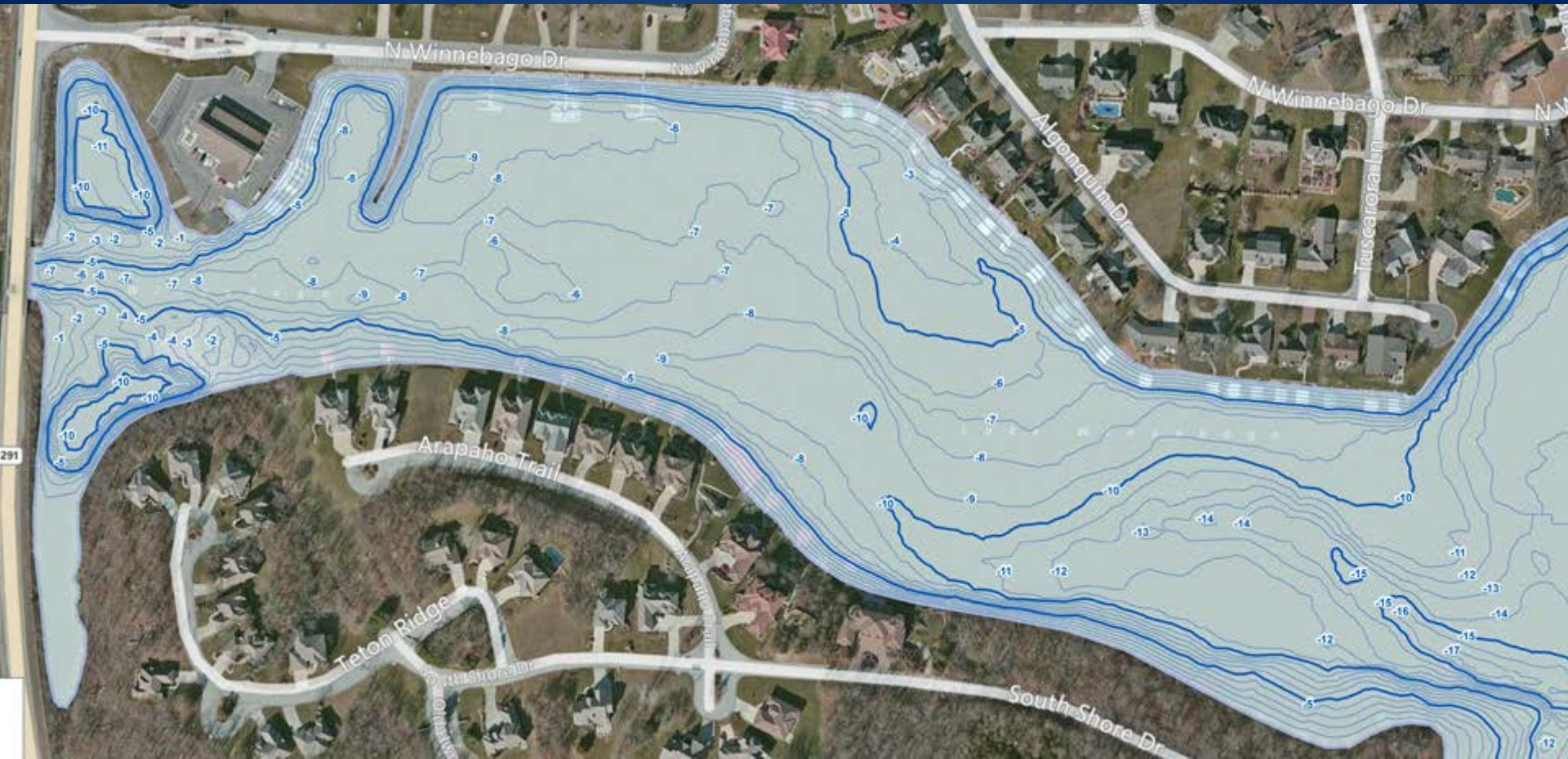


Estimated Year When Capacity is 50%: 2017

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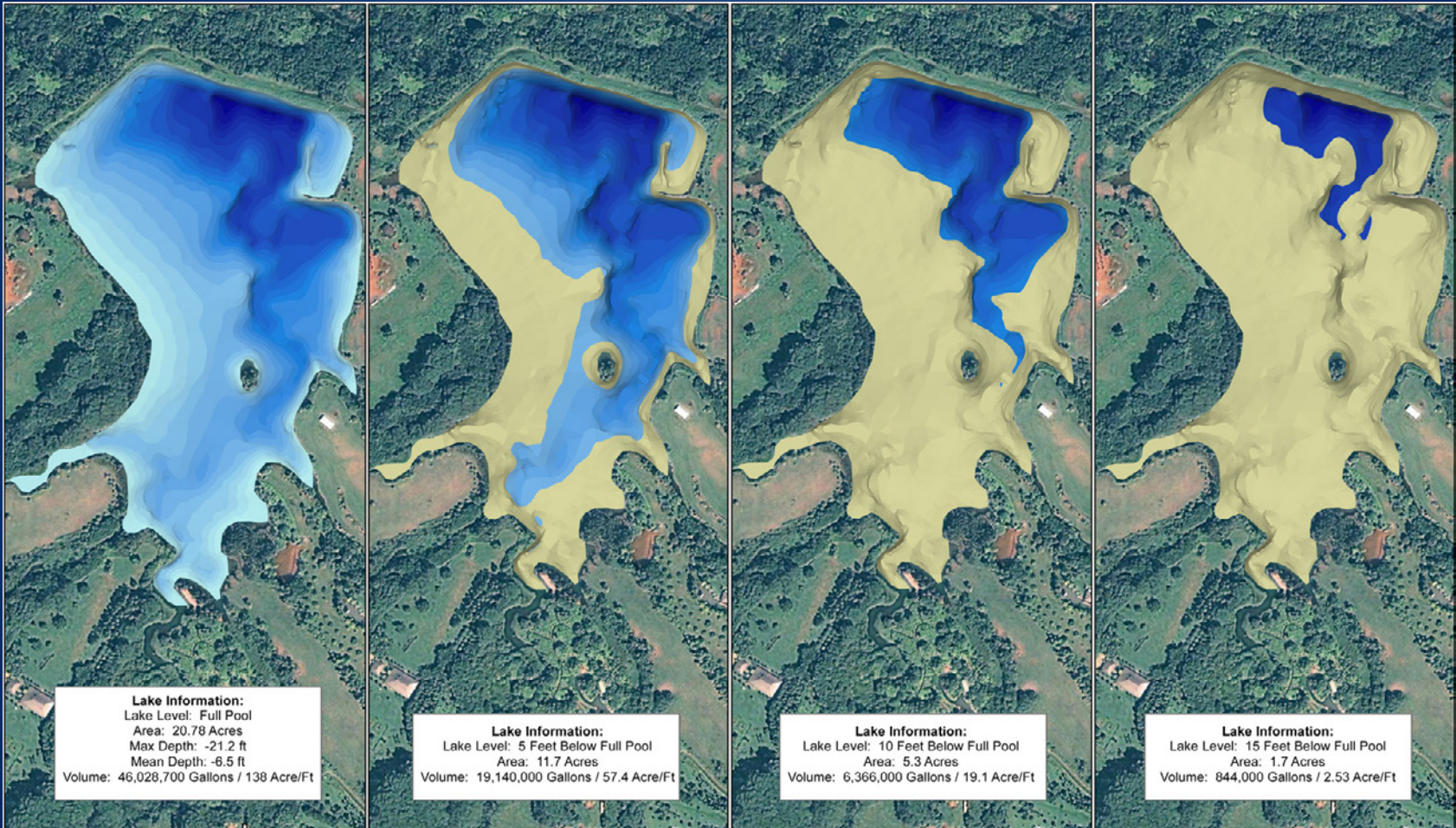


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Water Utilities | Irrigation Planning

