



Hydrobiology

BRISBANE | PERTH | SINGAPORE | PNG | BRAZIL

DRONE/UAV OPERATIONS

Company Overview and Capability



DRONE/UAV OPERATIONS

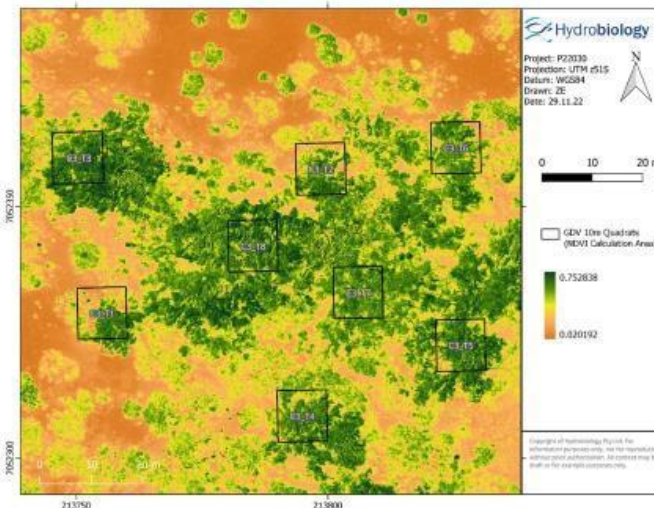
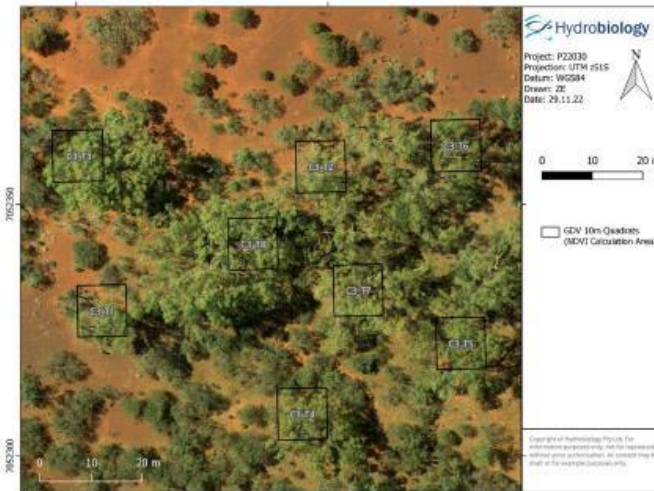
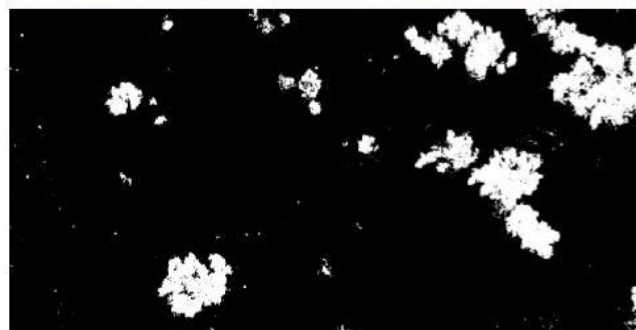
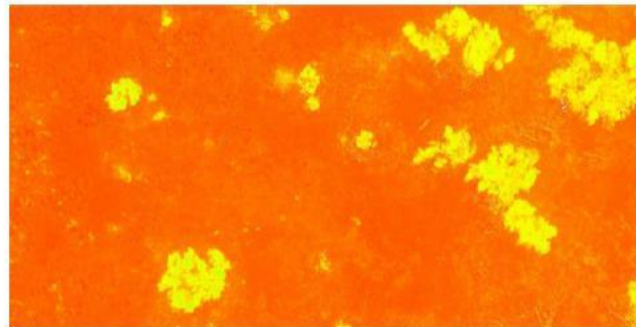
Hydrobiology is an Independently owned Environmental Consultancy established in 2001 (QLD), 2006 (WA), 2018 (Singapore) and 2022 (Brazil). We have developed niche capabilities in UAV-generated high resolution RTK-fixed georeferenced 3D Models, point clouds, Digital Surface Models (DSMs), 2D orthomosaics and high-resolution multispectral outputs. These have been used to calculate metrics commonly used in coastal, estuarine, riverine and terrestrial monitoring around the world, including:

- Water quality, discharge and plume monitoring
- Ecological and geomorphic habitat mapping
- Time series habitat monitoring
- Rehabilitation success analysis
- Multispectral biodiversity, terrestrial monitoring and Vegetation vigour
- Wetland establishment, mapping and health assessment
- Change analysis

Hydrobiology operates under CASA (Australia) and CAAS (Singapore) regulations and holds a Remotely Piloted Aircraft Operators Certificate for commercial operations in Australia (CASA.ReOC.7948).



