

NORBIT

- explore more -

Rapid Environmental Assessment (REA)

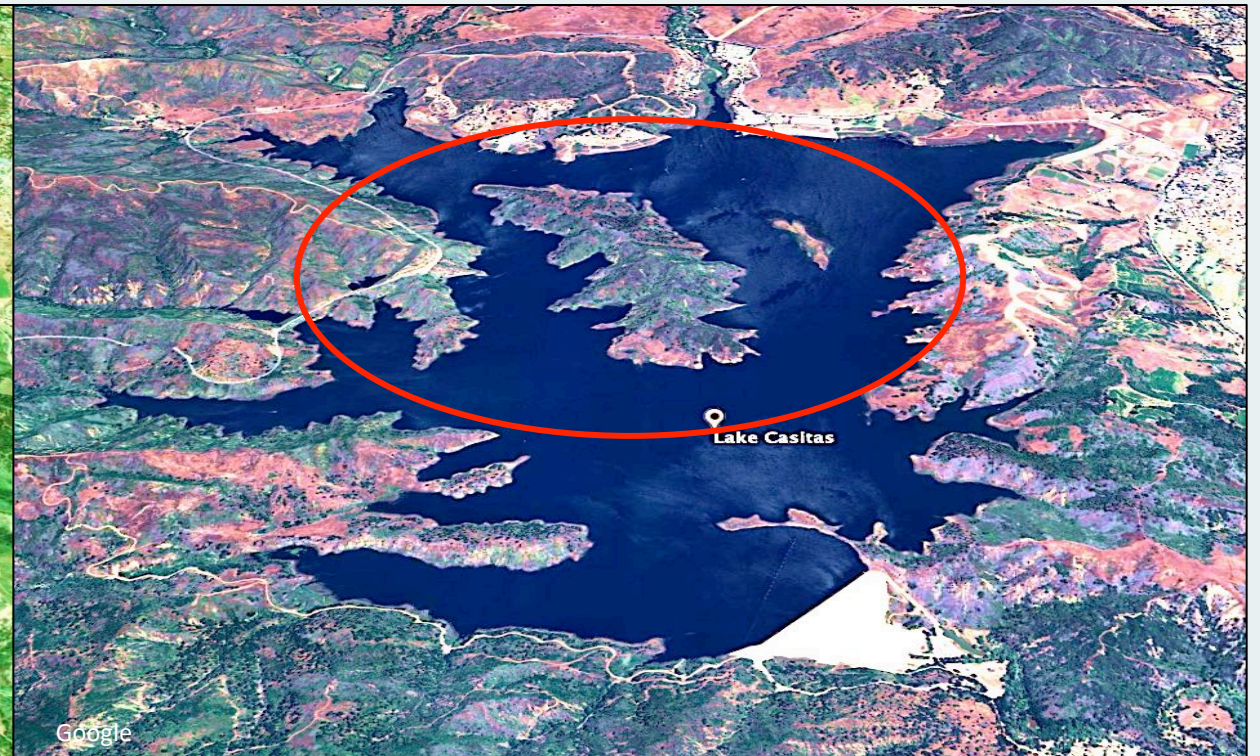
The application of NORBIT's high performance acoustics to support fast intelligence gathering in dynamic environments.

In the arid region of California, Lake Casitas stands out as a crucial reservoir and fishery that supports an entire ecosystem, tourism, and most importantly provides fresh water to local communities. Lake Casitas holds ~237,000 acre-feet of water and is fed by 2 local stream inputs and one main outflow.

Over the last decade, the lake has seen a massive drop in water levels. Satellite data from Google has documented this prolonged desiccation, painting a vivid picture of environmental distress on this valuable resource and its current state of being replenished rapidly by natural forces.