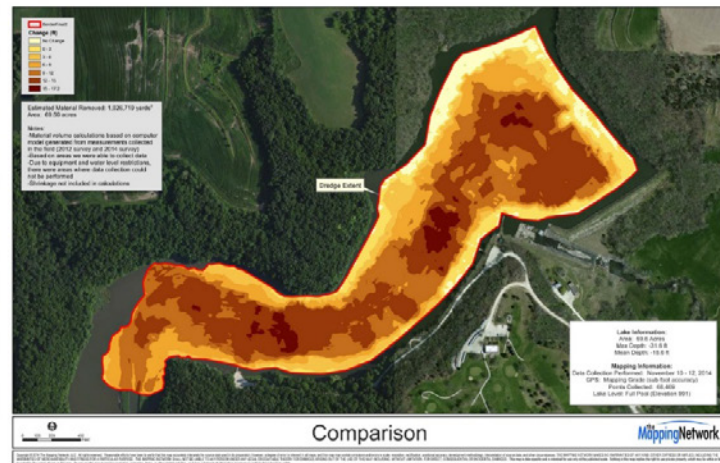
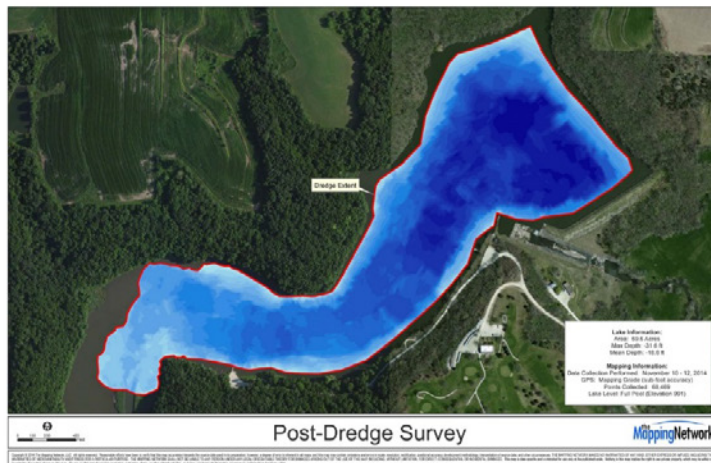
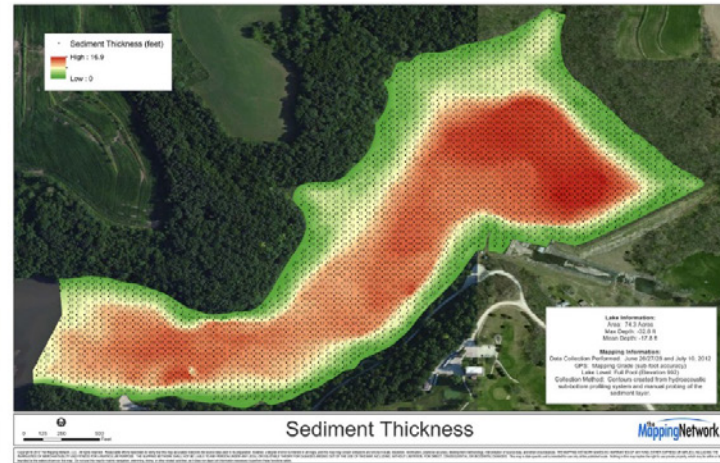
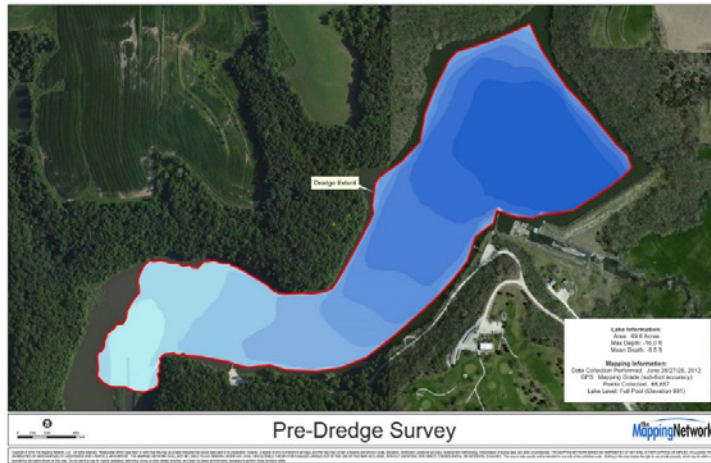


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Dredging Planning | Verification