CASE STUDY



Tecticornia/GDV assessments – Goldfields WA
Hydrobiology completed a series of annual multispectral UAV missions for Groundwater Dependent Vegetation at a potash resource in the Goldfields of Western Australia.

The objective was to use NDVI to define living and non-living vegetation cover and compare this with individual Plant Health Condition obtained during the field surveys to determine an appropriate cut-off NDVI value. To refine the cut-off value, NDVI imagery was reviewed in conjunction with high-resolution orthomosaic (true colour) imagery to determine the value that distinguished living plants from dead plants, bare soil and grasses.

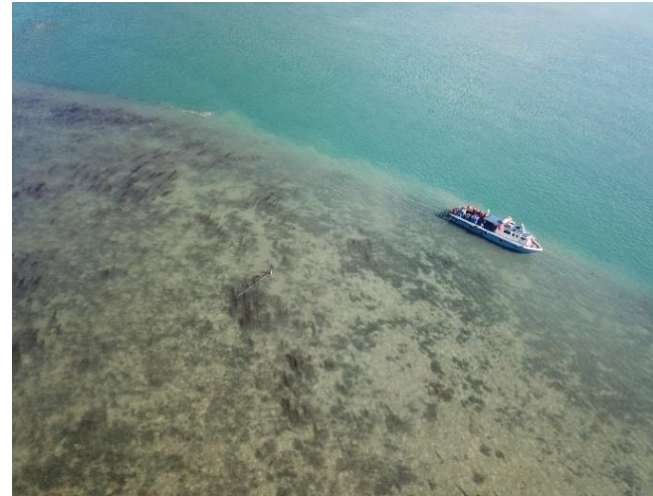
CASE STUDY

Mapping of marine coastal habitats and shoreline types, Singapore

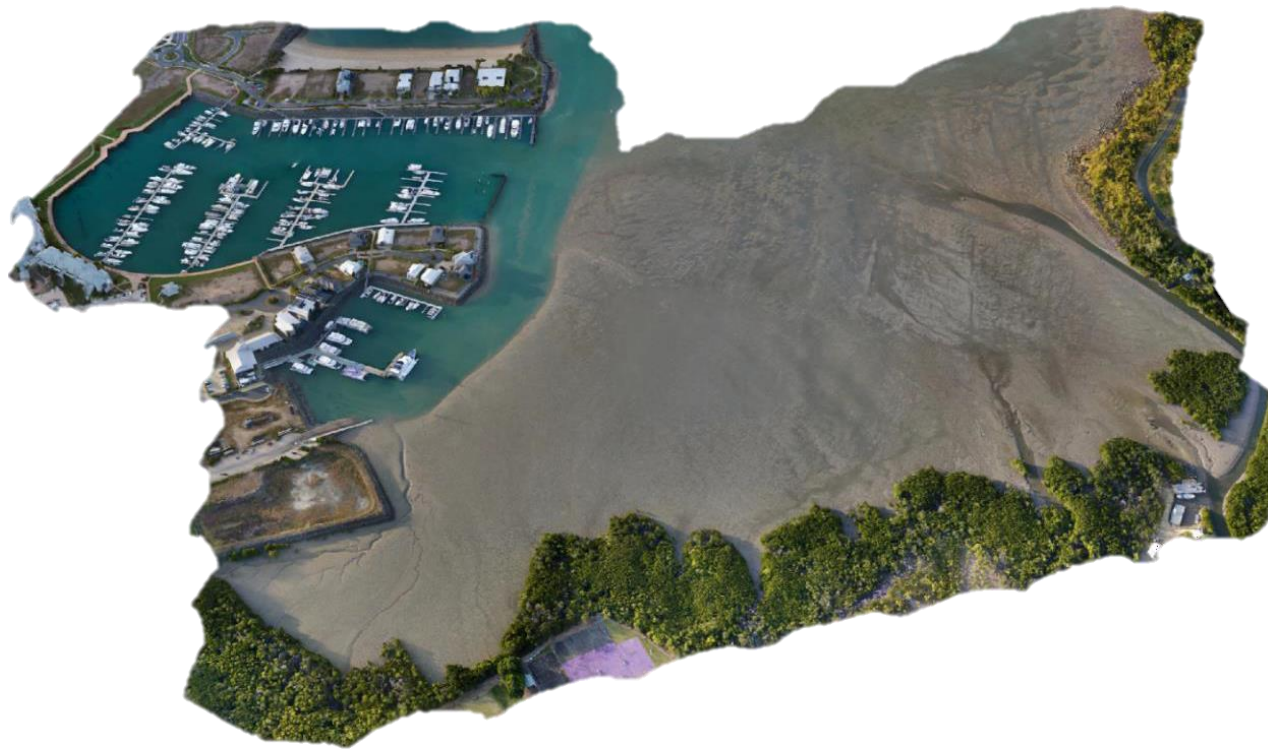
Hydrobiology completed a project for the National Parks Board to produce updated maps of the coastal and marine habitats and shoreline types in Singapore waters.