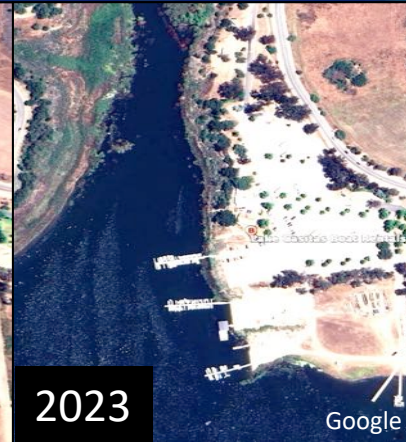
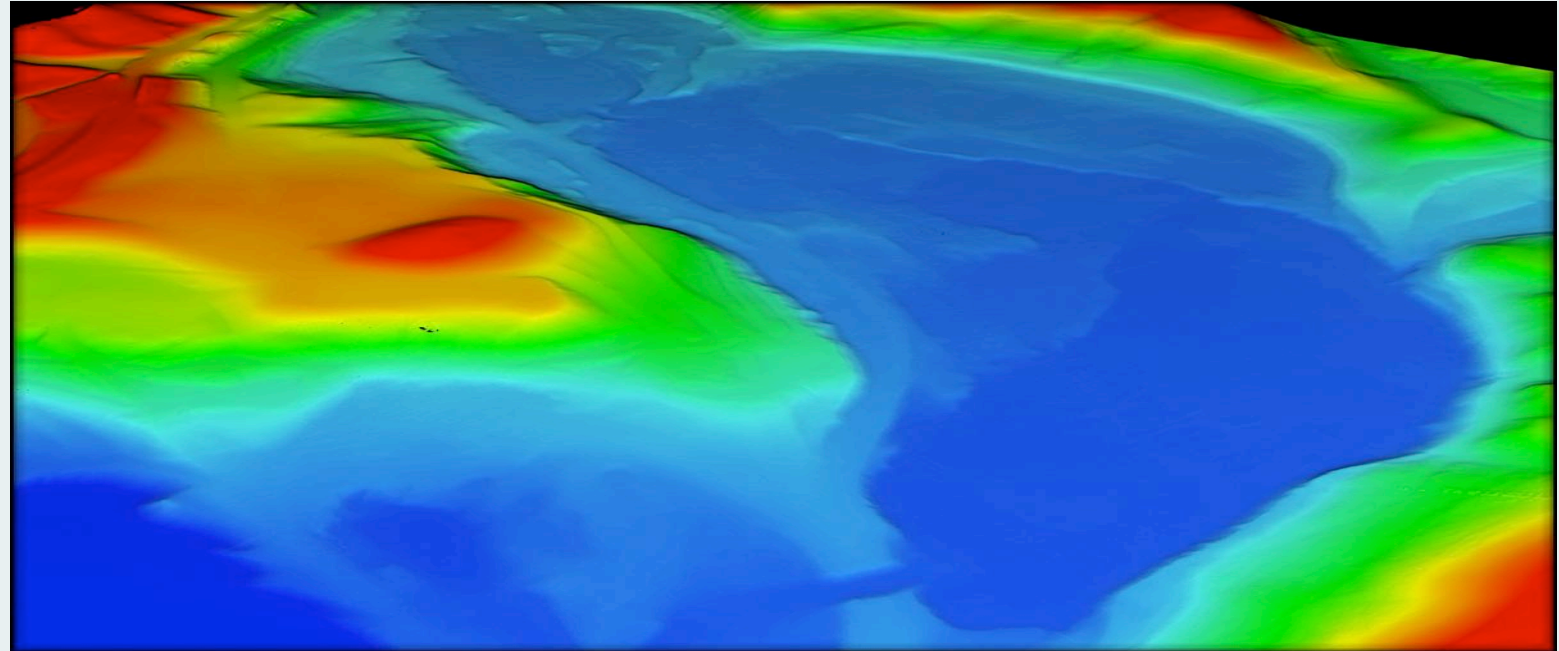


Lake Casitas at 25% Circa 2018



Lake Casitas at 90% Circa 2024

- Explain the benefits of using NORBIT solutions to perform rapid environmental assessments (REA).
- Highlight the importance of rapid assessment to support divers or underwater construction teams to localize objects of interest.
- Show concept of 2-hour mobilization and calibration anywhere, anytime.
- Perform survey of recently inundated areas /structures.
- Perform Large area survey <2 days.
- Data Processing <1 day



		
<p>NORBIT WINGHEAD i80S</p> <p>Fully Stabilised, GNSS/INS integrated solution for surface vessels</p>	<p>NORBIT iWBMSH</p> <p>High-End Turnkey multibeam sonar system for high resolution bathymetry survey in all conditions</p>	<p>NORBIT WINGHEAD F11</p> <p>Superior Performance Ultra High-Resolution Curved Array Forward Looking Sonar</p>

Why Use Lake Casitas to Illustrate REA?

A major shift occurred between 2018 and 2023 when rainstorm activity increased in Central California. This is an ongoing event. Lake Casitas is currently going through a remarkable change, inundated by storms and increasing its existing capacity from 25% to current levels of up to 90%.

The lake gained ~100,000 acre-feet of water in short time and is the largest single season inundation in ~50 years.

The inundation caused previously above water vegetation and man-made structures to be submerged over a relatively short time.

RAIN SEASON TOTALS AND PERCENT OF NORMAL REPORT 2024

Summary of daily rainfall totals for the current season and percent of normal. Includes previous years for comparison. Normals are determined from the 1957-1992 base period (i.e. the most recent 35 year period that represents average rainfall from gages with 80-120 years of record).

