

Four Band Image Mosaic of the Colorado River Corridor Downstream of Glen Canyon Dam in Arizona

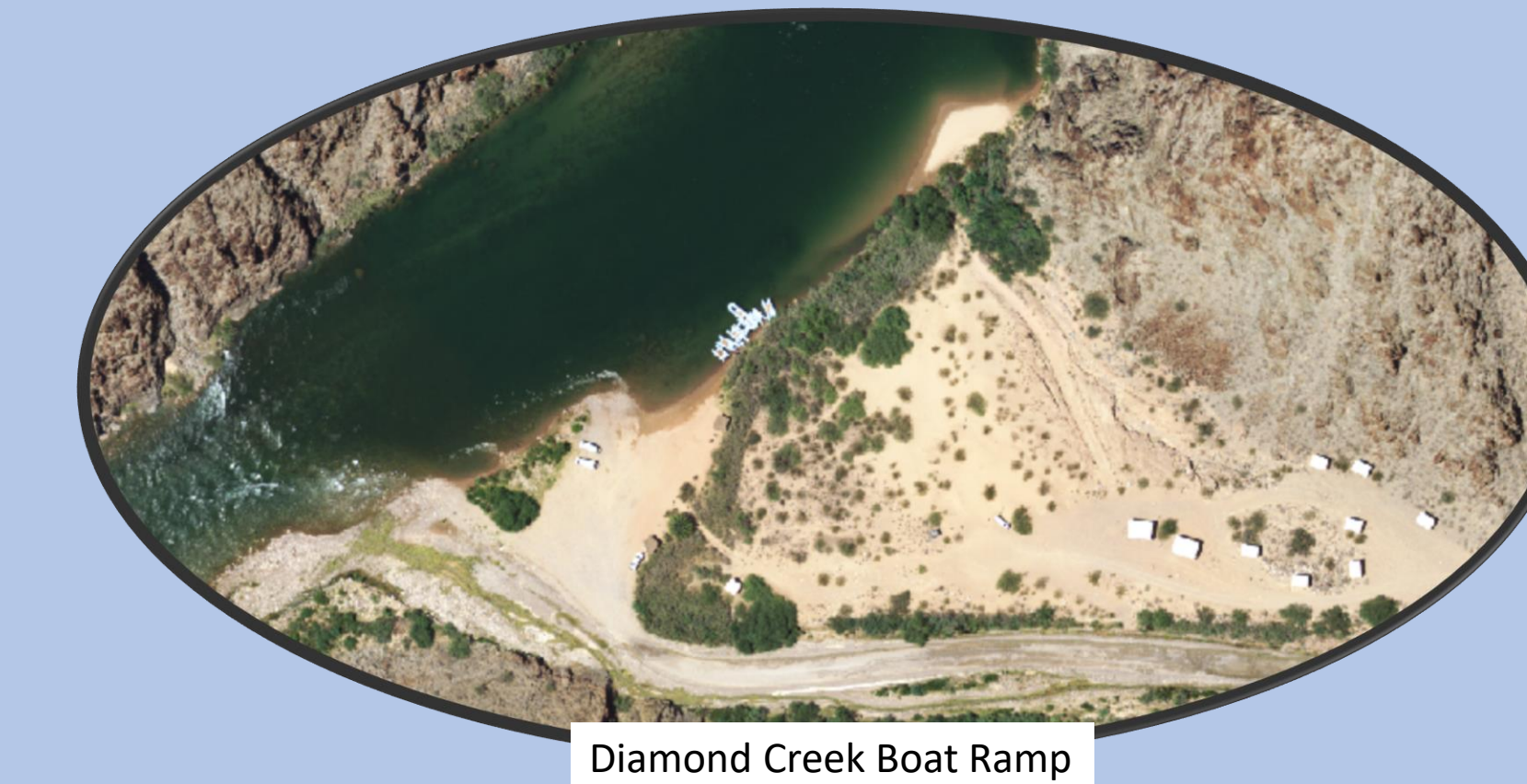
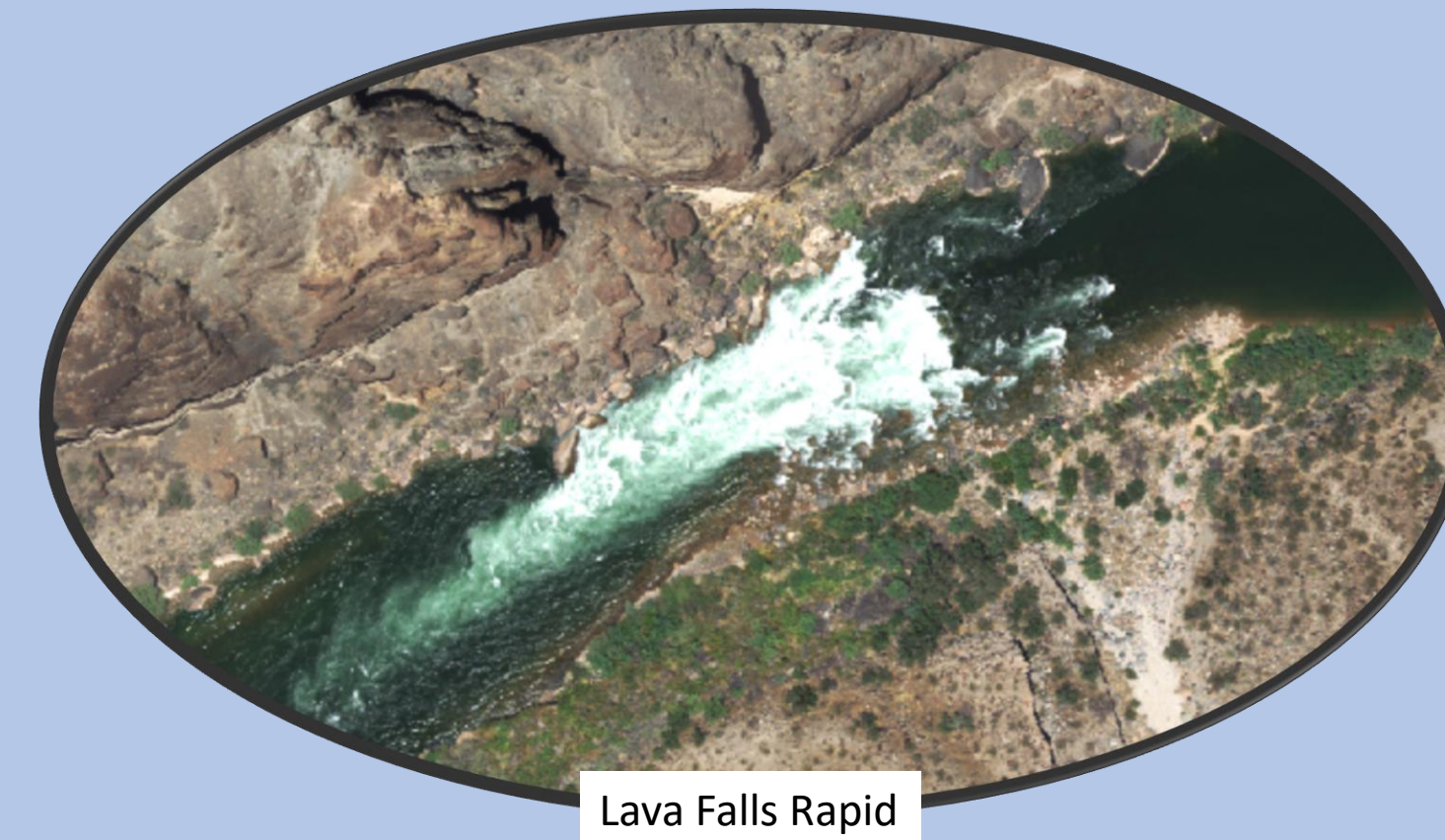
Derived from the May 2021 Airborne Image Acquisition