Coastline habitat and shoreline type mapping were based on analysis of satellite imagery and bathymetry data, followed by ground-truthing efforts for validation.

Ground truthing includes benthic habitat mapping, mangrove mapping, and monitoring coral reef patches using drones and 'on foot' intertidal surveys around the coast of Singapore.



CASE STUDY

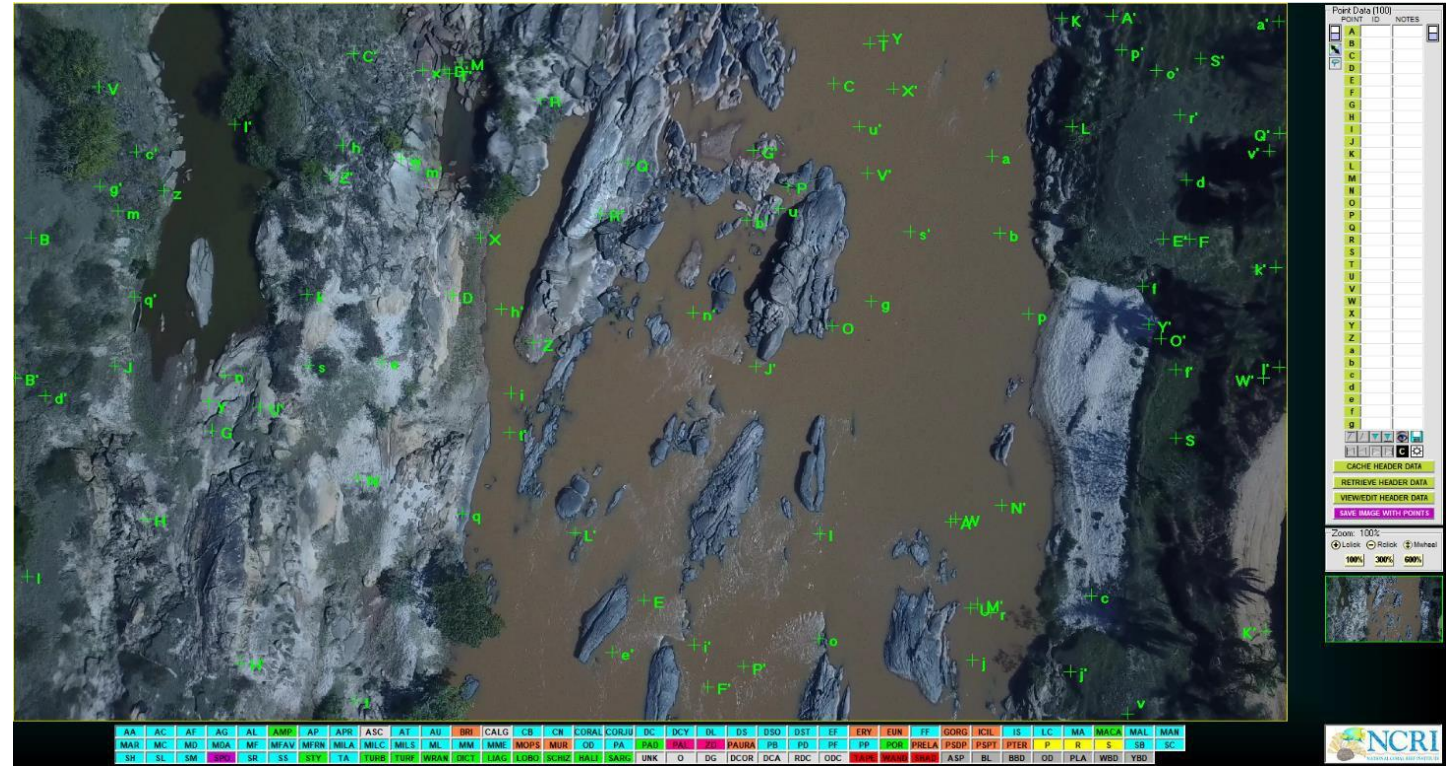


Port of Airlie, QLD Maintenance Dredging
Hydrobiology undertook environmental specialist support to determine whether there would be sufficient capacity in a dredge handling area if a portion is converted permanently to another land use. As part of the investigations, this included a high-resolution drone survey to acquire multispectral imagery of the surrounding environment and generation of RTK-fixed georeferenced 3D Models, point clouds and Digital Surface Models (DSMs) for cut and fill analysis of the dredge area using the software ESRI ArcGIS Pro. A Phantom 4 Multispectral drone was used with inbuilt RTK, to fix the images resulting in an overall georeferencing Root Mean Square Error (RMSE) of 1 – 1.5 cm.