CURRENT SEASON TOTALS AND PERCENT OF NORMAL

LOCATION	RAIN SINCE 8AM	24 HOUR AMOUNT ENDING AT 8AM PST	RAIN TOTAL LAST 5 DAYS	SEASON TOTAL TO DATE	NORMAL TO DATE	PERCENT OF NORMAL TO DATE	LAST YEAR TO DATE
Camarillo - PVWD	0.00	0.01	1.06	12.90	10.09	127.9%	12.46
Casitas Dam	0.00	0.02	1.06	29.37	17.75	165.4%	34.50
Casitas Station	0.00	0.01	0.89	29.53	17.48	168.9%	35.65

Data provided through <https://www.vcwatershed.net/fws/reports/rain-season-report>

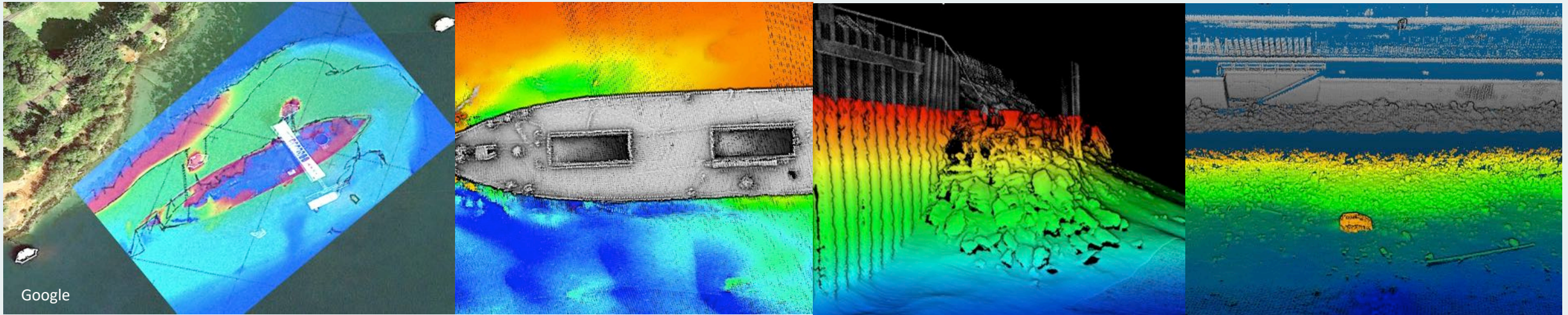
Why Use Lake Casitas to Illustrate REA?

Lake Casitas' transition is dynamic and still active. Mapping and Imaging sonars are relevant when measuring these types of environmental changes.

Underwater construction/deconstruction teams, and search and recovery operations using divers rely on accurate georeferenced data to speed up time critical operations.

The capabilities of a mapping/imaging sonar to rapidly find and georeference objects of interest is a driving force behind REA. Accurately georeferencing submerged structures, or recently lost assets/objects of interest, is of great importance when supporting REA.

Similar NORBIT Projects Supporting REA including Integrated LiDAR Mapping



Rapid analysis to support divers and underwater construction teams

Critical Infrastructure Assessment

Locating objects quickly (Car model is Suzuki)

Rapid Mobilization of NORBIT Solutions

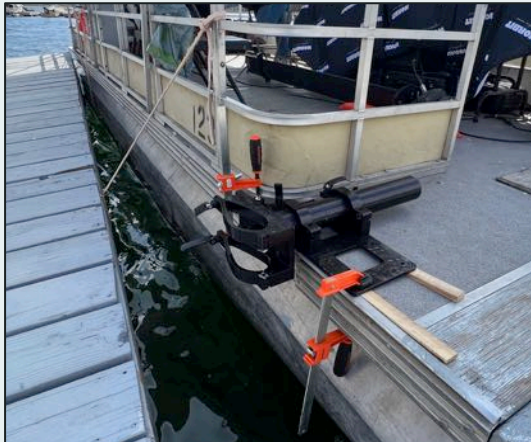
Current sonar technology produces high-definition outputs at the cm level. To ensure maximum quality of results, the systems must be installed and calibrated according to the best practices of hydrographic mapping.

This process can historically take up to one day whereas REA activities can sometimes require immediate deployment on vessels available at a moment's notice.

- NORBIT's systems are ultra-compact and come fully integrated with GNSS capabilities.
- Using NORBIT's state-of-the-art over the side pole mount, the systems can be deployed on almost any vessel, calibrated and set to work in a few hours or less.
- Equipment comes in cases suitable for international transit.