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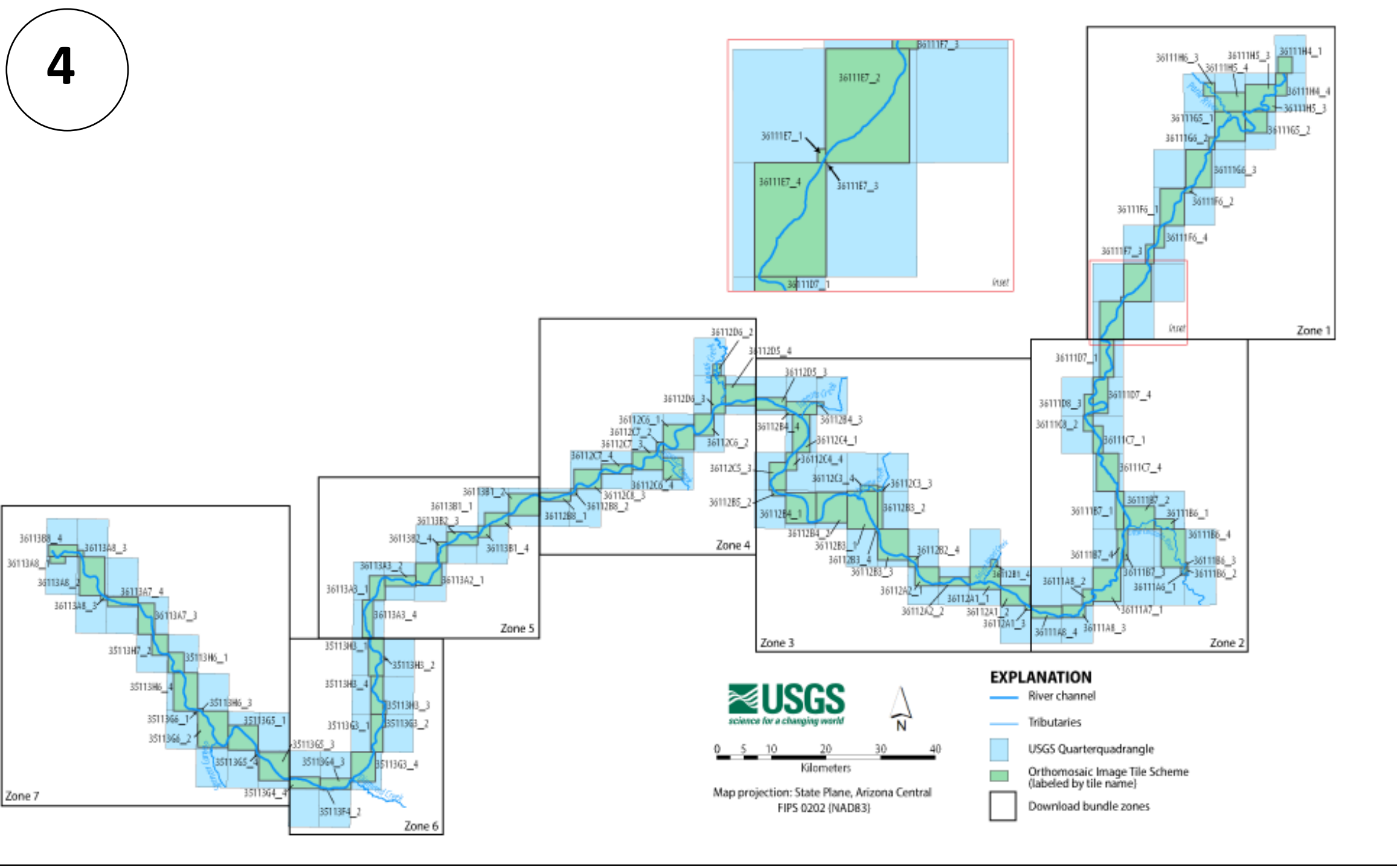