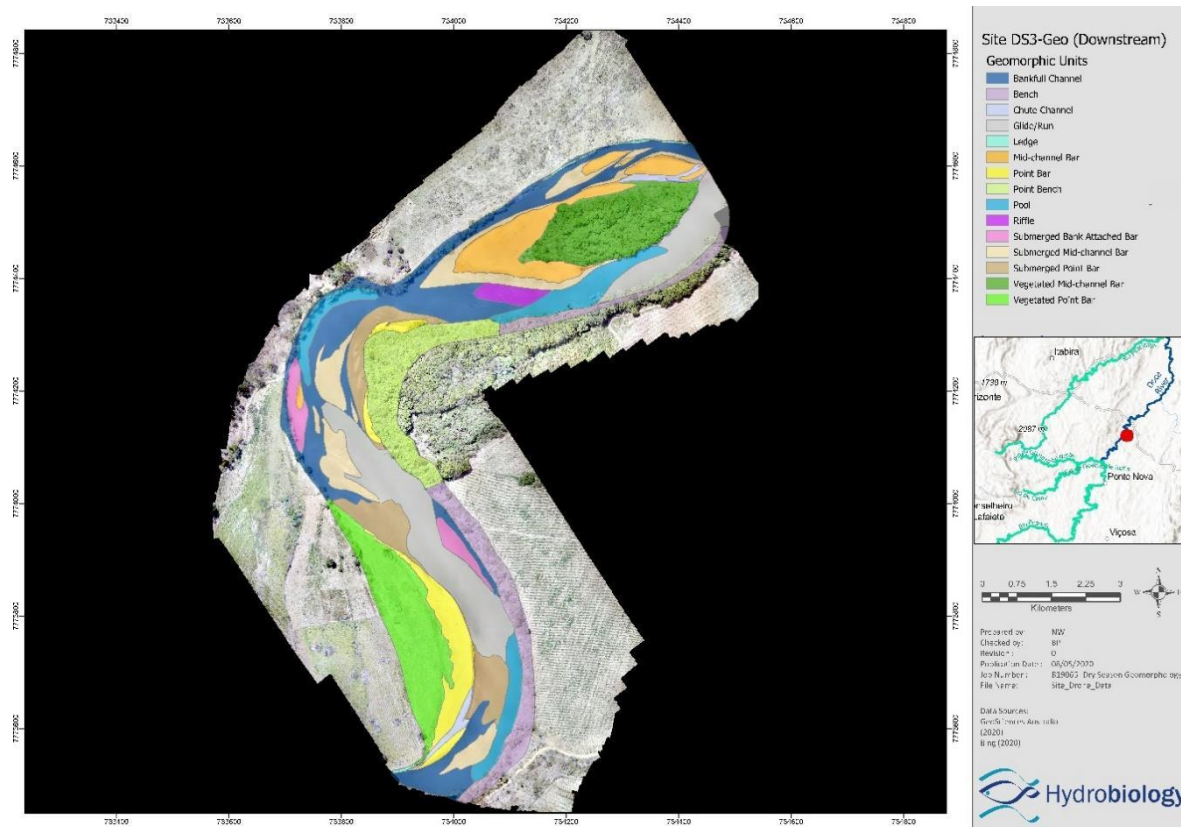
CASE STUDY

Environmental and Social Impact Assessment for Sepon Gold Mine, Laos

Drone-based aerial imagery acquisition was undertaken for Sepon Gold Mine in Laos. The imagery was georeferenced using the in-built drone GPS then uploaded to a GIS. The acquired imagery was then analysed using GIS tools to characterize riparian vegetation communities (e.g. grass, tree, shrub, virgin forest, secondary growth forest) and to map aquatic habitat types (e.g. riffles, run, pools, rock, bars, benches, etc.). The results were used to inform the habitat and geomorphology components of an ongoing ESIA



CASE STUDY



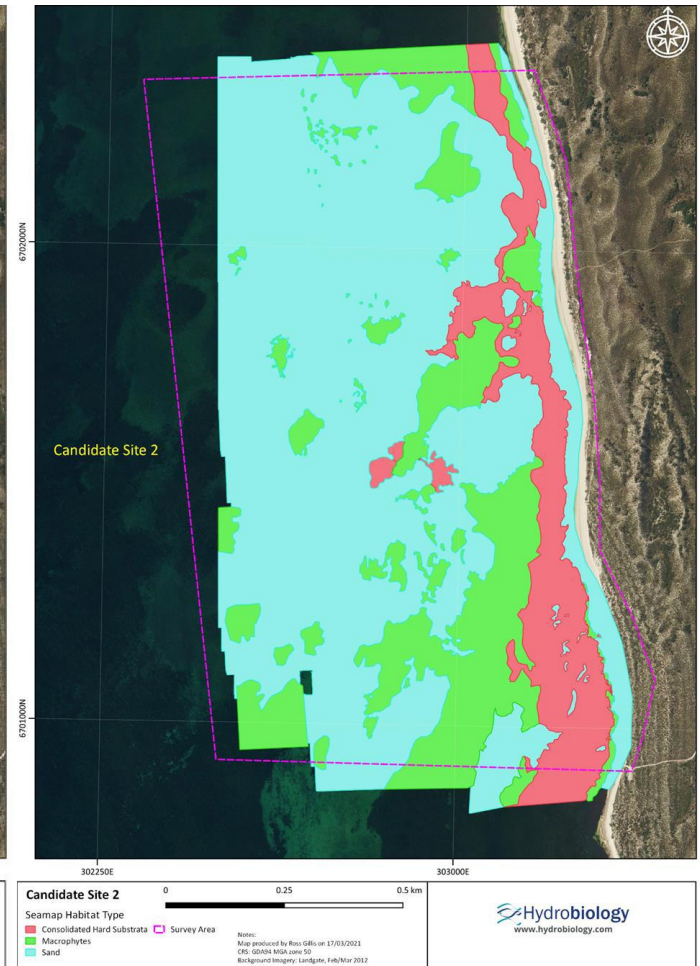
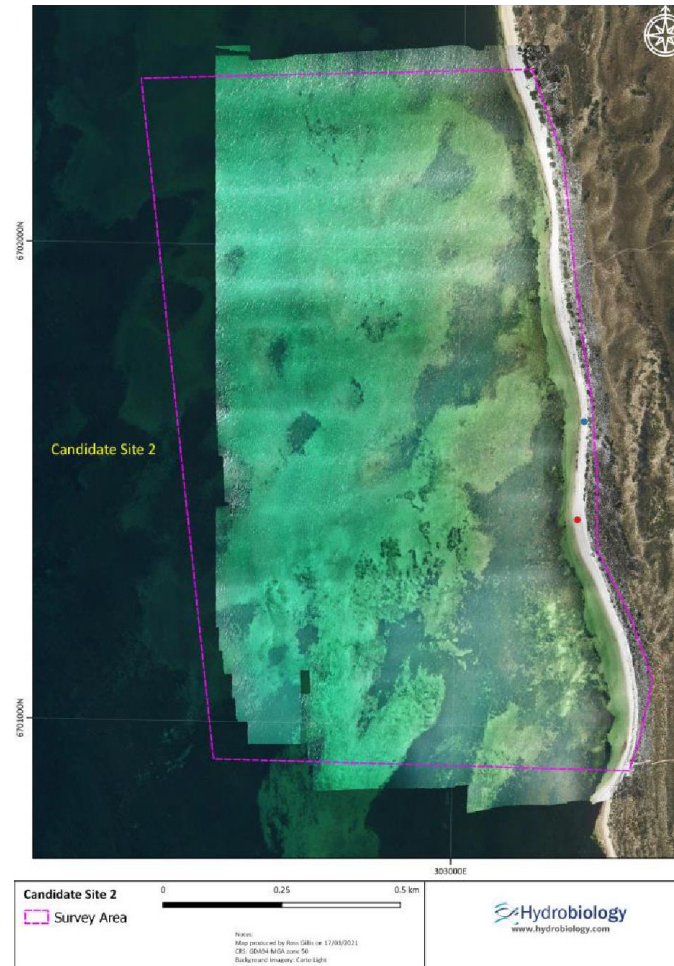
Monitoring Geomorphic Recovery in Doce River, Brazil

