

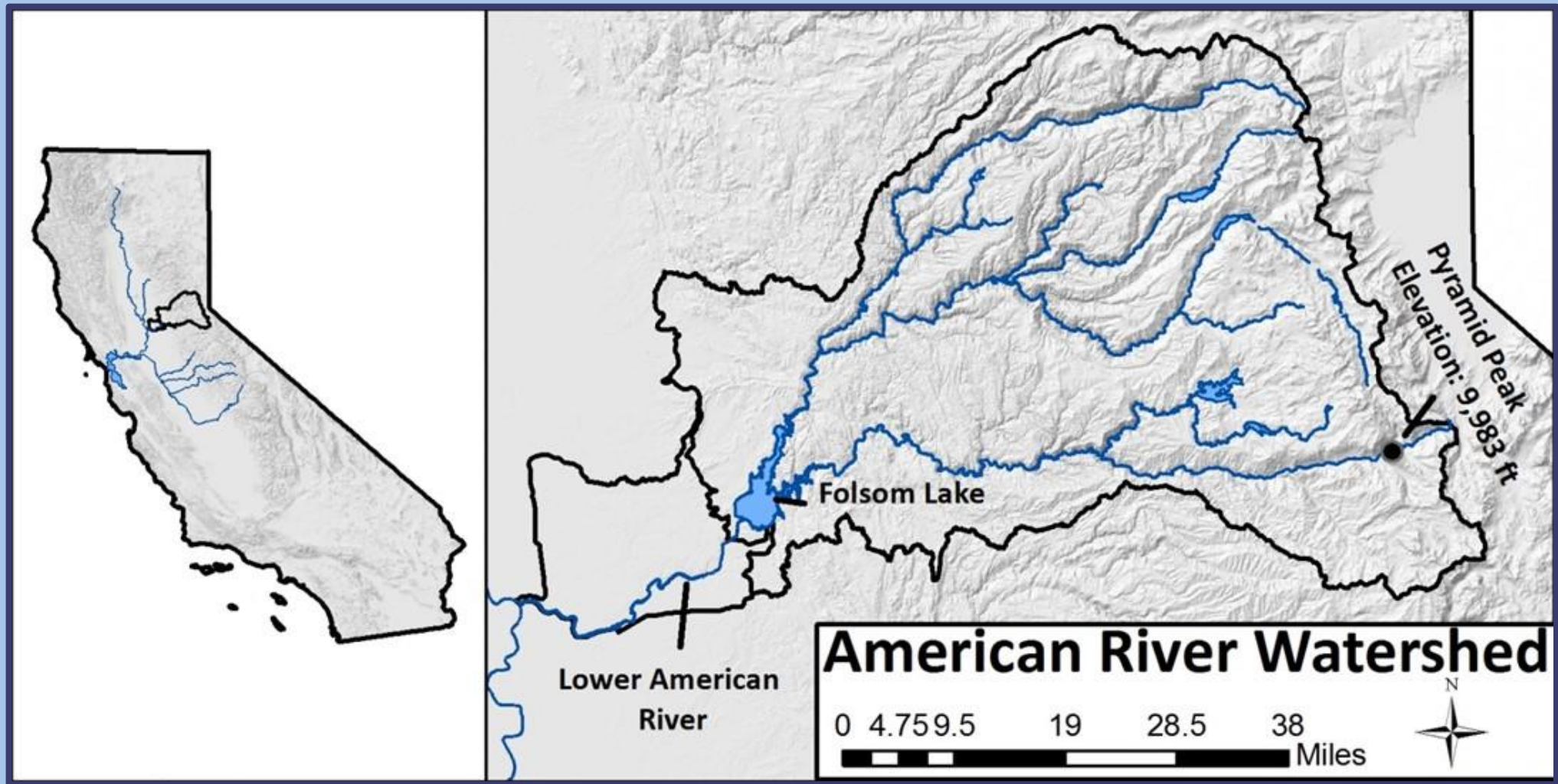
Chinook Salmon Redd Enumeration on the Lower American River using Aerial Imagery



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Digitizing redds from aerial images and using multiple readers supports robust and detailed spatial analysis and quantifies error associated with the method