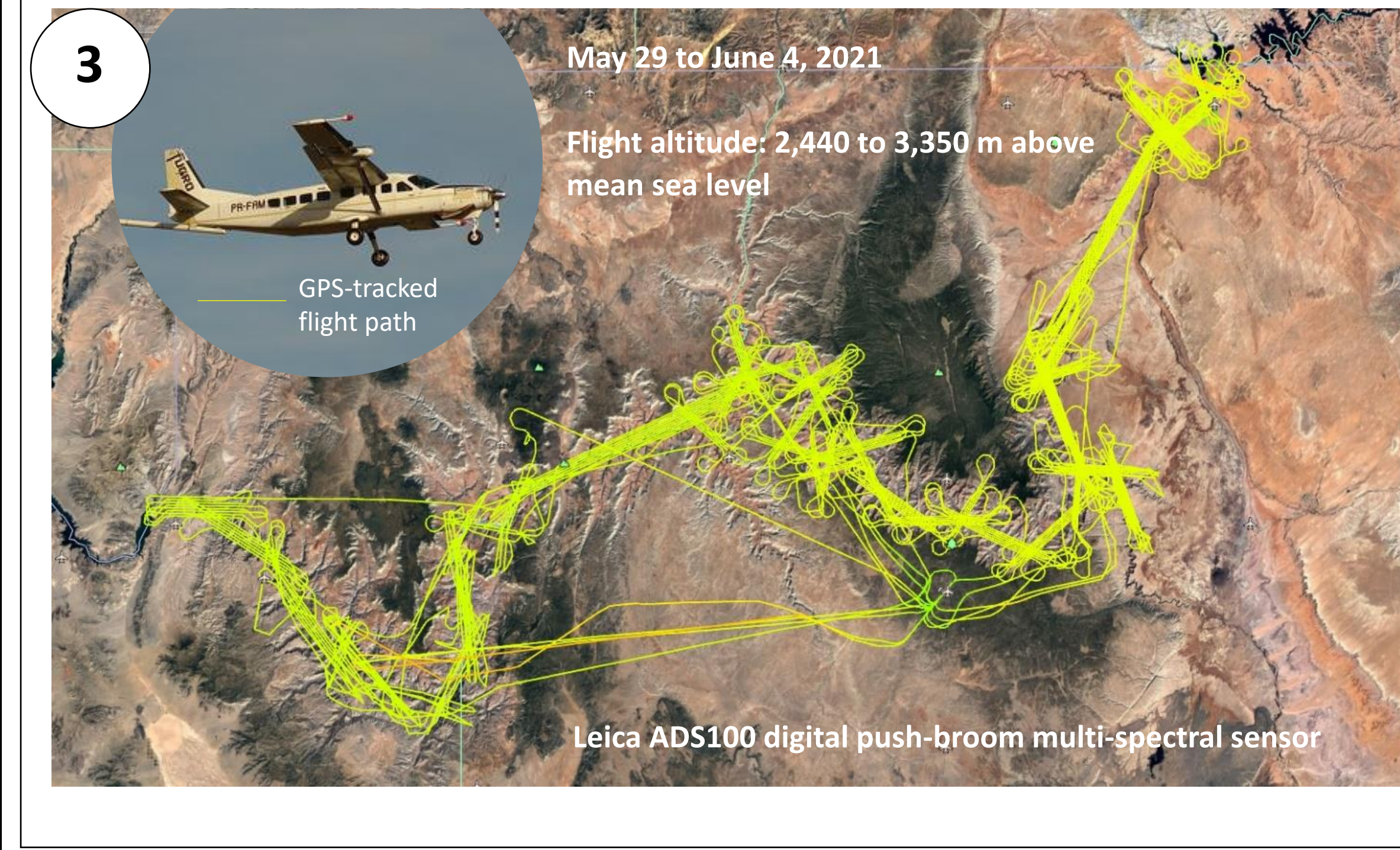
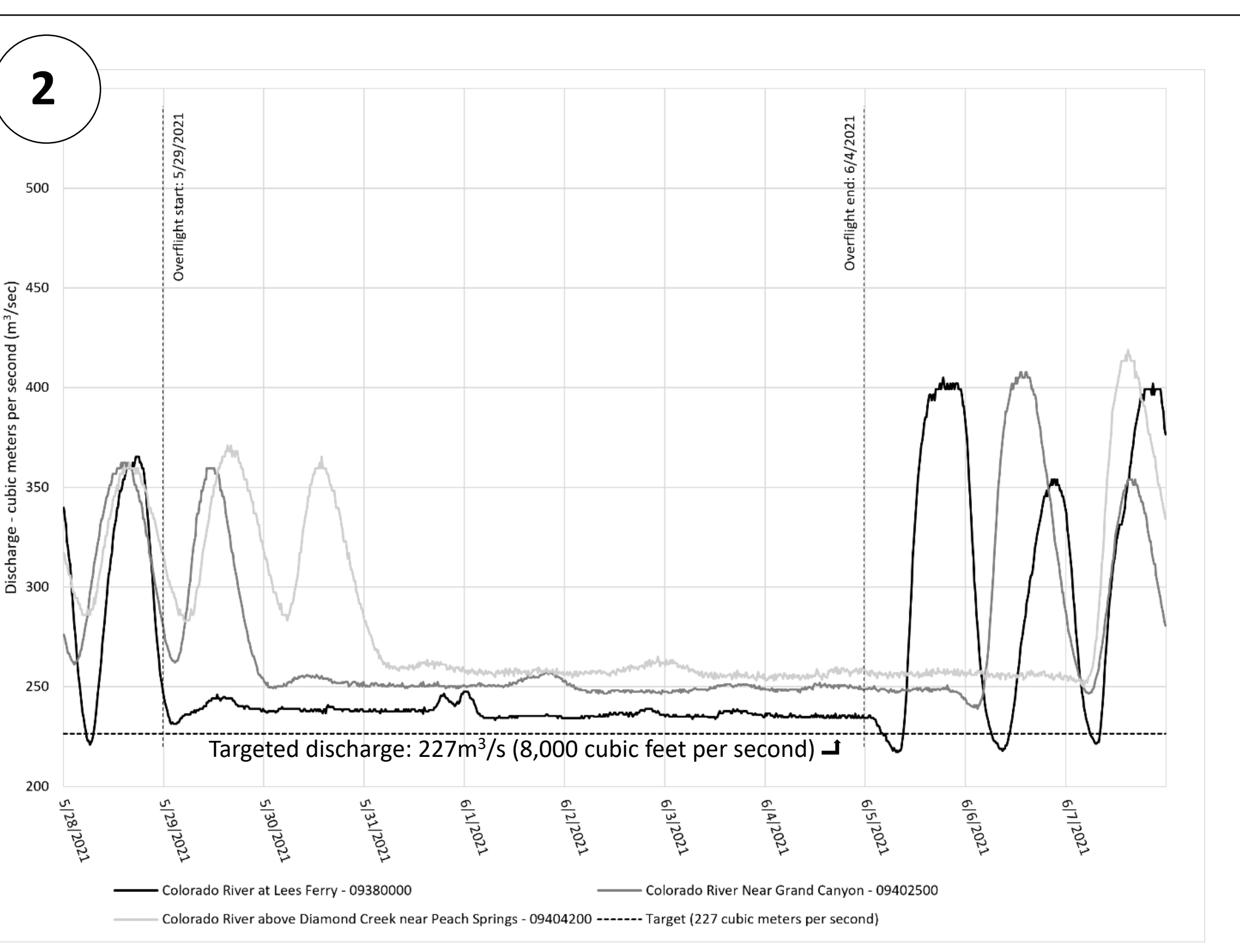