Since 2018, Hydrobiology has been conducting periodic geomorphic monitoring for the upper catchment of the Doce River in Brazil. In addition to geomorphic condition assessments, this has included the mapping of geomorphic habitat diversity using high-resolution drone generated orthomosaics to measure changes to and recovery of geomorphic habitat through time. A DJI Mavic Pro drone was used to capture aerial imagery at each of the field sites. Geomorphic recovery. The high-resolution georeferenced drone outputs allow for repeat accurate measurement and comparison of habitat geomorphic units in subsequent surveys.

CASE STUDY

Coastal habitat mapping – Midwest WA

Hydrobiology completed a VLOS survey of marine coastal habitat (500 – 750m offshore) at multiple locations between Leeman and Dongara. Over 500 hectares of nearshore habitat was mapped, which informed the design of more targeted in-field survey. The imagery was processed using DroneDeploy software where a point cloud approach was applied to stitch together and geo-rectify a photographic orthomosaic. Following the processing stage, dominant habitat types were mapped by a marine ecologist using the Seamap Australia Classification Scheme

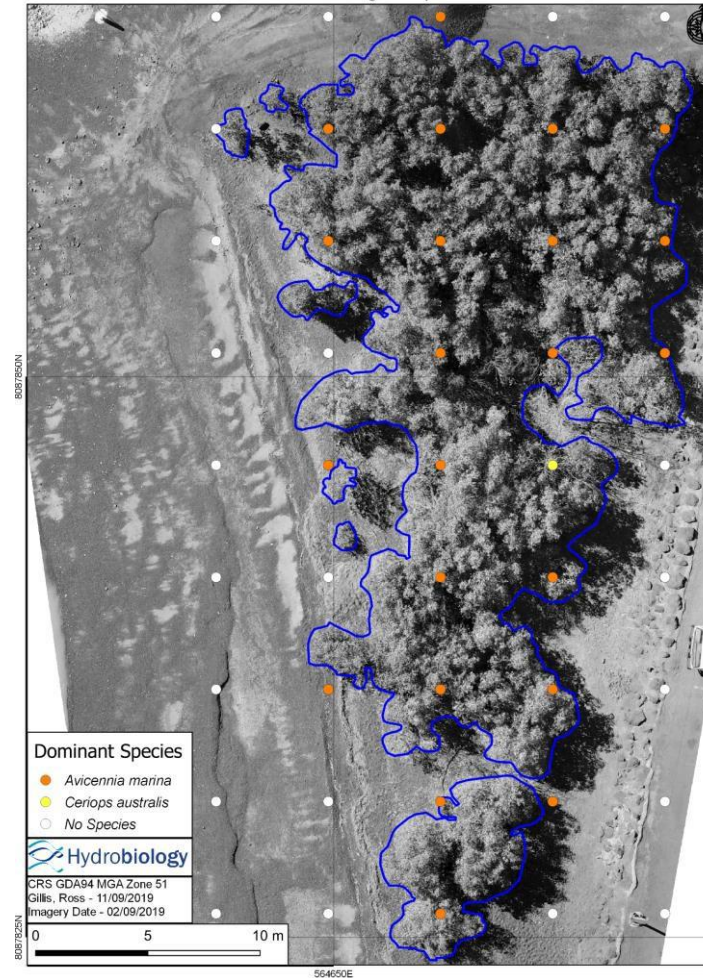


CASE STUDY

Mangrove Study Area



Dominant Mangrove Species



Mangrove Habitat Assessment – Derby WA
Hydrobiology completed an aerial imaging survey of mangrove habitat at Derby wharf and barge landing areas with species and health parameters ground truthed by in-field survey methods.

Aerial imagery and canopy height were acquired using a Mavic Pro Platinum Unmanned Aerial Vehicle (UAV) which produced high quality imagery (1 cm per pixel) and topography (4.6 cm per pixel) for mapping and analysis purposes.



PROJECT EXPERIENCE

Location	Client	Year	Summary
Laos	LXML, Sepon Gold Mine	2017	Drone-based aerial imagery acquisition was undertaken for Sepon Gold Mine in Laos to inform the habitat and geomorphology components of an ongoing ESIA
Brazil	BHP	2018	Geomorphic monitoring for the upper catchment of the Doce River in Brazil including the mapping of geomorphic habitat diversity using high-resolution drone generated orthomosaics to measure changes to and recovery of geomorphic habitat through time.
Singapore	National Parks Board	2019	Mapping of Mandai Mangrove & Mudflat Nature Park and Pulau Seamakau (~150 ha) as part of ground truthing efforts for mapping the coastal and marine habitats for Singapore.