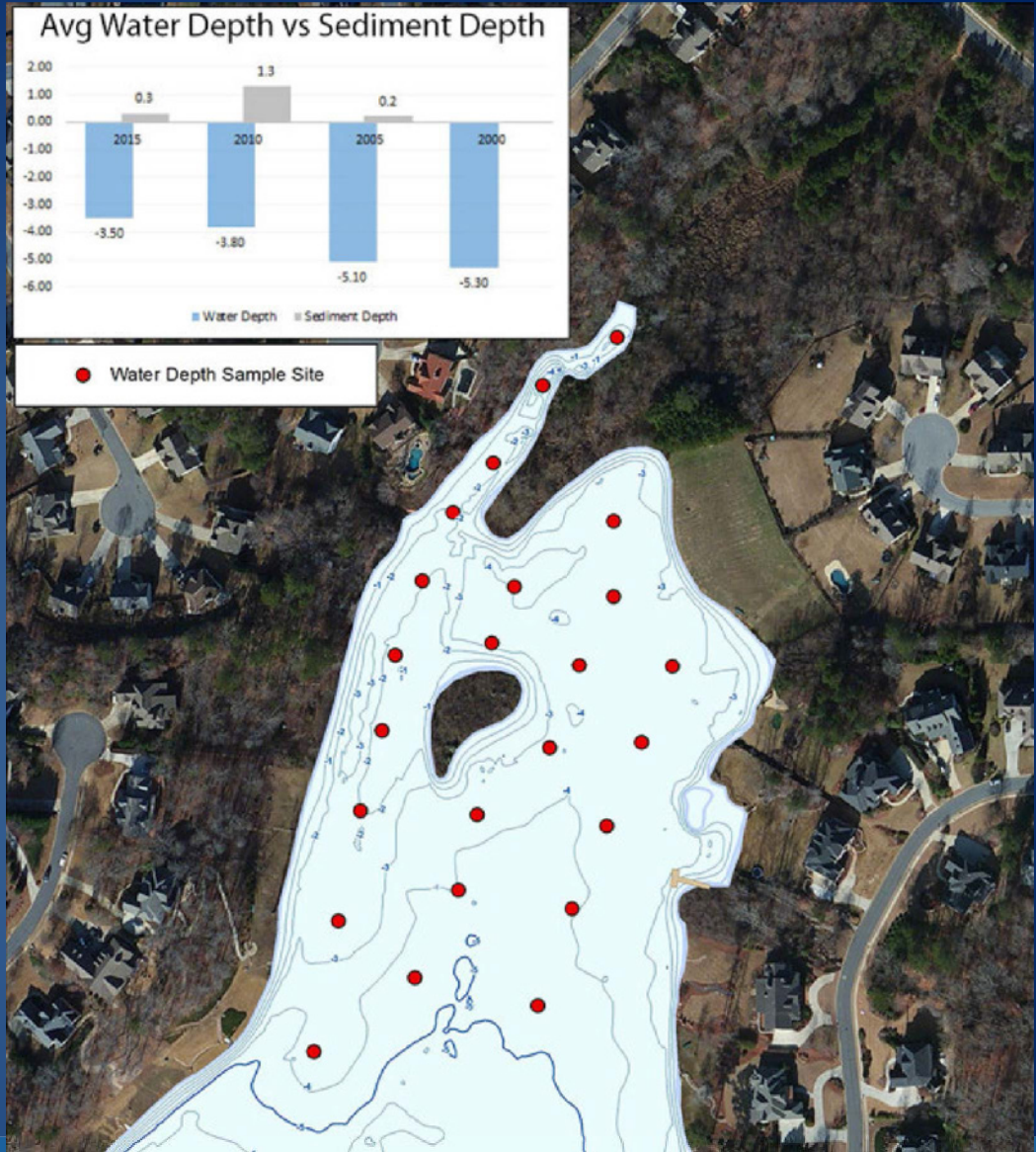


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Sedimentation Tracking

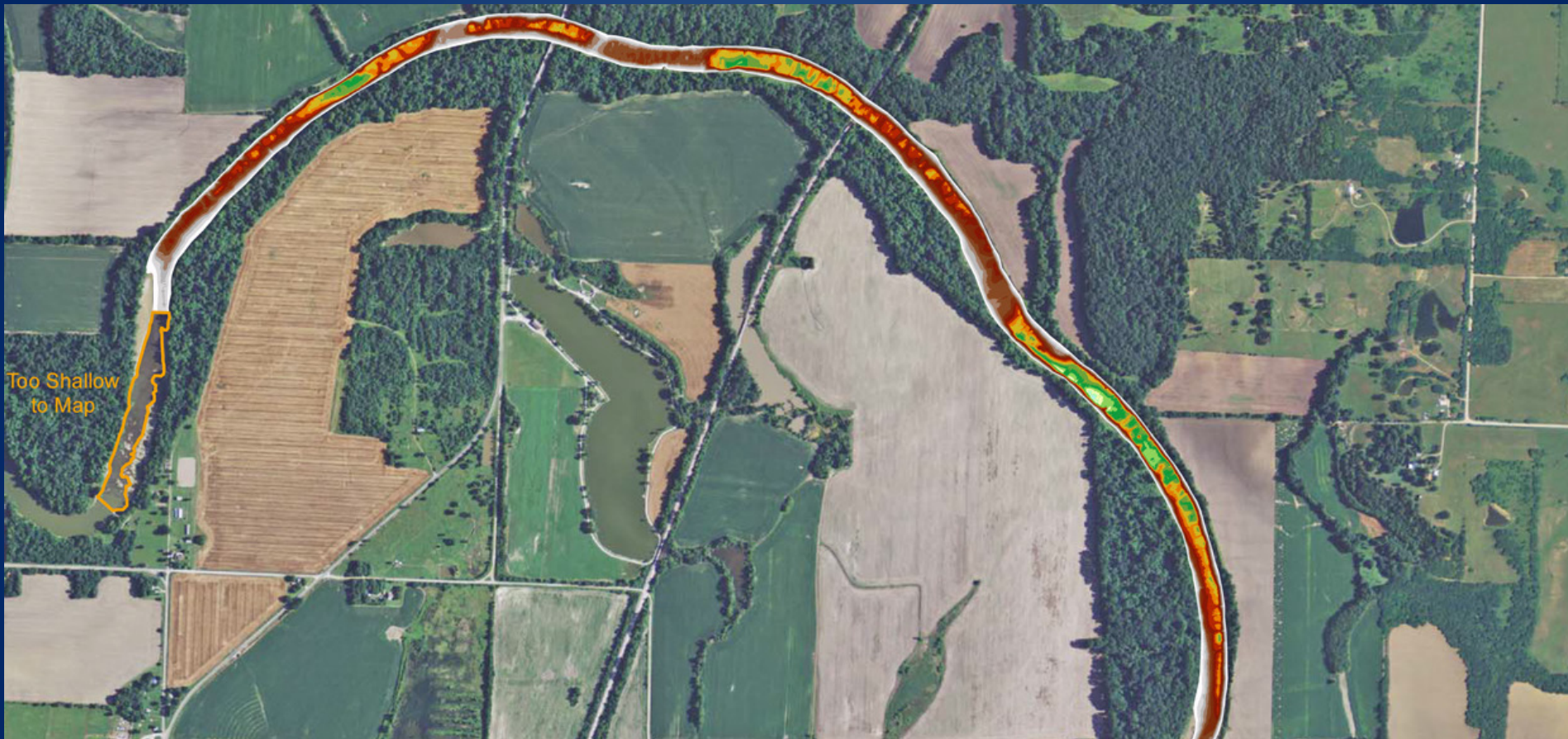


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River and Stream Systems

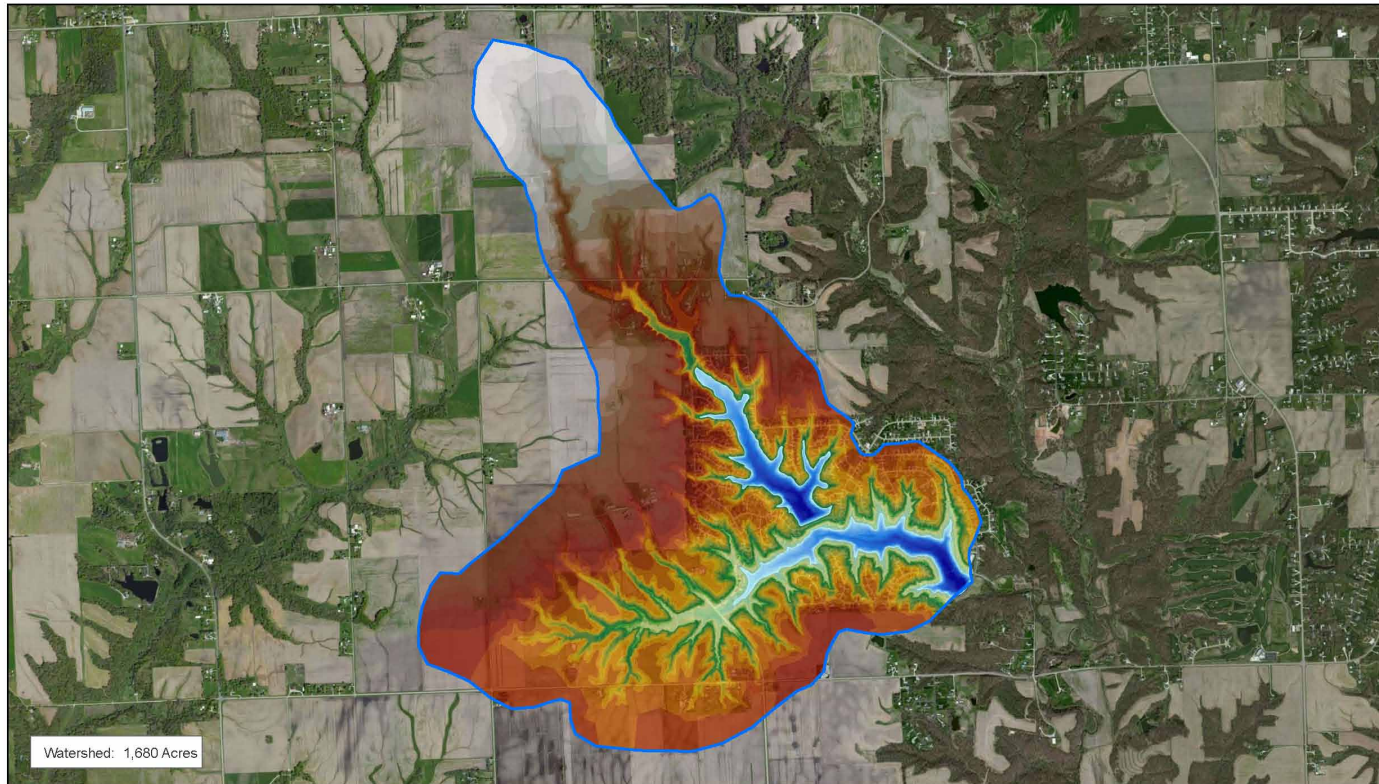


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Watershed Delineation



Camelot & Lancelot Watershed

The Mapping Network

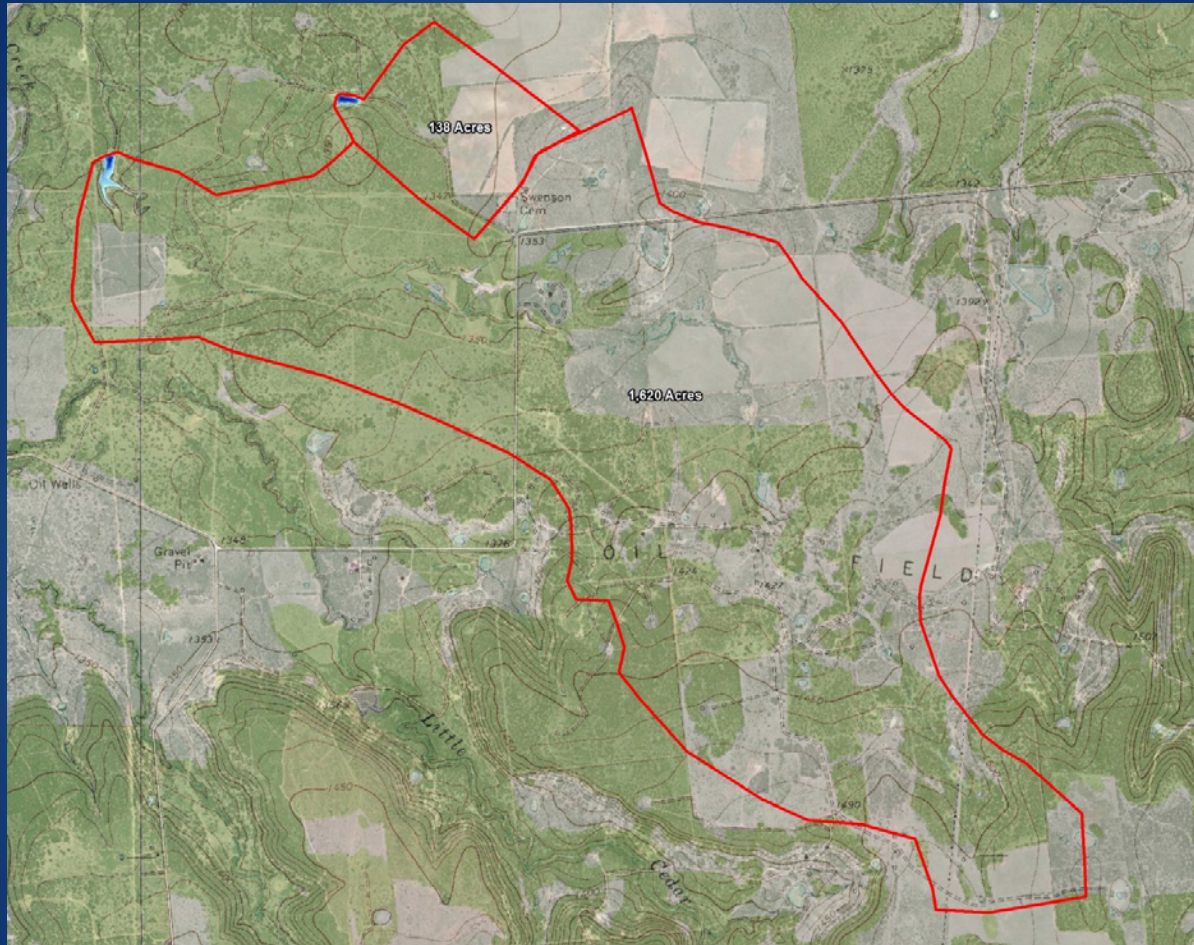
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Watershed Delineation