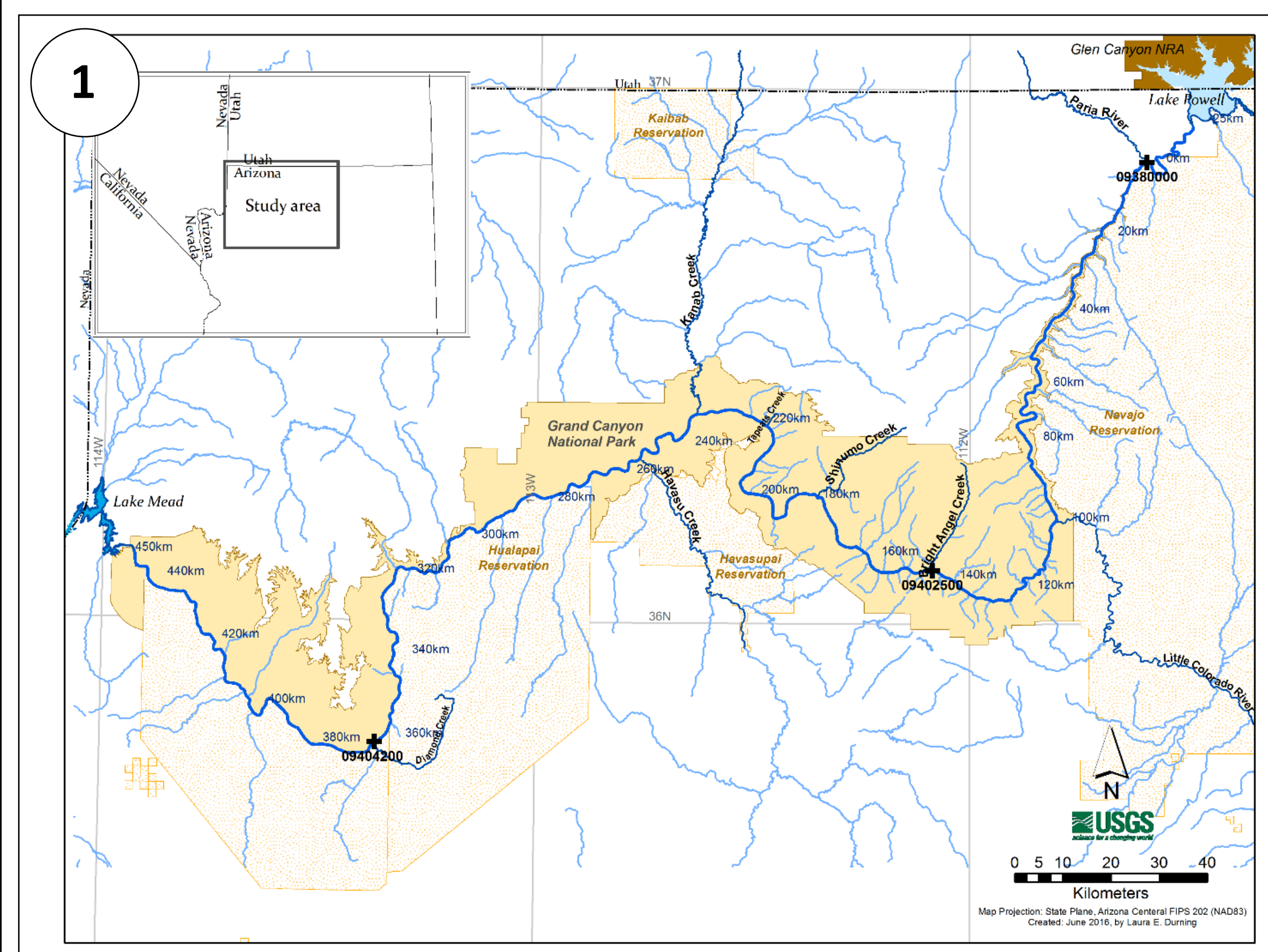
³U.S. Geological Survey Astrogeology Science Center