BACKGROUND

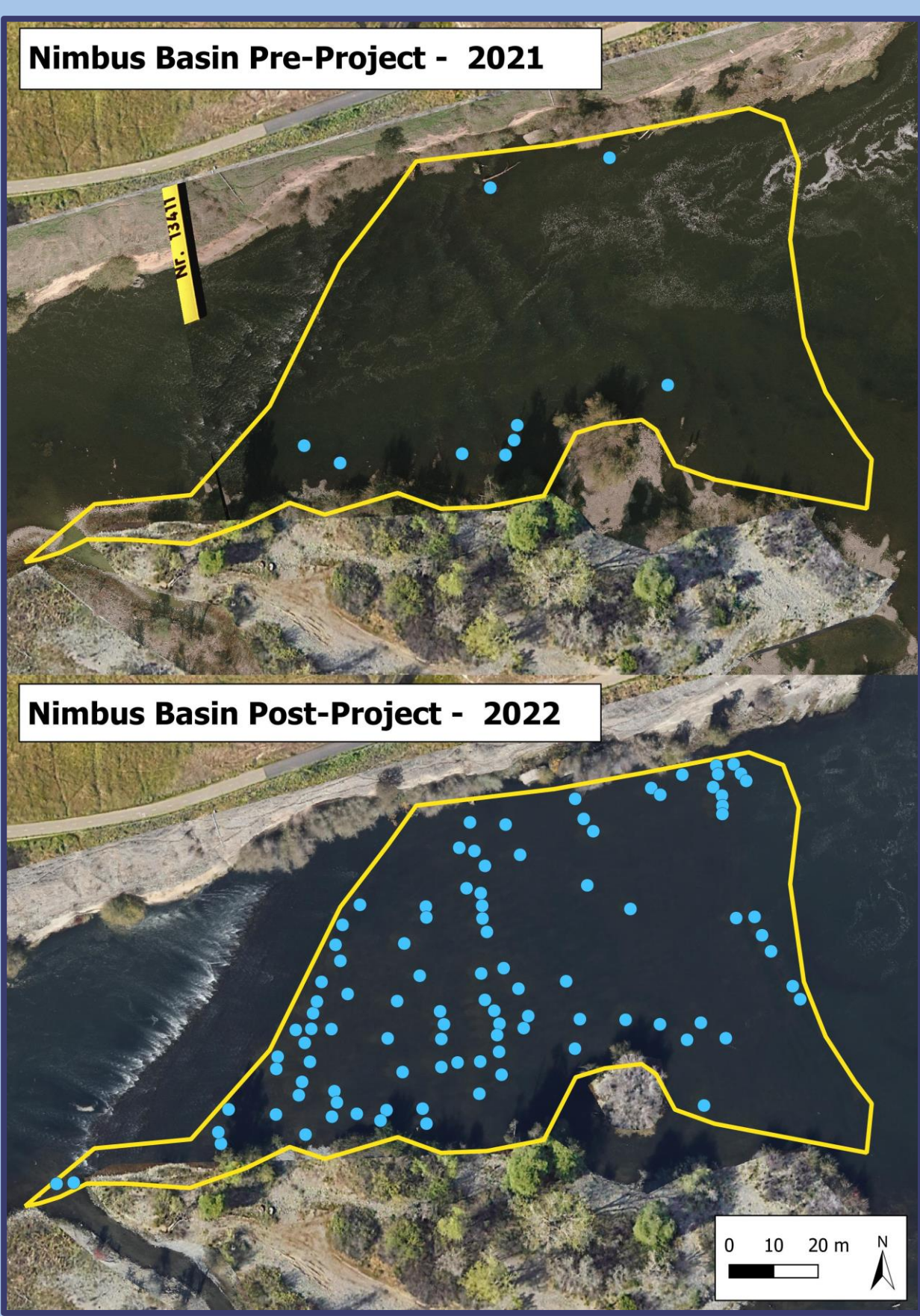


- Aerial analysis allows for whole-river quantification of Chinook Salmon redds relatively inexpensively compared to ground-based surveys



- Traditionally, on the Lower American River, a single reader has enumerated redds, and the images were not digitized in a spatial program
 - This limits the utility of the data for assessing spatial distribution of redds within restoration sites
- Redd enumeration can be subjective, particularly in areas of high-density spawning