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Watershed Delineation

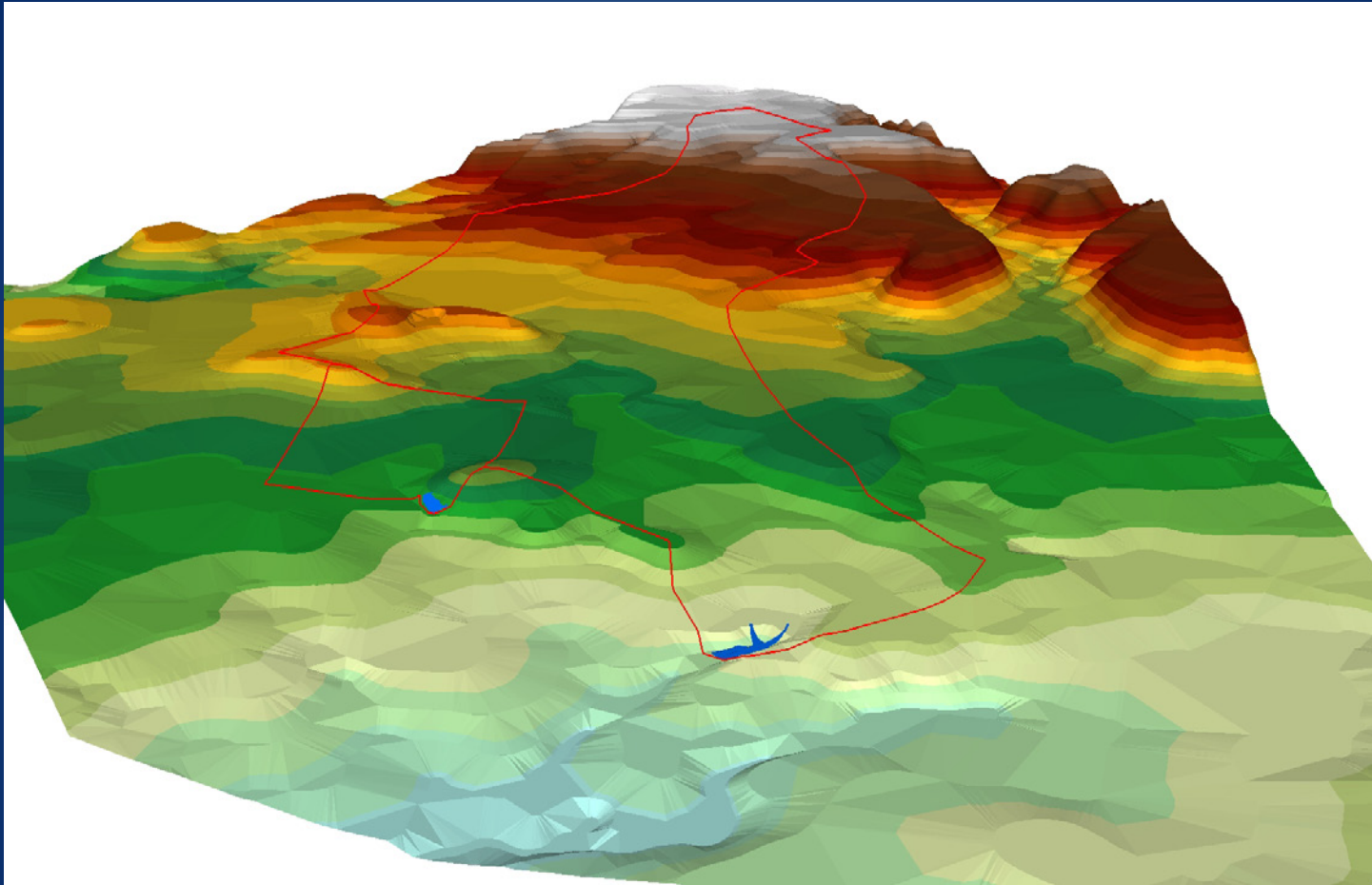


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Watershed Delineation



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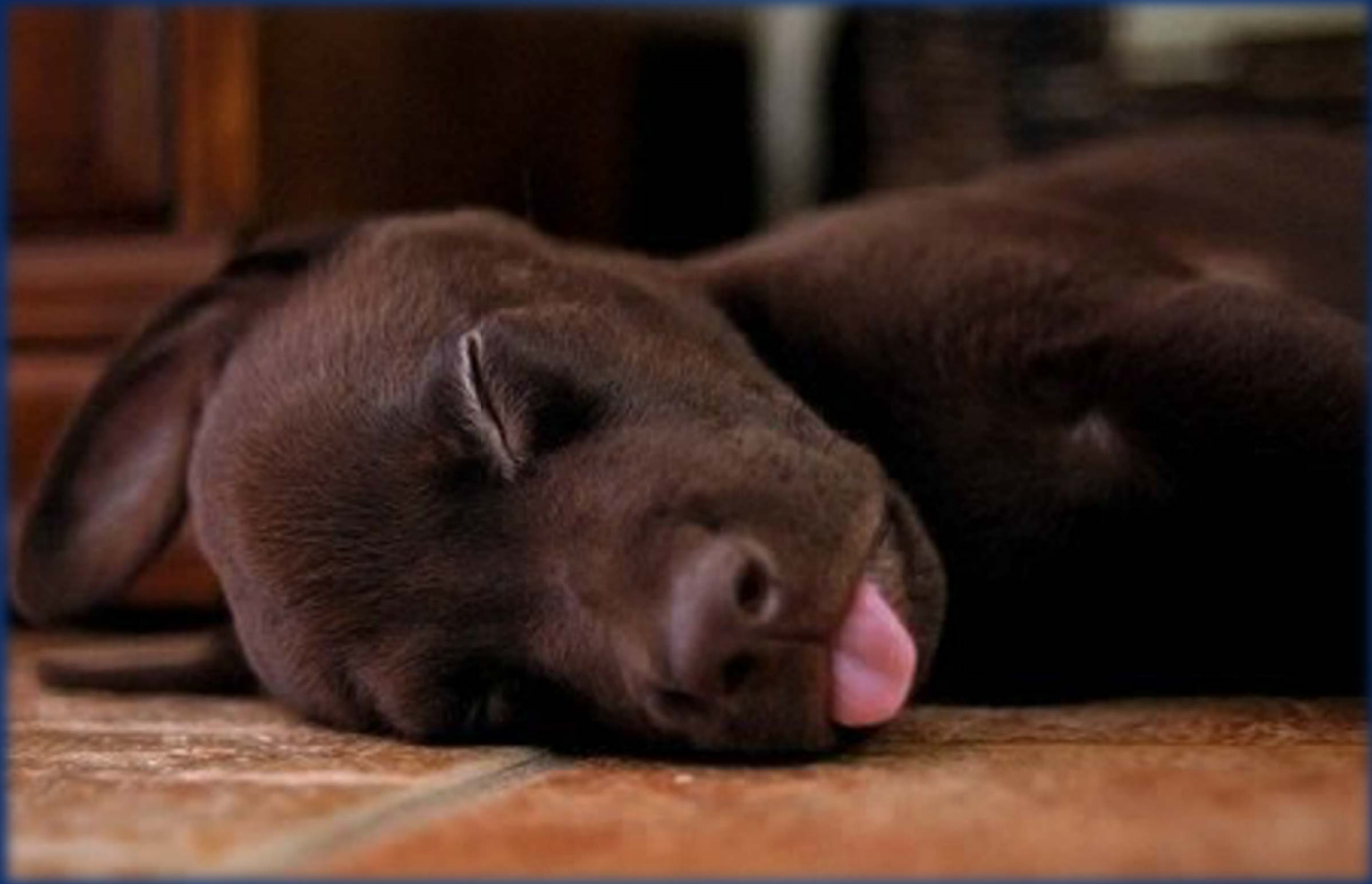
Watershed Delineation



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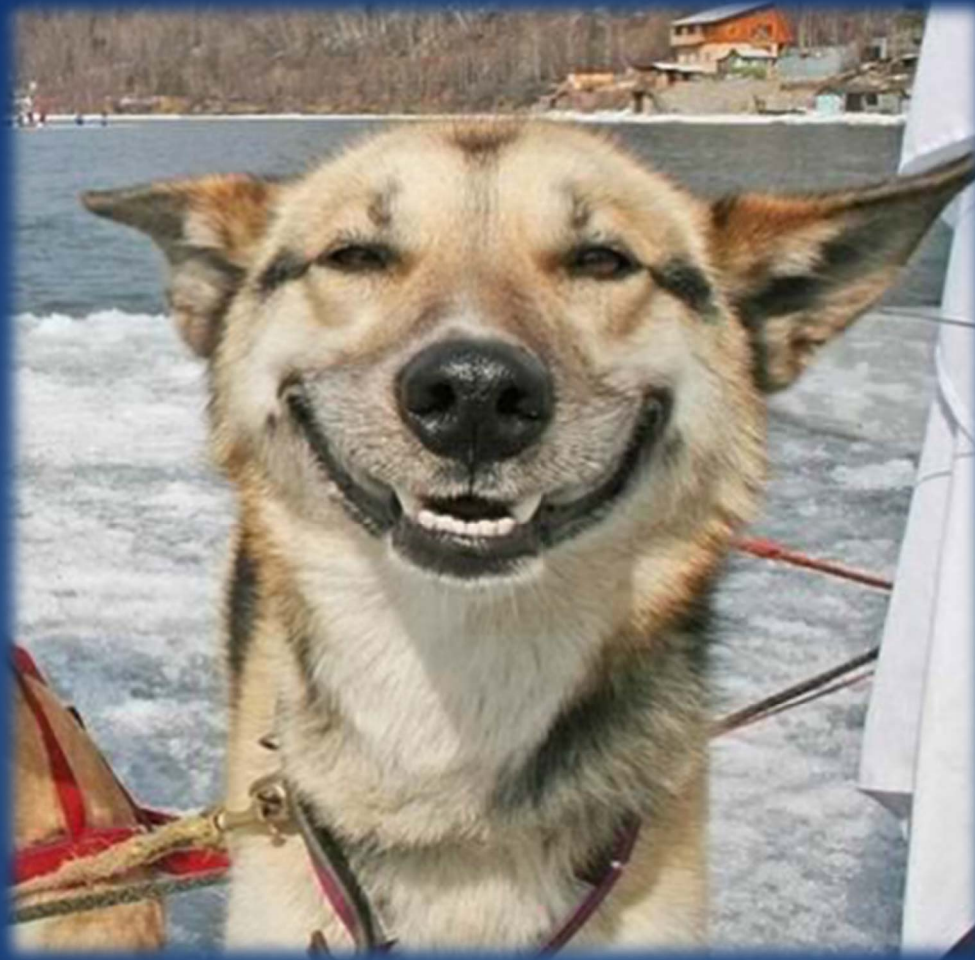
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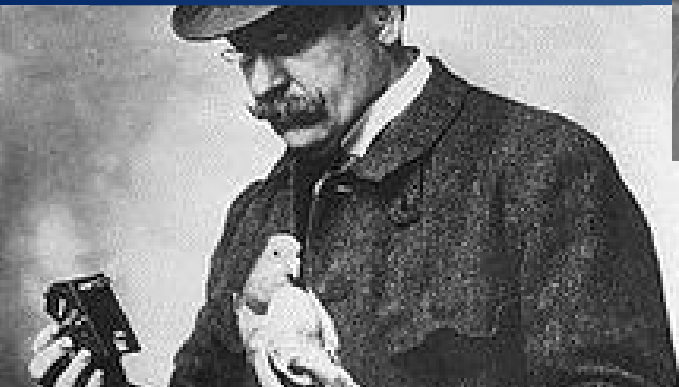