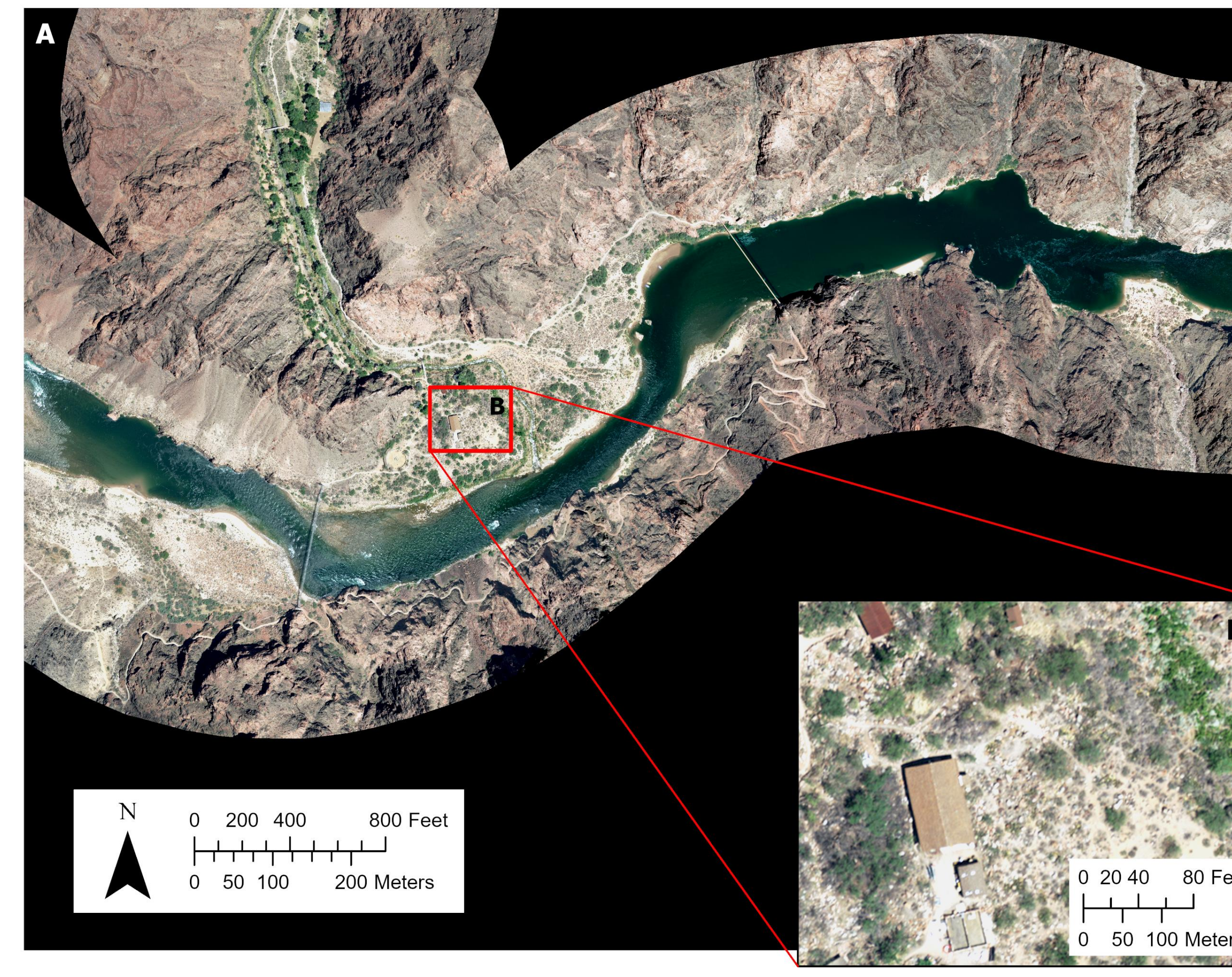
Purpose
Overflight aerial imagery is used by scientists of various backgrounds to study ecology, invasive vegetation species, or as high-resolution base maps for field maps.