NORBIT's PORTUS Pole Mounting system
One-Man Portable, Carbon Fiber Design



Adapting mount to a pontoon boat



Compact System



Adjustable Bracketry



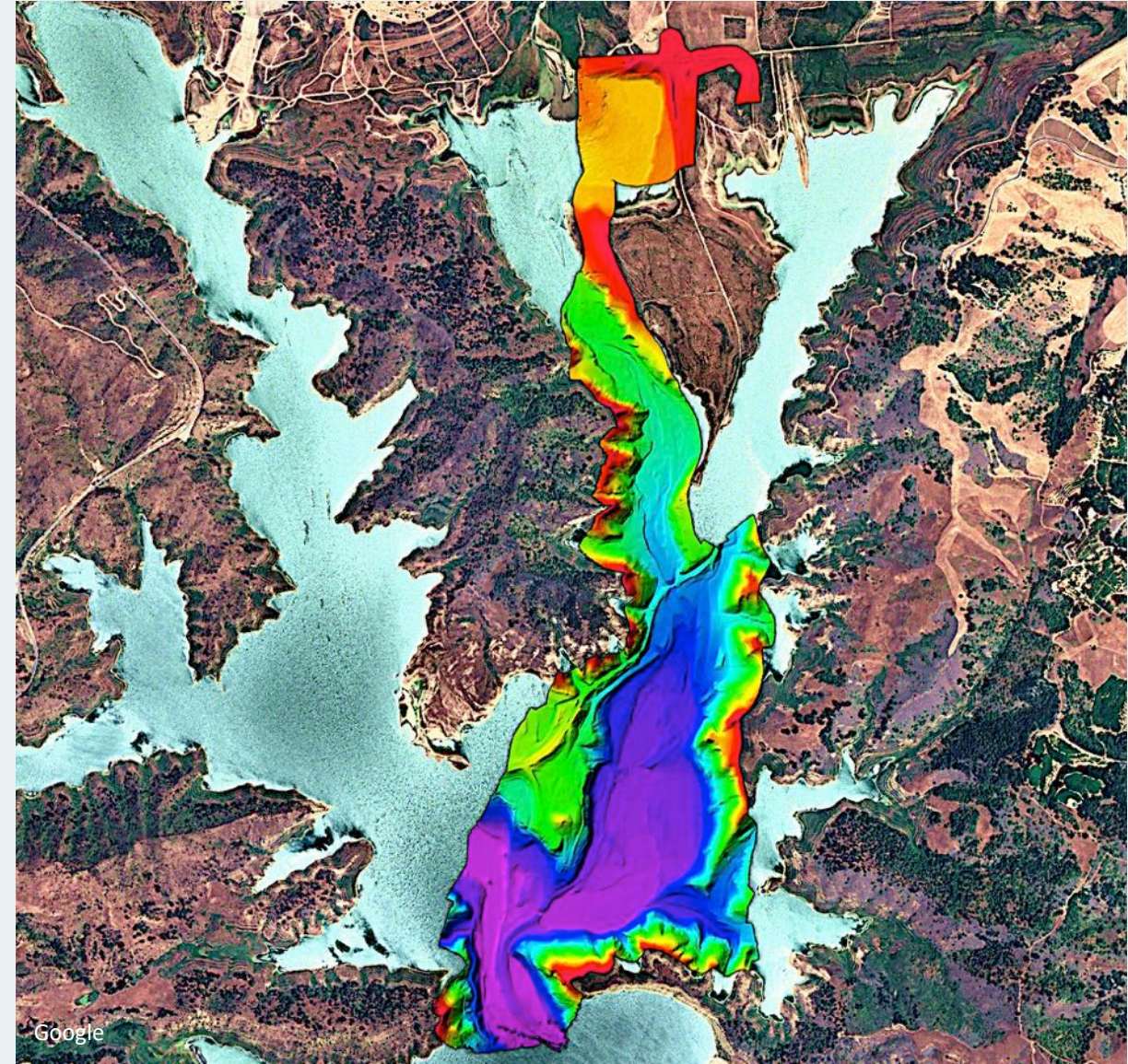
Rapid Mobilization Complete!

By combining publicly available historical data from Google Maps with NORBIT's recent survey data and georeferenced data output, we illustrate how an analyst or decision maker can rapidly assess large inundated areas and make informed decisions regarding responses.

This composite image shows a satellite view of Lake Casitas in 2018 with color-coded depth data from NORBIT's sonar in 2023. Actual water levels in 2023 are directly compared to those in 2018 by using overlaid bathymetry data.

Data Processing was done in <1 day using standard commercial processing software.