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Origins



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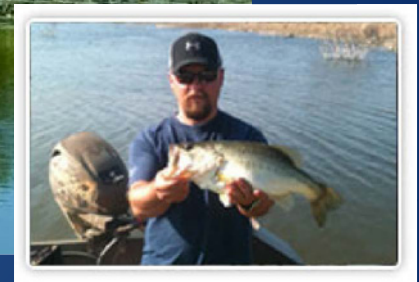
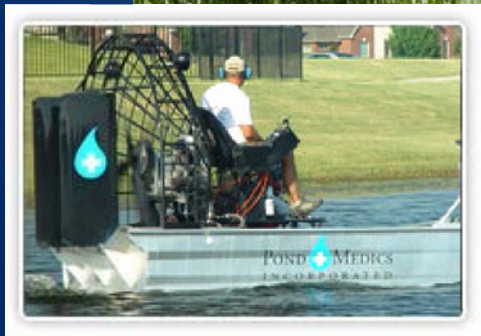
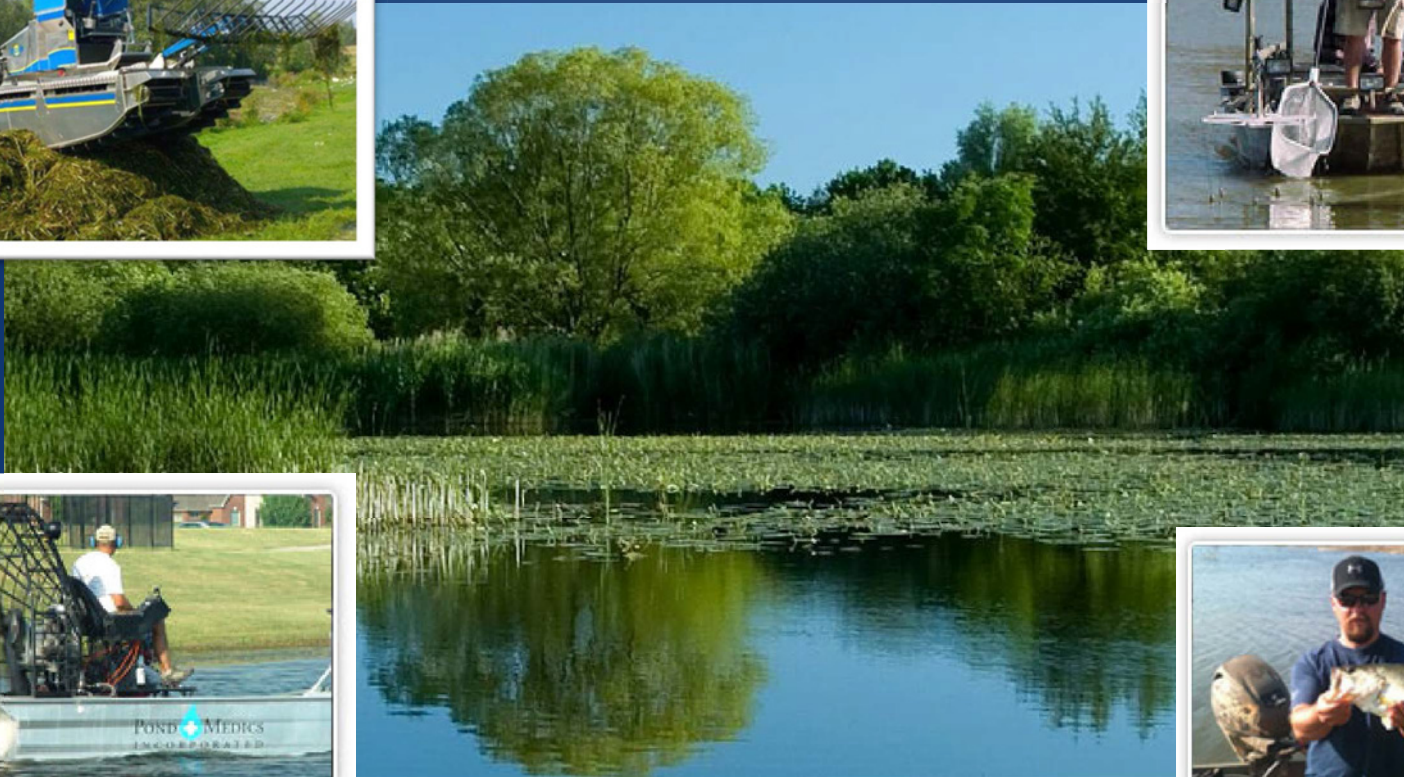


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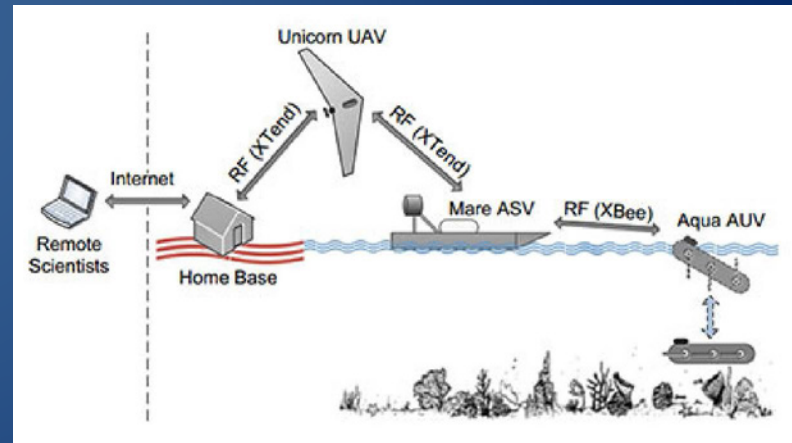
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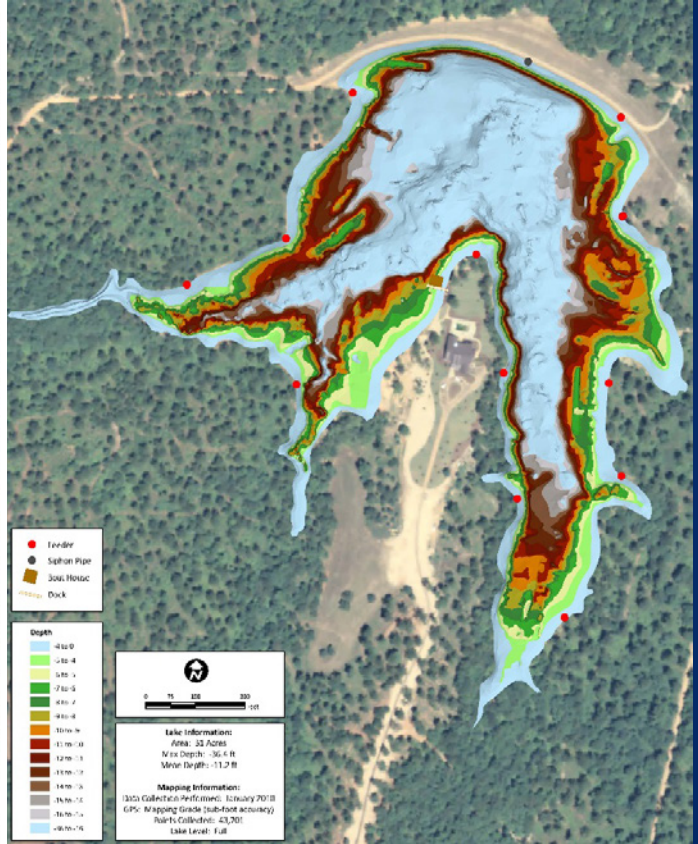
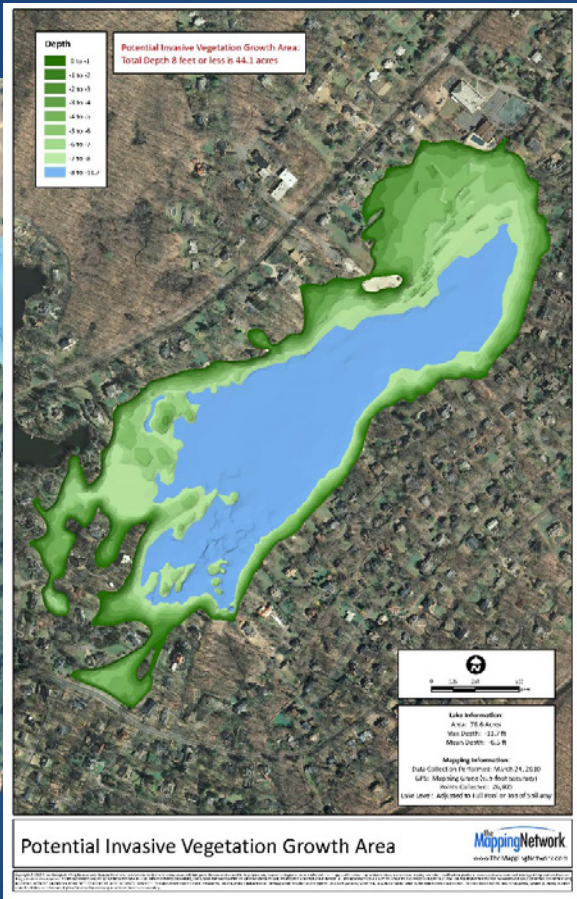
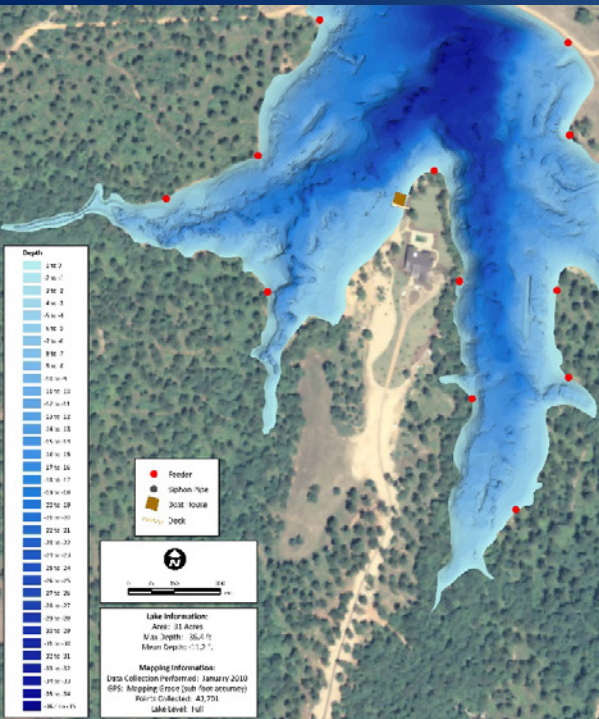