Data Collection by Fugro, Inc. under contract with the USGS Grand Canyon Monitoring and Research Center

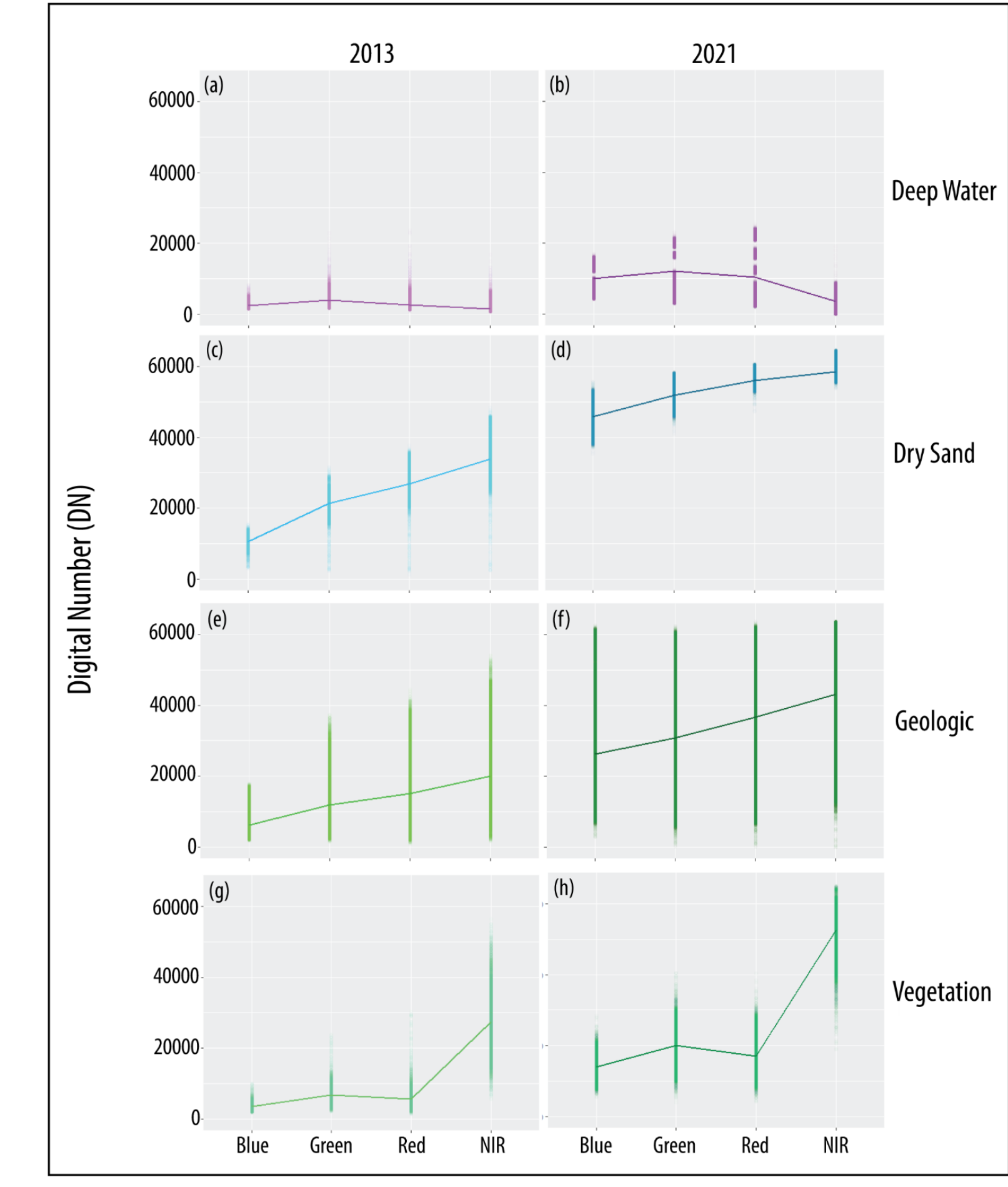
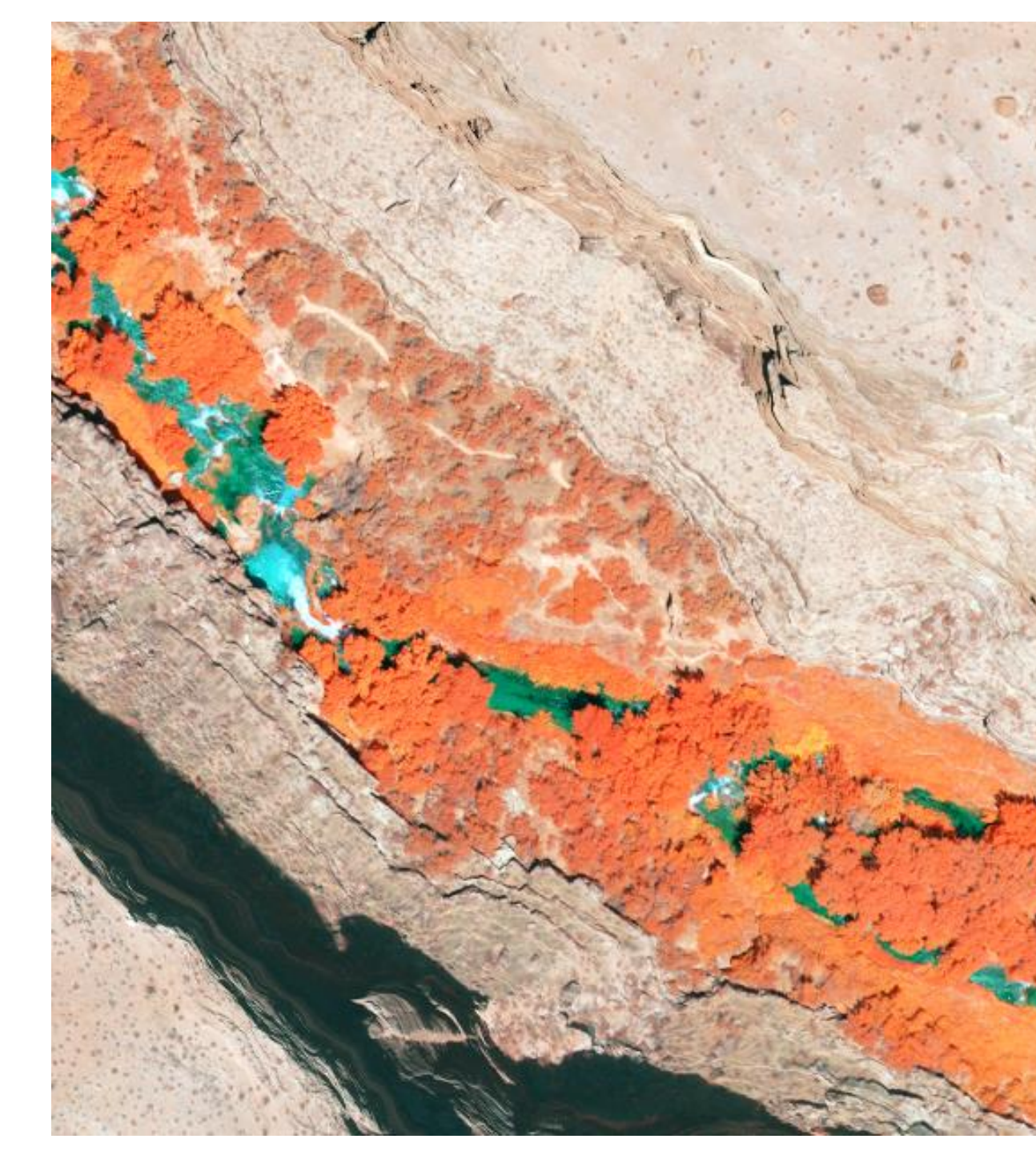
1. Collected from just upstream of Glen Canyon Dam (in Lake Powell) near Page, Arizona, downstream to Lake Mead's Pearce Ferry, Arizona, for a total length of 475 kilometers (km) at a width of about 500 meters (m) centered on the mainstem of the Colorado River and its seven primary tributaries: the Paria River, the Little Colorado River, Bright Angel Creek, Shinumo Creek, Tapeats Creek, Kanab Creek, and Havasu Creek
2. Targeted river discharge of 227 m³/s (8,000 cubic feet per second)
3. For any given section of the river corridor, five or six overlapping linear flightlines were acquired, allowing for the greatest probability of error-free and low-shadow imagery
4. Initial image orthomosaic of overlapping flightlines produced by contractor (Fugro)