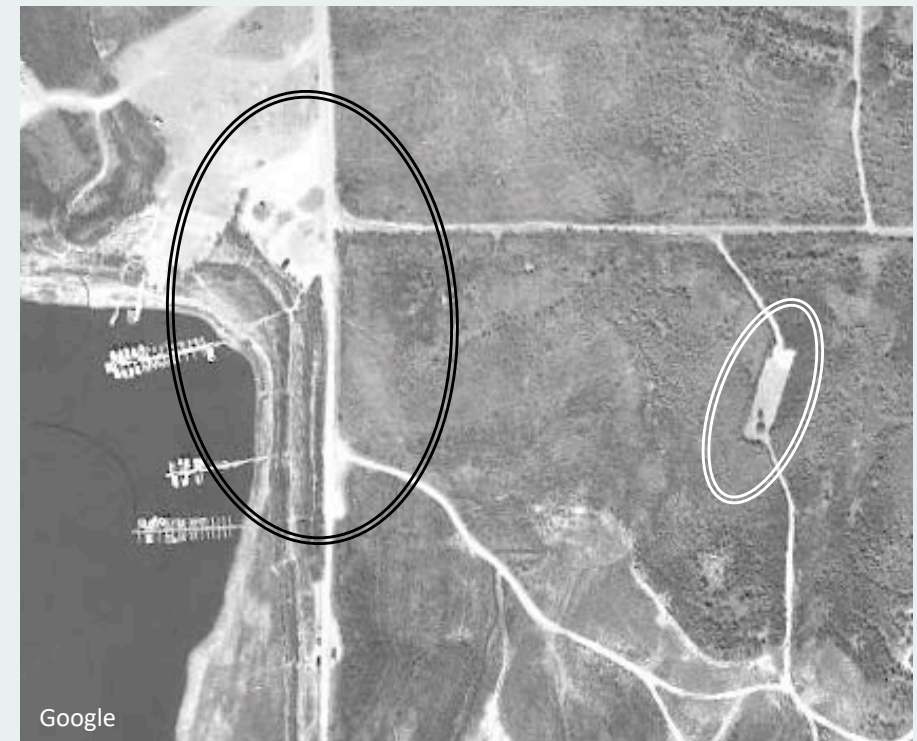
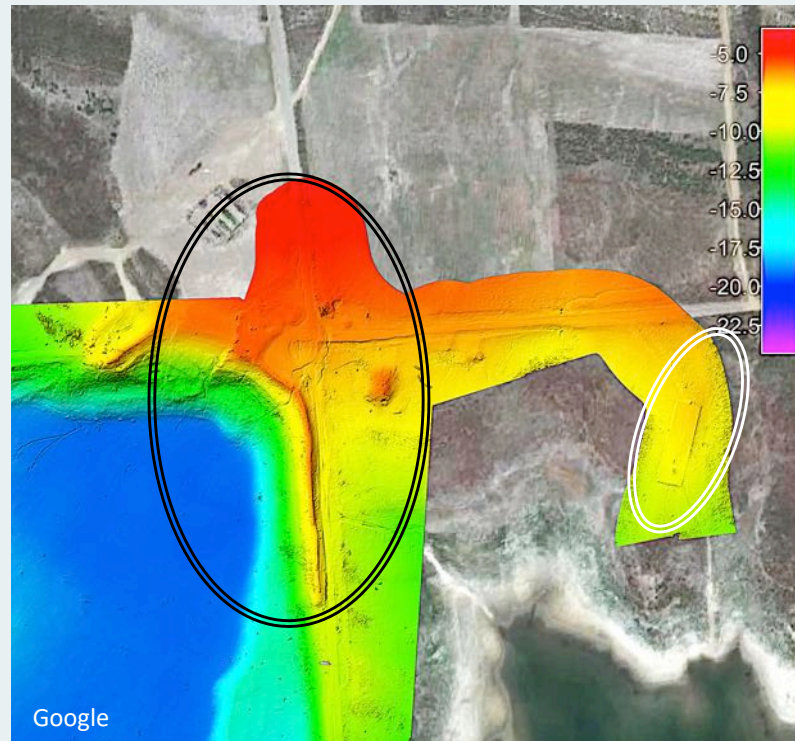
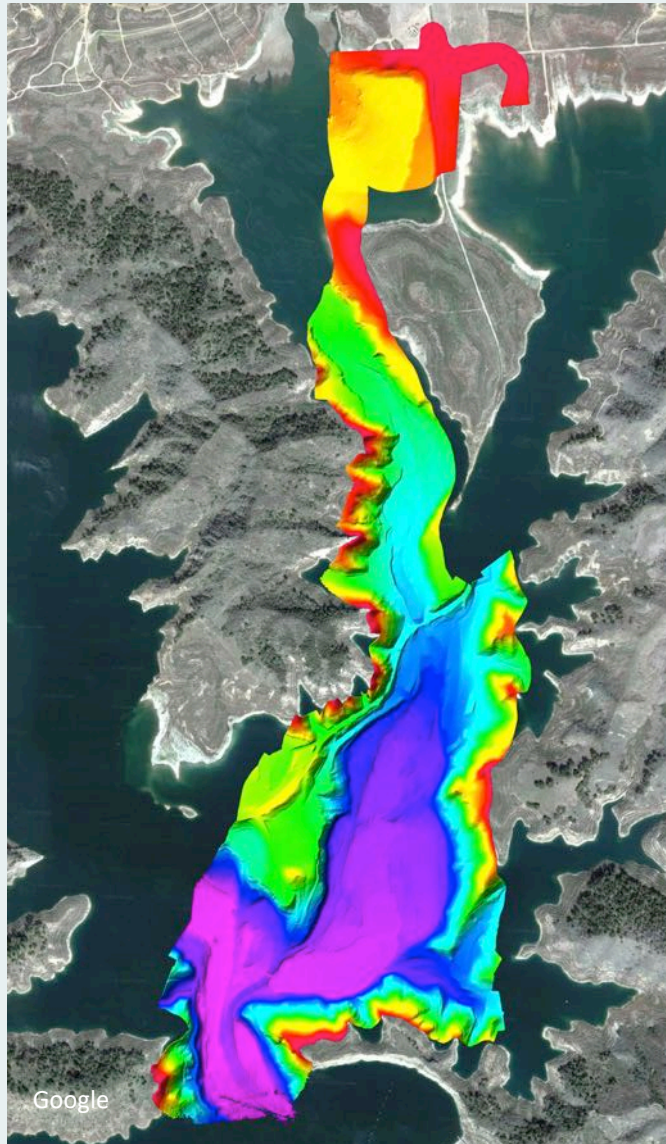
Red indicates potentially inundated shallow areas; blue/purple indicate depth in this overlay.



