

## Application of Unmanned Aerial Systems (UAS) for Ecological Monitoring at Reclamation

Leveraging UAS to provide a faster, cheaper solution to pest management problems

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Unmanned aerial systems (UAS) can reduce costs and improve the collection of ecological data. Potential areas of application include: aquatic and terrestrial vegetation mapping, habitat classification, wetland delineation, water sampling, and restoration evaluation. Developing innovative UAS capabilities will establish Reclamation as a leader in this emerging field.

### Mission Issue

Deploying UAS to mitigate the impact of pest organisms will improve Reclamation's ability to deliver water, produce energy, and manage critical resources.

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### Problem

Pest organisms adversely impact the delivery of water by fouling water conveyance systems and reducing the efficiency of infrastructure. UAS may provide a faster, cheaper tool for monitoring and controlling pests. Reclamation needs to understand potential applications and limitations of UAS to ecological research.

### Solution

An extensive literature review was conducted to establish a working understanding of the capabilities of UAS as applied to pest management and invasive species detection.



*Aerial view of an invasive floating weed (giant salvinia) covering a large section of Brown's Drain near Blythe, CA in September 2005. Giant salvinia infests backwaters and other areas that are not easily accessible by boat or on foot. UAS can allow environmental managers to pinpoint locations for treatment and to monitor the spread of nuisance vegetation.*

***“The best review of ecological applications for UAS that I’ve ever read.”***

Annie Quattlebaum  
Biologist  
Bureau of Reclamation

### Collaborators

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### More Information

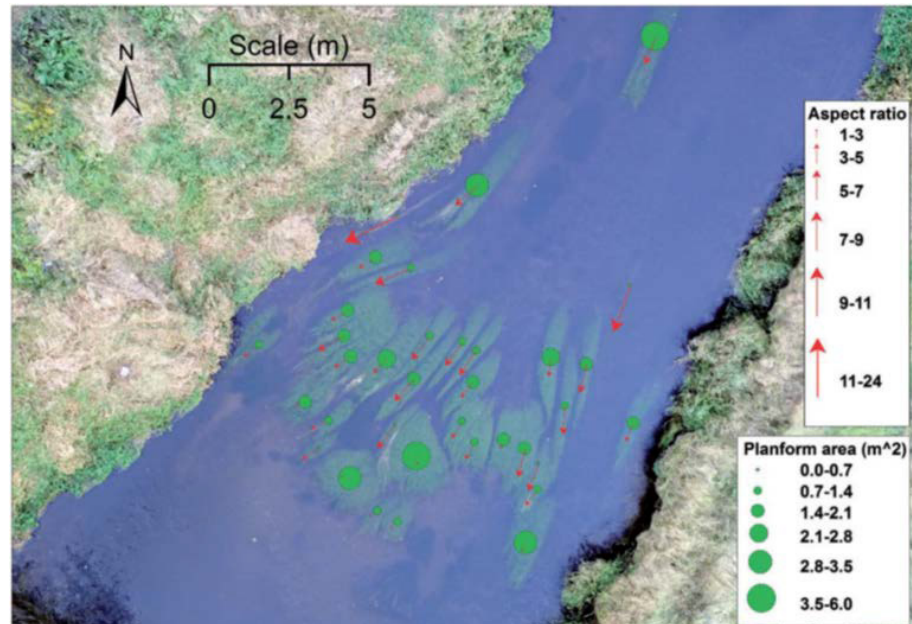
<https://www.usbr.gov/research/projects/detail.cfm?id=19012>

## Application and Results

UAS can be used for aquatic and terrestrial vegetation mapping or invasive plant monitoring. Although understory surveys are not currently feasible in complex environments, overstory habitat can be classified using current capabilities. Wetland delineation and ecosystem restoration monitoring are areas where UAS could quickly be applied and provide substantial return on investment.

## Future Plans

The Technical Service Center will pursue partnerships with area offices to incorporate UAS into new or existing ecological projects. The research team will continue to monitor emerging UAS technology to identify additional pest management applications.



*Ranunculus penicillatus* patches in the River Urie, Scotland showing flow redirection around a dense macrophyte cluster that may have caused bank erosion and changes to river morphology. From “Coupling Unmanned Aerial Vehicle (UAV) and hydraulic surveys to study the geometry and spatial distribution of aquatic macrophytes,” by H.J. Biggs et al, 2018, *Journal of Ecohydraulics*, 3(1), 45-58.