APPLICATION

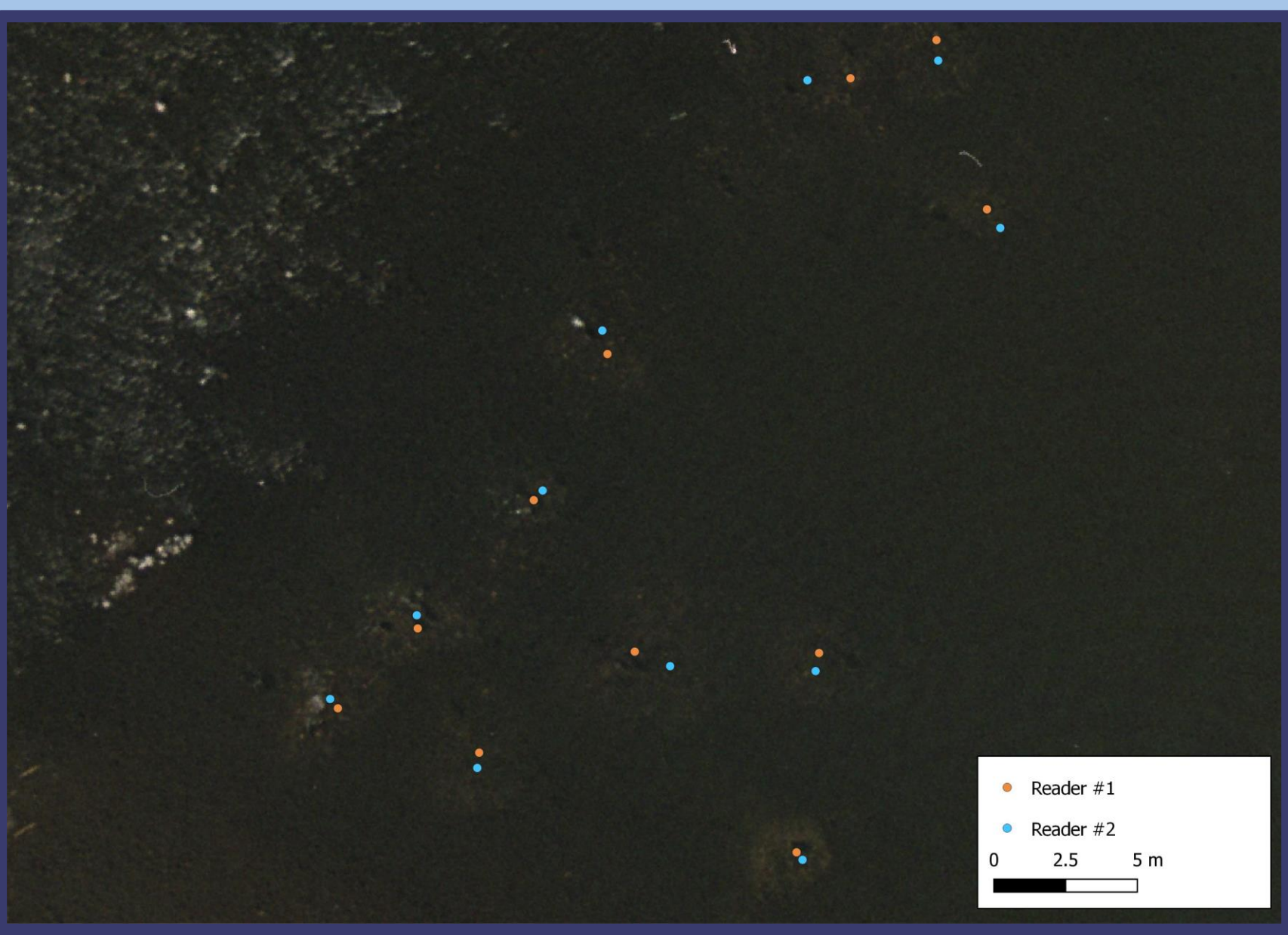


Before gravel augmentation

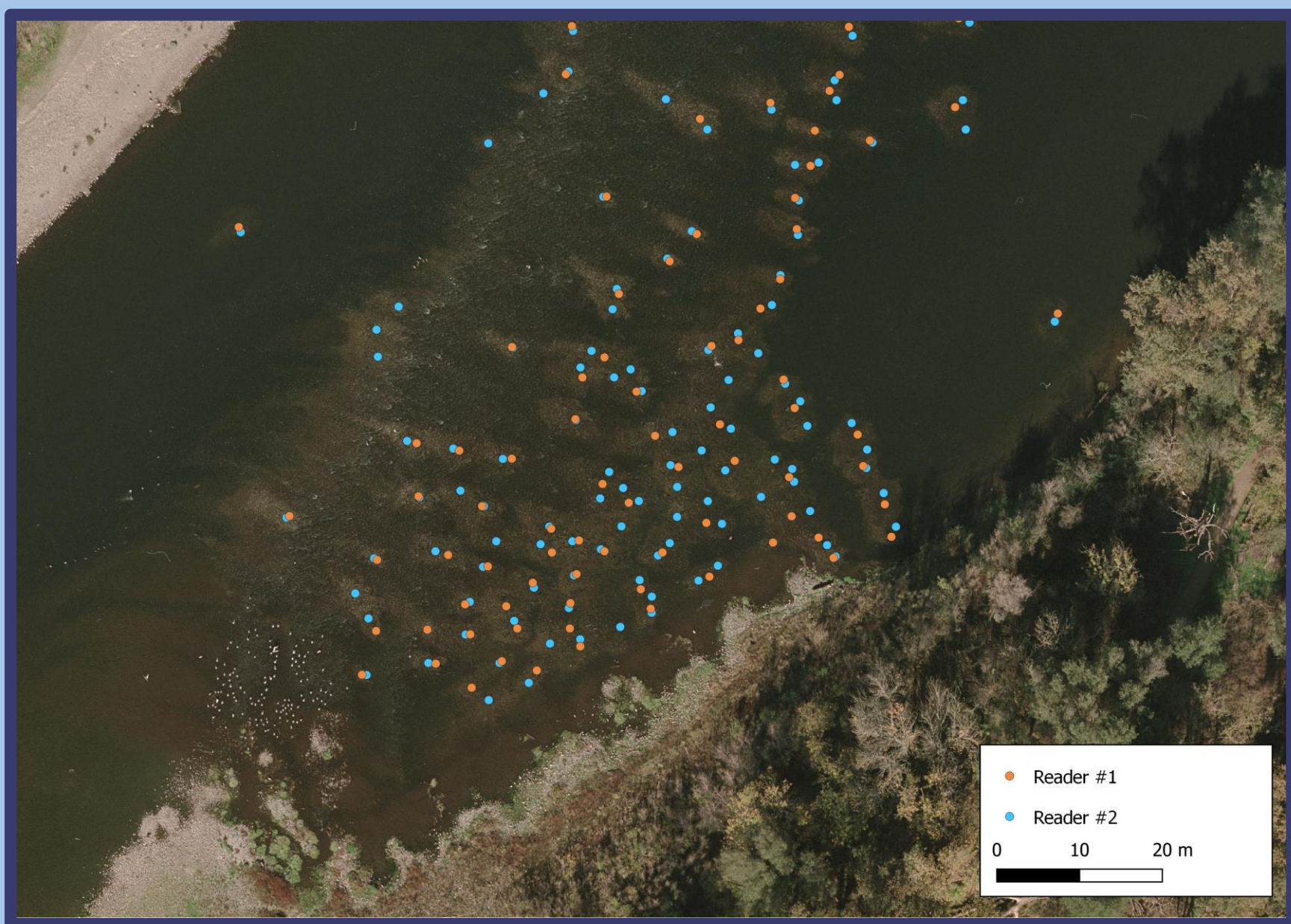
Aerial image analysis can help document effectiveness of restoration and the rate of decay of gravel augmentation sites

After gravel augmentation

Digitizing redds into shapefiles (yellow outline) can allow restoration design teams to pinpoint specific restoration features (e.g. substrate size, location, flow conditions) that functioned well to be replicated in future restoration projects



Low superimposition = high agreement among readers



High superimposition = lower agreement among readers

Site	Reader 1	Reader 2	Avg. # Redds	Percent Agreement
Upper Sunrise - main channel	23	24	23.5	96
Lower Sunrise - above side channel	94	124	109	76

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Superimposition presents a potential source of error however multiple readers allows quantification of that error for more impactful results. Training and inter-reader calibration can improve accuracy