Result - Rapid Georeferencing of Targets

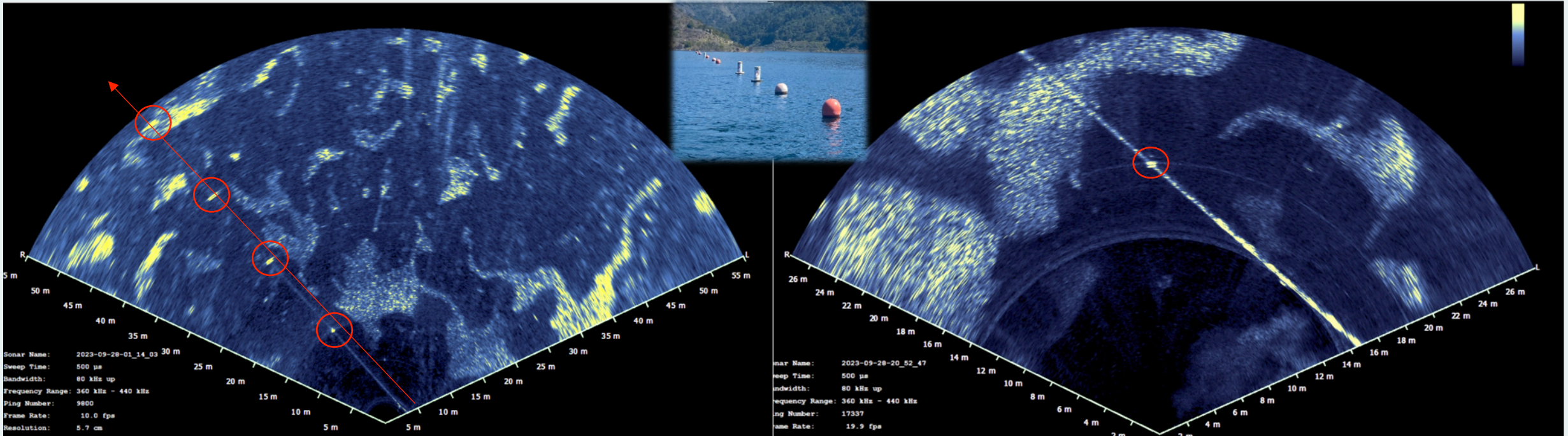
Here, we show recently flooded roads and recognizable structures. These are georeferenced with cm level precision using NORBIT's integrated mapping solution.

Rapid Environmental Assessment is the key to supporting downstream decision making when bathymetry is combined with existing geospatial data.



Result - High-Res Imaging (FLS) for REA

While mapping sonars provide a snapshot in time of a large area, imaging sonars (FLS) are useful for navigating through unknown marine/aquatic landscapes which supports REA. Imaging sonars can provide obstacle avoidance and terrain info ahead of a vehicle in unmapped waters, like a flashlight. In addition to navigation aiding, they can provide a near real time “acoustic video” at up to 50Hz, with wide coverage to help locate objects as the vessel is moving, even in zero “visibility”.