Final Mosaic Specifications



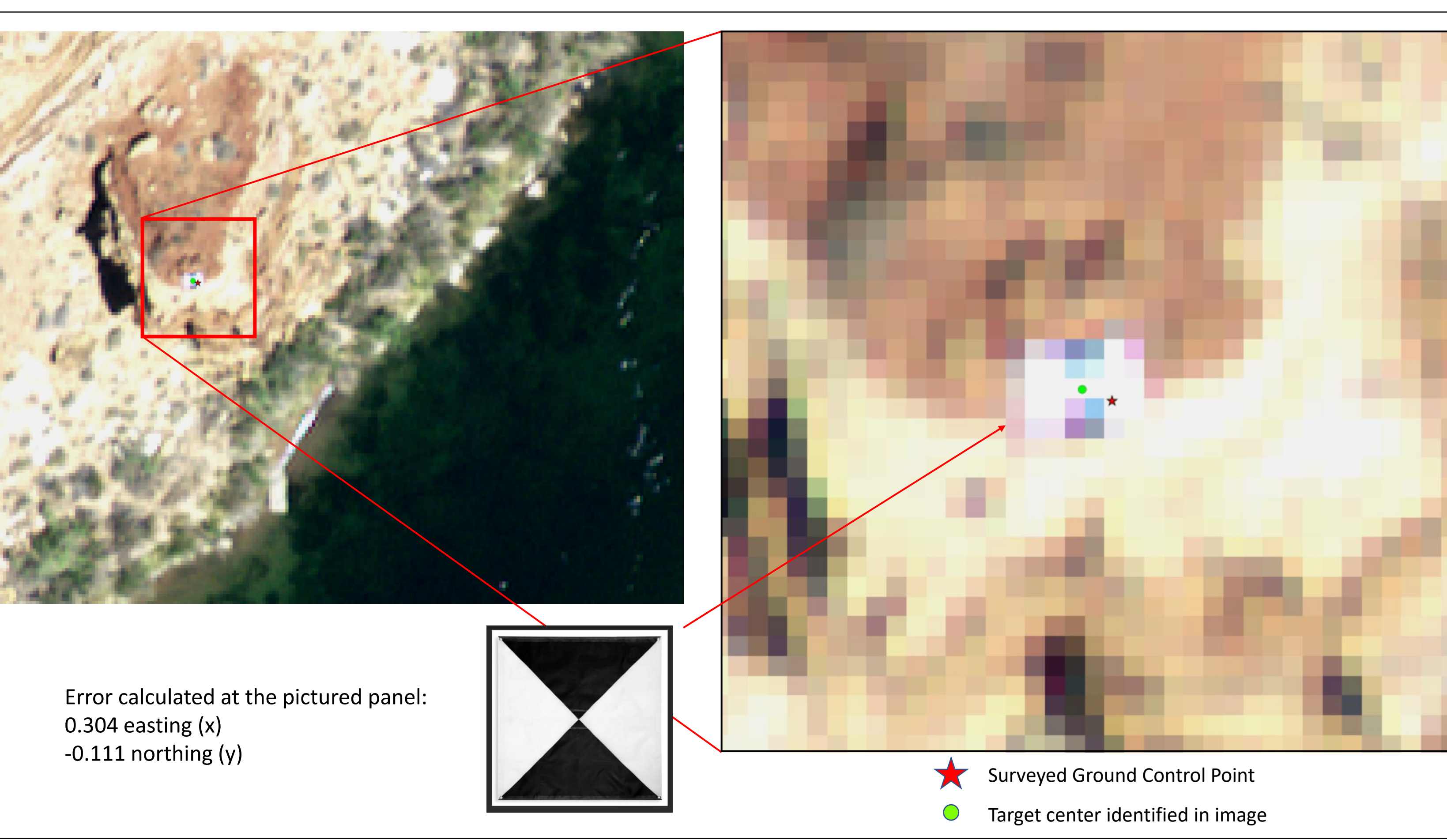
- 20 cm spatial resolution
- 4 bands (Red, Green, Blue, Near-Infrared)
- Seamless mosaic checked by GCMRC scientists for smear, shadow extent, and water clarity



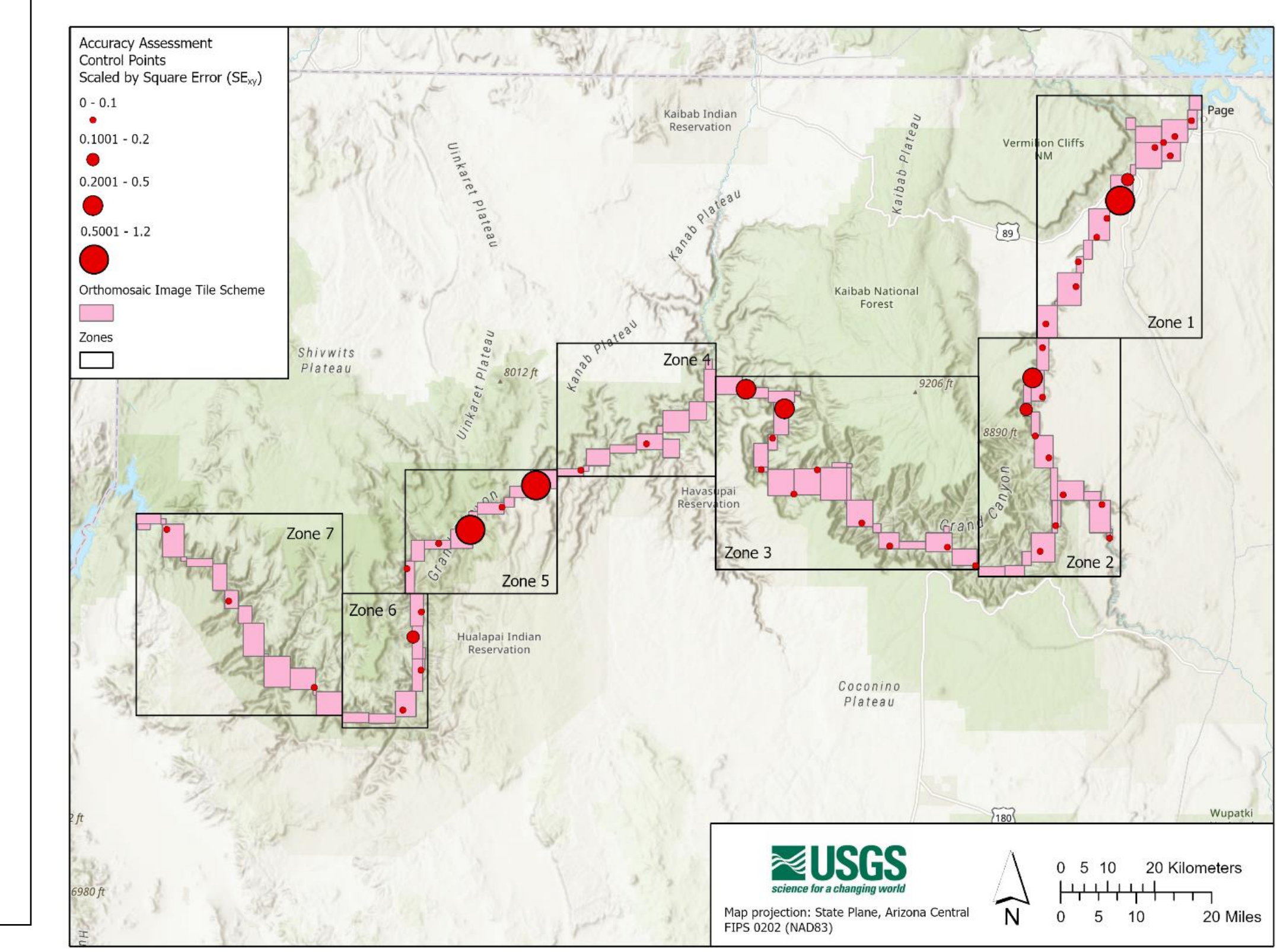
A. Imagery over Phantom Ranch, Grand Canyon National Park from final 2021 overflight mosaic
B. Zoomed view of buildings and vegetation from final 2021 overflight mosaic
Havasu Creek displayed in false color composite: red is near-infrared
Data range of 2021 imagery is greater than previous image acquisitions