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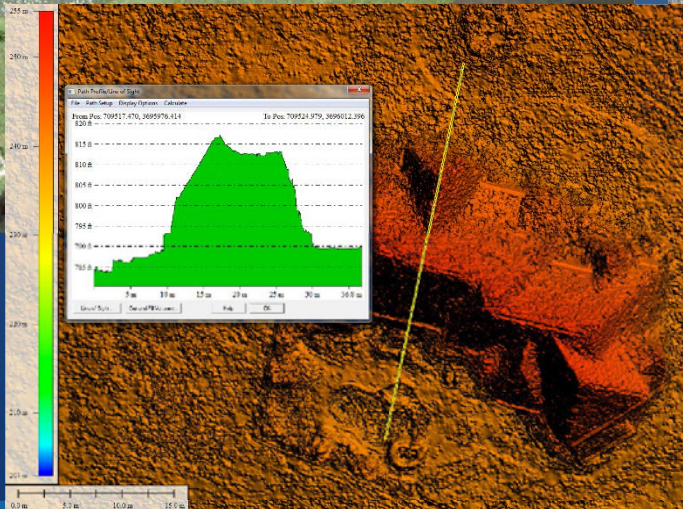
Waterborne Robots to Collect Data



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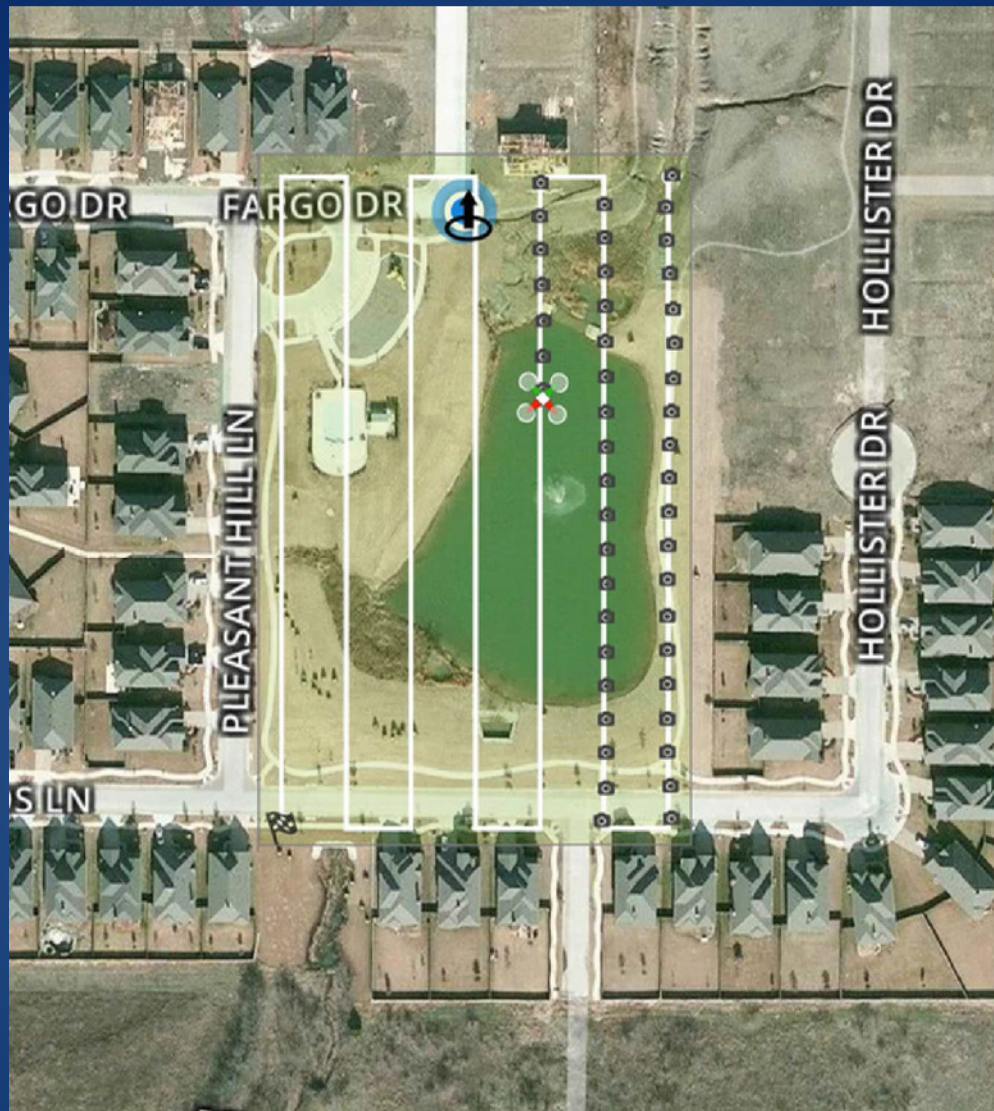




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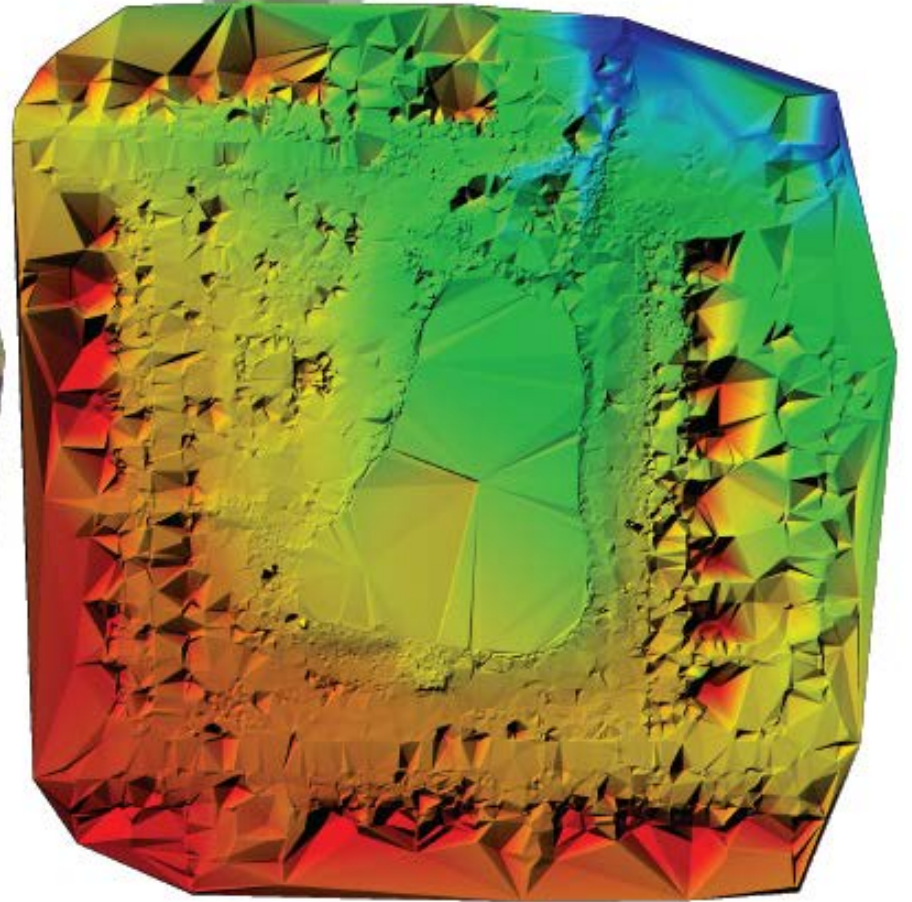