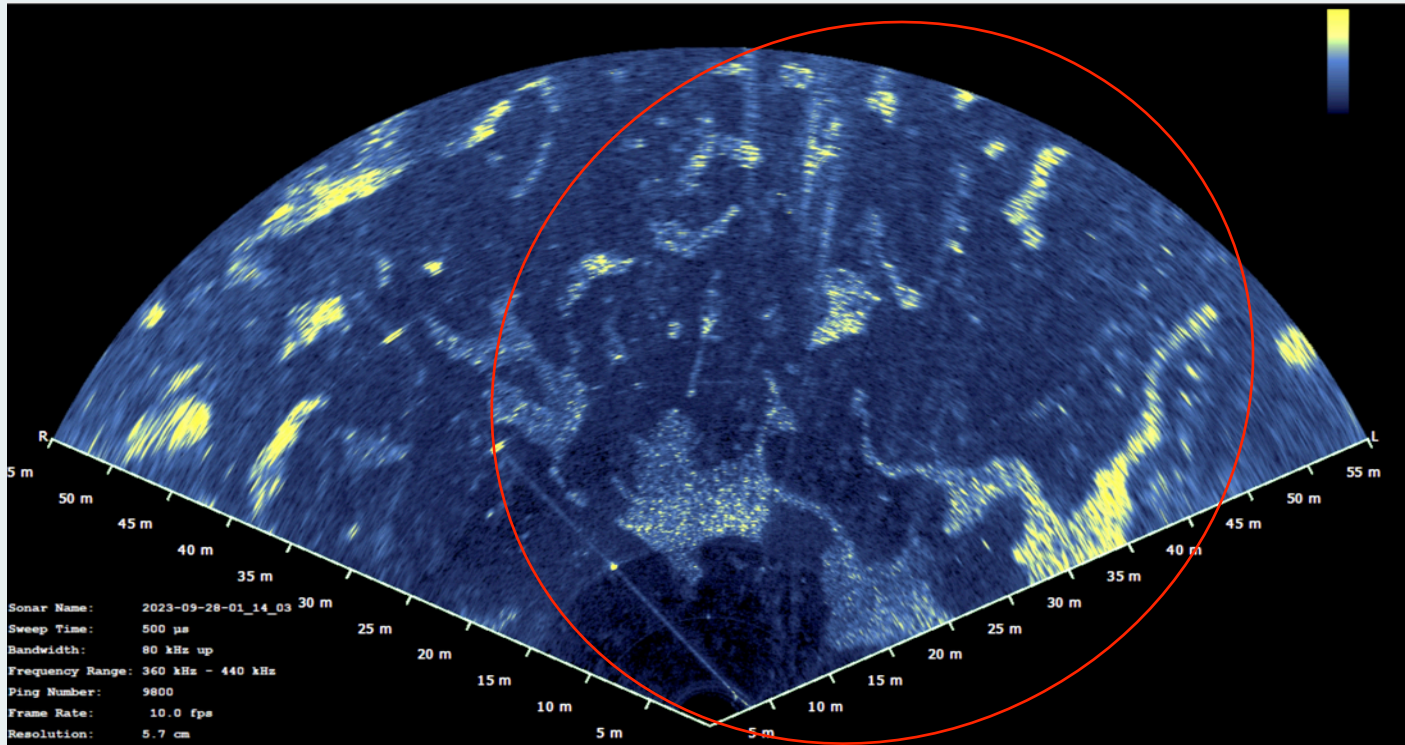


Surface Buoy and Line, Benthic Fish Shoals, 60m range

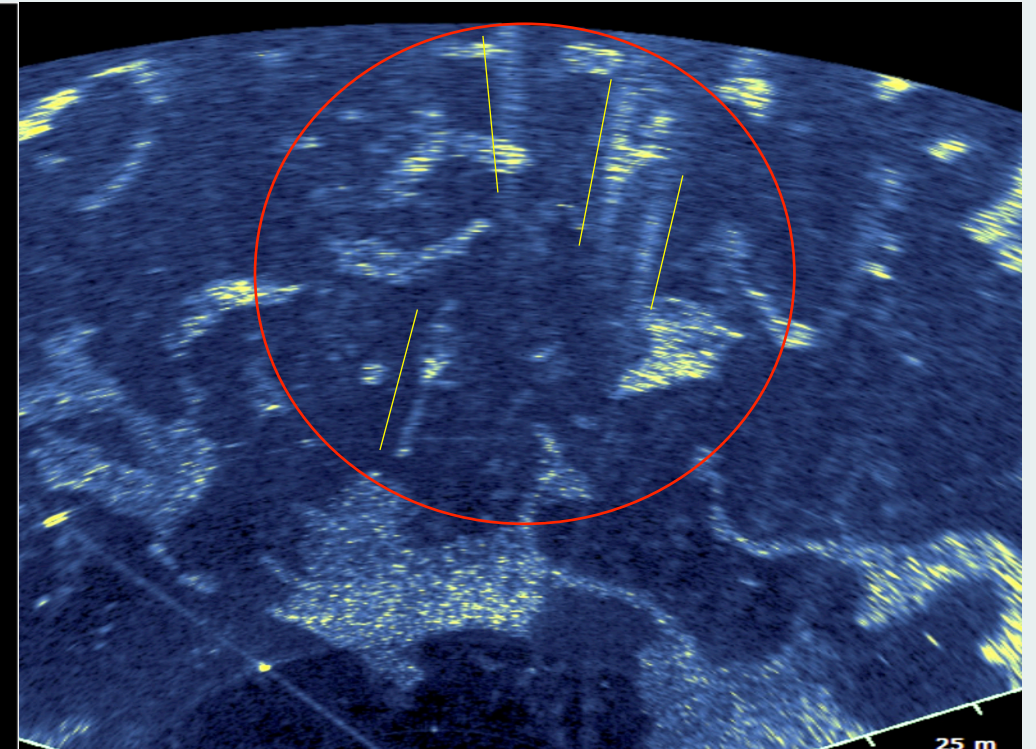
Surface Buoys and Line, Benthic Fish Shoals, 30 m range