Horizontal Accuracy Assessment

Calculated by finding the error between the Grand Canyon Monitoring and Research Center network of ground control points and the same points identified from target panels in the image



Ground control point sample	Horizontal accuracy at 95% confidence		
	Easting (X)	Northing (Y)	Combined (XY)
n = 47 not provided to, or used by, Fugro for mosaic development	0.408	0.416	0.514
n = 74 coincident between 2021 and 2013 image-data acquisitions (Durning and Others, 2016a, b)	0.609	0.583	0.744



USGS Edits to Initial Mosaic

✓ Reducing shadows

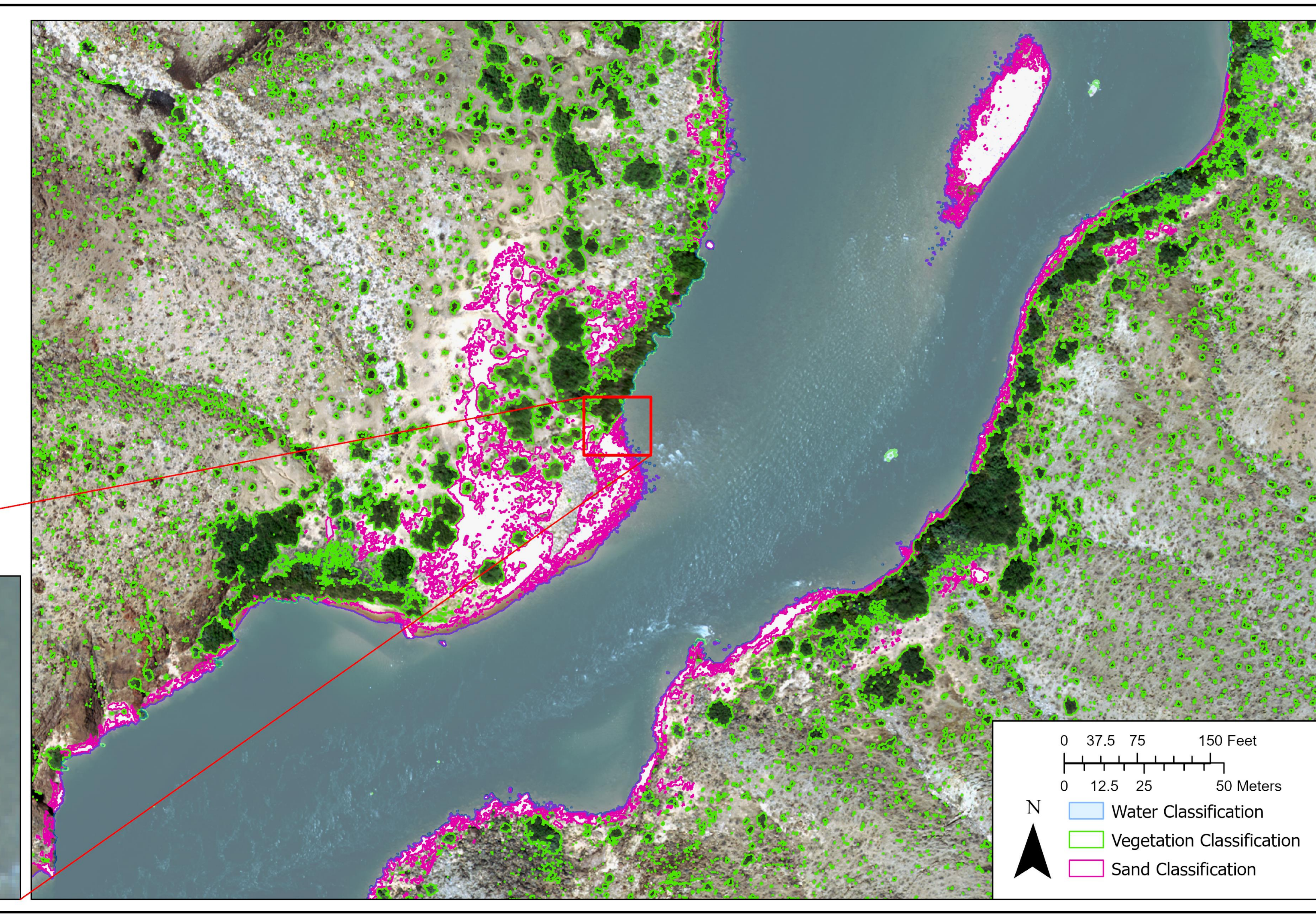
✓ Fixing vegetation "smear"

✓ Smoothing cutlines

✓ Removing geologic "ripple" effect

What Comes Next

- Imagery publication in press
 - Sankey, J.B., Bransky, N., Pigue, L., and Kohl, K., *In Prep.*, Four band image mosaic of the Colorado River corridor downstream of Glen Canyon Dam in Arizona derived from the May 2021 Airborne image acquisition: U.S. Geological Survey data release, to be published at <https://doi.org/10.5066/P9BBGN6G>.
- Science and landcover mapping
- Future Grand Canyon overflights
 - Previous, similar overflights: 2002, 2009, 2013
 - Potential future overflight: during the FY 2025-27 Triennial Work Plan



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