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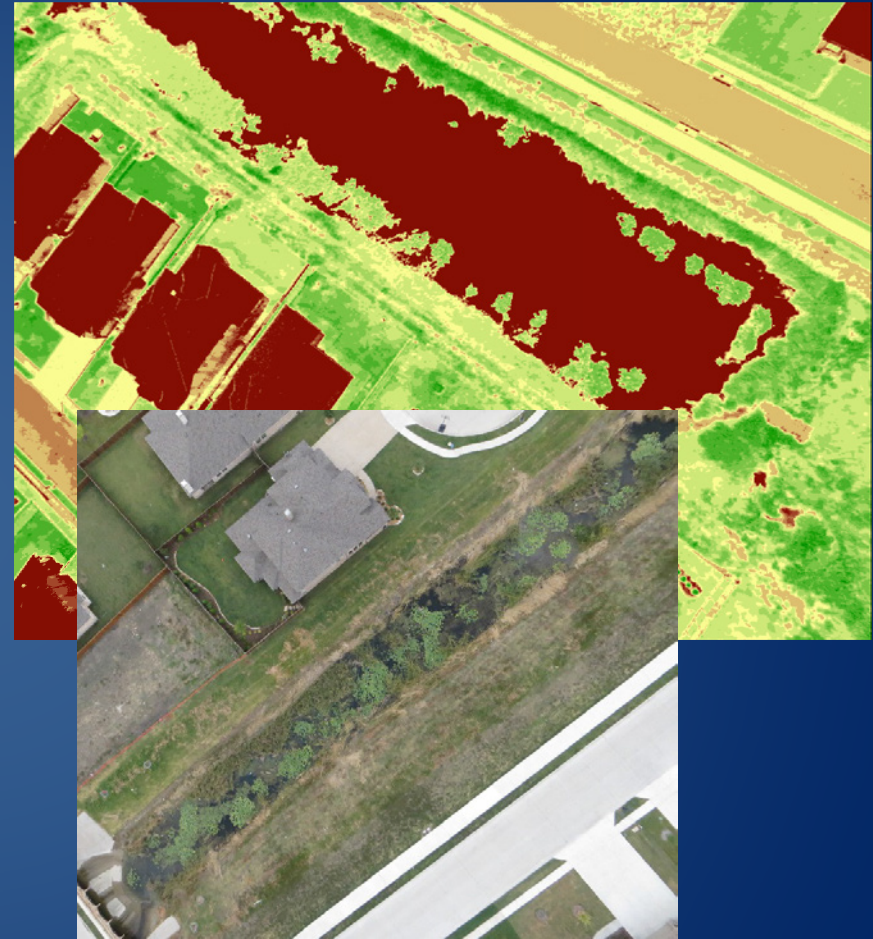
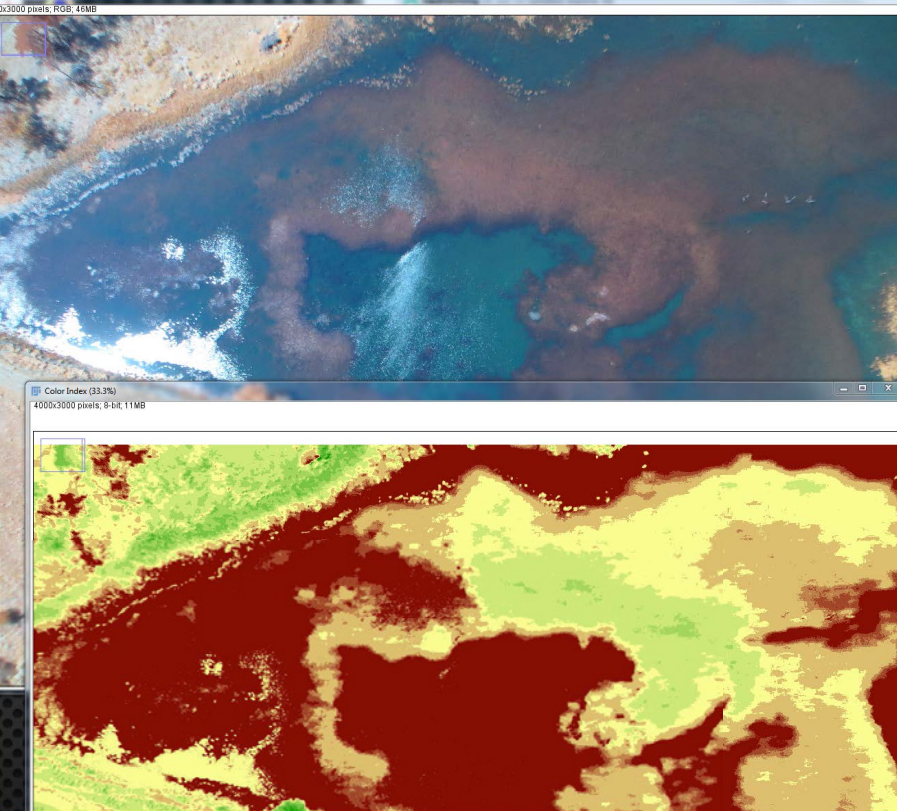


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Application



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Geo-referenced Orthomosaics



GSD 7cm/px



GSD 7cm/px



GSD 30cm/px

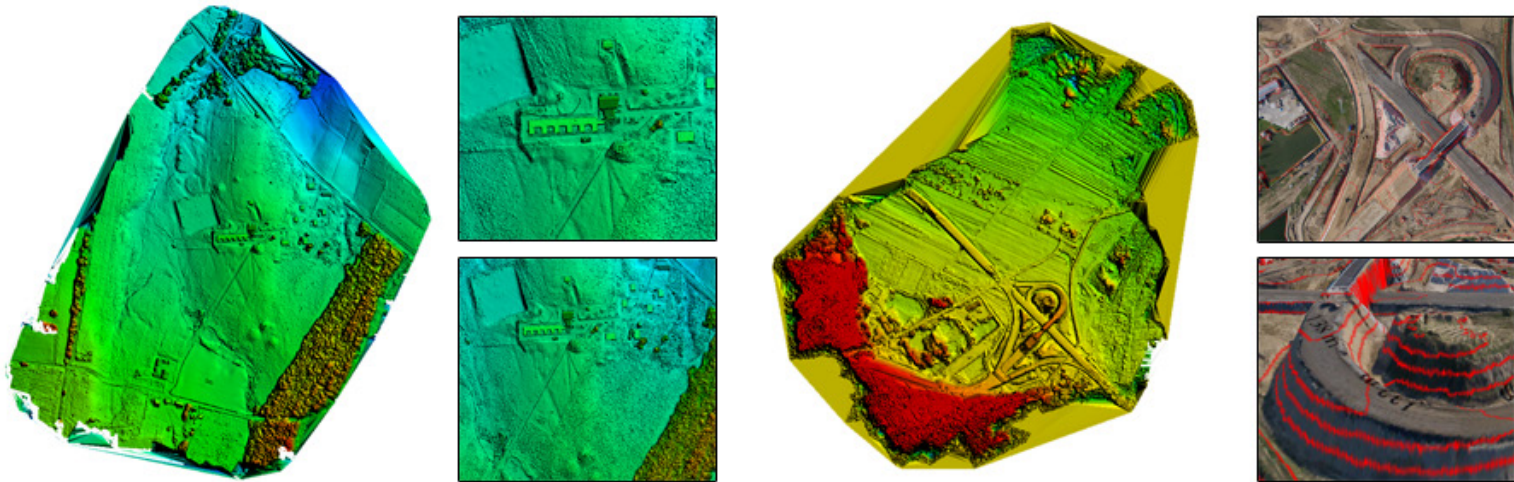
GEO-REFERENCED ORTHOMOSAIC GENERATION

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DEM



HIGH RESOLUTION GEO-REFERENCED DIGITAL ELEVATION MODEL (DEM) GENERATION

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DSM



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Static 3D/Point Cloud



GEO-REFERENCED 3D MODEL AND POINT CLOUD GENERATION

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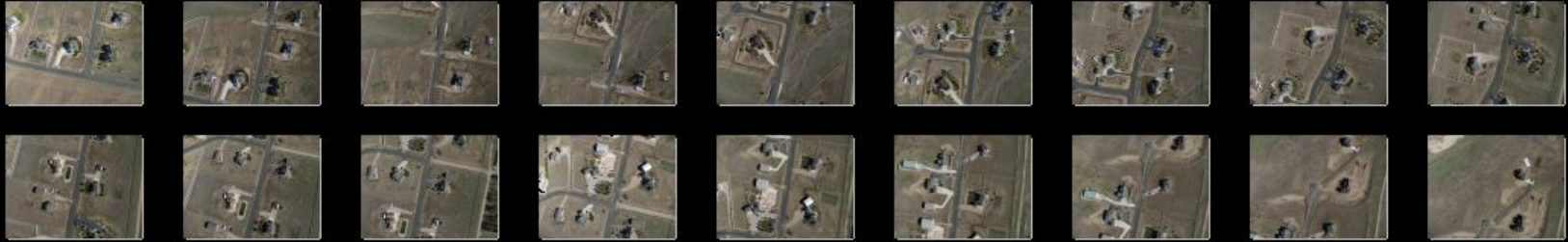
Mapping Resolution