Result - High-Res Imaging (FLS) for REA

Understanding the outputs of an imaging sonar can provide an operator or analyst with real time details in dynamic conditions including Biological Assessment. In this example you can see massive shoals of fish on the lake floor. These shoals are actively hunted by local aquatic piscivorous birds called Grebes, specifically the Western Grebe, a diving hunter. In this single snapshot from a WINGHEAD F11 FLS, you can see massive shoals of fish, surface buoy line, and also the evidence of bubble trails which are left as the Grebes dive to hunt fish before surfacing.

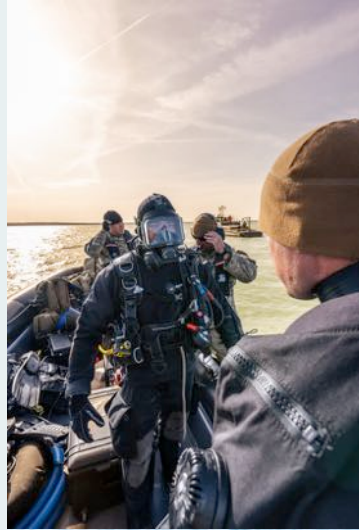
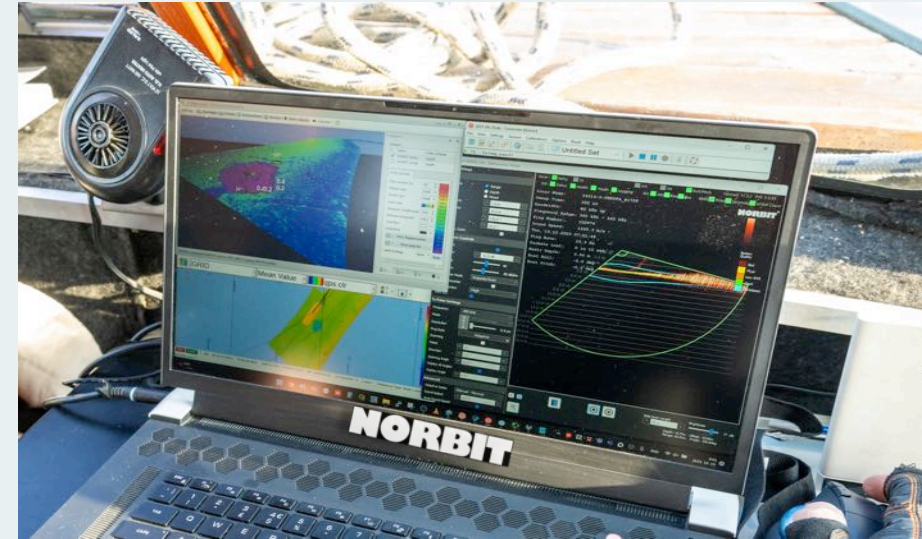


Benthic fish shoals, showing interesting and dynamic morphology.



Bubble trails created by Western Grebes while hunting fish. Trails show as linear signal

In many cases, REA activities lead to human divers and teams of divers deployed for a specific remediation event. Divers frequently go into unknown areas, unmapped, with poor visibility and with the mission to find something of interest quickly. This can be a labor intensive and dangerous adventure. Using Imaging and Mapping sonars, NORBIT has demonstrated how dive team operations can be optimized for safety and time spent underwater by using NORBIT acoustics to accurately portray an environmental or georeference objects of interest for recovery or remediation.



NORBIT works with dive teams globally to support safe S&R operations

Conclusions – NORBIT Solutions For REA

- Regardless of timescale, the ability to quickly create a composite data product, including historical data, is a key to action supported by NORBIT Solutions.
- REA using NORBIT sonars allows for near “instant” snapshots or real time video of key areas to support operational needs.
- Compact High-Performance sonars allow extremely rapid mobilization in “unideal” conditions.
- NORBIT data processing yields clean, easy to process data sets to support rapid output of data products to decision makers.
- Combining NORBIT output with standard GIS data sets yields enhanced awareness using standard commercial software tools.
- NORBIT solutions provide a comprehensive capability which enables decision making and enhances safety of operations.



NORBIT

- explore more -

For more information contact:

NORBIT

subsea@norbit.com