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GEO-TAGGED JPG IMAGES @ 4000 x 3000 PIXELS



↑
IN-TRACK
OVERLAP
> 60%
↓

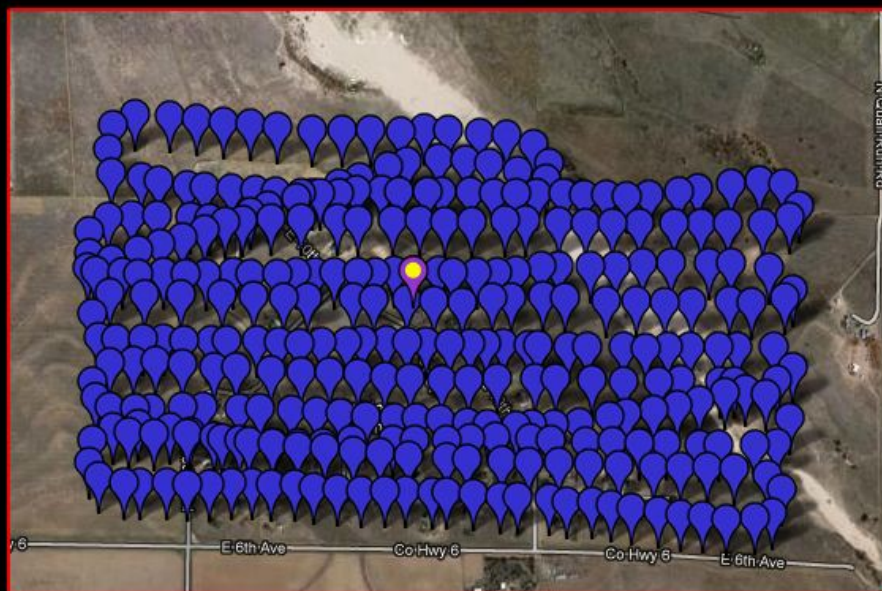


→ CROSS TRACK
OVERLAP
> 50% ←

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FULL DATA COLLECTION OF 321 NADIR IMAGES



203 NADIR IMAGES TRIMMED TO AOI

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Creating Flight Plan

Mission Planner 1.2.78 build 1.1.5004.12827

FLIGHT DATA FLIGHT PLAN INITIAL SETUP CONFIG/TUNING SIMULATION TERMINAL HELP DONATE

COM9 57600 CONNECT

Distance: 14.6478 km
Prev: 1178.90 m
Home: 892.08 m

Close

Zoom

Action

Mouse Location
Lat: 33.2523262
Long: -96.8484521
Alt: 184

UTM
X: 700433.517
Y: 3681324.529
Zone: 14N

MGRS (testing)
14SQB0043481325

Grid
GoogleHybrid
Status: loaded tiles

Read WPs
Write WPs

Home Location
Lat: 33.25065231
Long: -96.83908081
Alt (abs): 188.9700012

00 NW 330 345 0 15 30 NE 60

30 45 20 10 0 10 20 30 45 60

DISARMED

AS 0.0
GS 0.0

Unknown
0>0

GPS: No GPS

Quick Actions Gauges Status Servo Telemetry Logs DataFlash

roll	0	ay	0	ch2out	0
pitch	0	az	0	ch3out	0
yaw	0	gx	0	ch4out	0
groundcourse	0	gy	0	ch5out	0
lat	0	gz	0	ch6out	0
lng	0	mx	0	ch7out	0
alt	0	my	0	ch8out	0
altasl	0	mz	0	ch3percent	0
altoffsethome	0	magfield	0	nav_roll	0
gpsstatus	0	accelsq	0	nav_pitch	0
gpshdop	0	failsafe	False	nav_bearing	0
satcount	0	rxrsi	0	target_bearing	0
altd1000	0	ch1in	0	wp_dist	0
altd100	0	ch2in	0	alt_error	0
airspeed	0	ch3in	0	ber_error	0
targetairspeed	0	ch4in	0	aspd_error	0
groundspeed	0	ch5in	0	xtrack_error	0
verticalspeed	0	ch6in	0	wpon	0
wind_dir	0	ch7in	0	mode	Unk
wind_vel	0	ch8in	0	climbrate	0
ax	0	ch1out	0	tot	0

Waypoints

WP Radius: 25 Loiter Radius: 60 Default Alt: 100 Absolute Alt Verify Height [Add Below](#)

	Command				Lat	Long	Alt	Delete	Up	Down	Grad
14	WAYPOINT	0	0	0	33.2555901	-96.8408284	150	X	⬆	⬇	0
15	WAYPOINT	0	0	0	33.2555834	-96.8412538	150	X	⬆	⬇	0

GEO 0.000000 0.000000 0.00 Tuning Auto Pan Zoom 17.0



GROUND CONTROL POINTS (GCP)

PRECISION GCP AVAILABLE WORLDWIDE: **CompassData**

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GEO-REFERENCED ORTHOMOSAIC

GEO-REFERENCED DSM (SCALED)

GEO-REFERENCED DIGITAL ELEVATION MODEL

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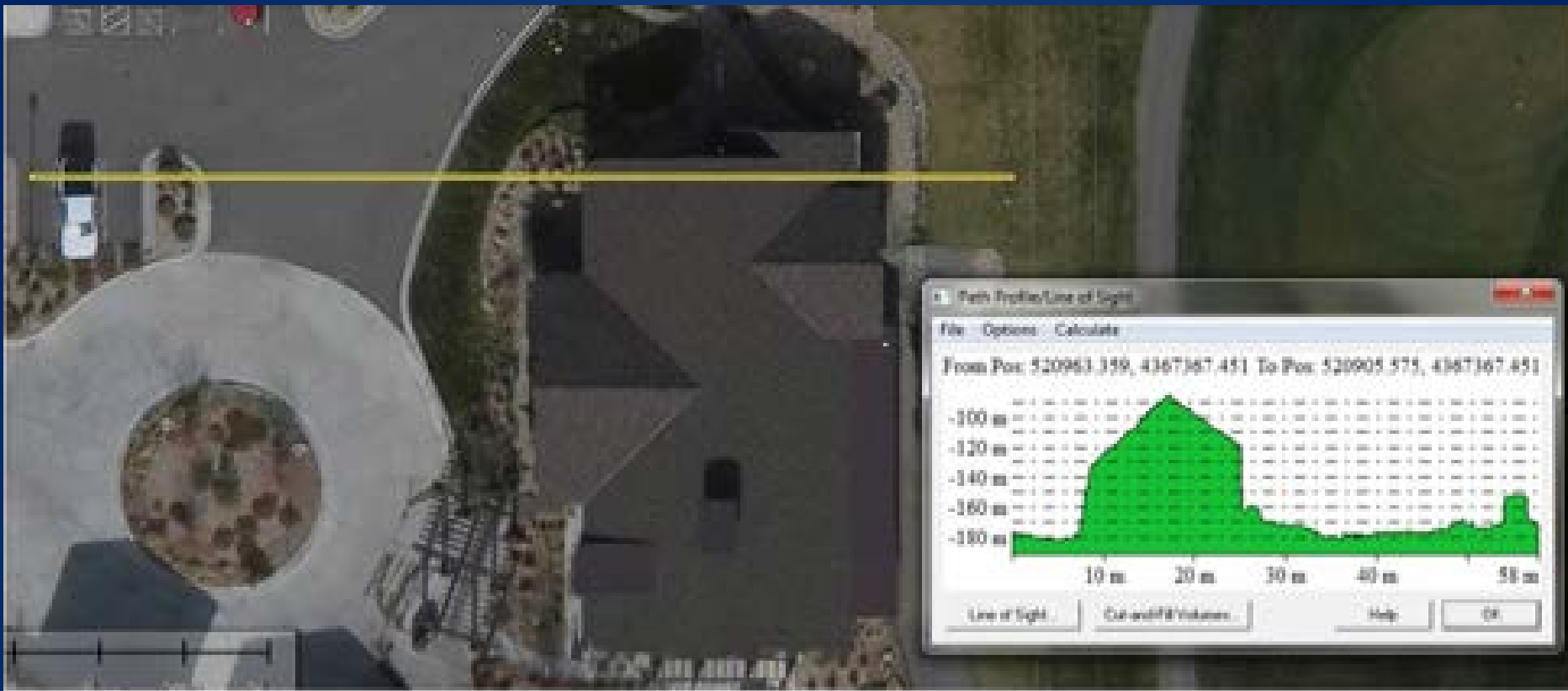


ORTHORECTIFIED IMAGE
6 CM PIXEL RESOLUTION FROM 200M FLIGHT ALT

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**VOLUME AND ELEVATION MEASUREMENTS
ON COMBINED DEM AND ORTHO
6 CM PIXEL RESOLUTION FROM 200M FLIGHT ALT**

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Opportunities

- A. GIS in-field use
- B. Efficiency
- C. Monitoring
- D. Real-time data
- E. Regulatory
- F. Economies of Scale



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Q&A

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