Derby, WA	MGX	2019	In-situ species identification and UAV photographic surveying was performed to record the key floristic and spatial characteristics of a mangrove outcrop at Derby barge ramp.
Singapore	National Environmental Agency	2020	Mapping of mangrove species into three major mangrove types within the Sungei Buloh Wetland Reserve to provide baseline information for the construction of a waste recycling facility with treated waste discharge. Hectares mapped: ~40ha
Dongara/Leeman, WA	ILUKA	2021	Preliminary benthic habitat mapping (seagrass) at 4 near shore sites.
Lake Way, WA	SO4	2021	Groundwater dependent vegetation monitoring as part of implementation of the site GDV Management Plan. Drone surveys with tree-health ground-truthing across six sites in impact and control areas. Multispectral vegetation health indices generation and assessment against management triggers.
Cape Flattery, QLD	Metallica Minerals	2021	Multispectral drone flight for intertidal habitat mapping
Airlie Beach, QLD	Port of Airlie	2021	Multispectral drone flight for intertidal habitat mapping
Stanthorpe, QLD	Various Landowners	2022	RTK Drone flight over several reaches of watercourses on farm land to map watercourses upstream and downstream of proposed farm dams for the purpose of understanding fish passage issues 100 ha
Brazil	BHP	2022	RTK Drone flight of 22 locations along a 100km length of river to map geomorphic habitat and features to understand river recovery following a mining tailings spill. 260 ha
Singapore	Shell Eastern Petroleum Pte Ltd	2022	Coastal and habitat mapping of Shell-owned facility around Pulau Bukom and the surrounding reef patches as part of biodiversity baseline study initiated by Shell Hectares mapped: ~16km (since its coastline)
Brisbane, QLD	Kokoda Property	2023	Mangrove vegetation vigour and mapping along Brisbane River bank
Brazil	BHP	2017 – 2023	Surificial habitat mapping across three rivers, feature detection for change analysis
Wagin, WA	Water Corporation	2020-2021	Drone capture of photogrammetric digital elevation model in June 2021 of overland flow area as a high-resolution DEM (RTK – multispectral). NDVI analysis of surrounding vegetation.
Iron Bridge, WA	FMG	2020-21	Mapping and photogrammetry of various river pools around the site. Routine baseline monitoring.
NSW	Rous County Council	2021 - 2023	RTK Drone flight over a 22km reach of river to provide a DSM and high resolution imagery of the river to inform river rehabilitation measures. 220 ha
Jacobs Well	Horizon Shores Marina	2022 - 2023	Coastal vegetation vigour and health monitoring as part of site-wide EMP

GET IN TOUCH WITH THE TEAM



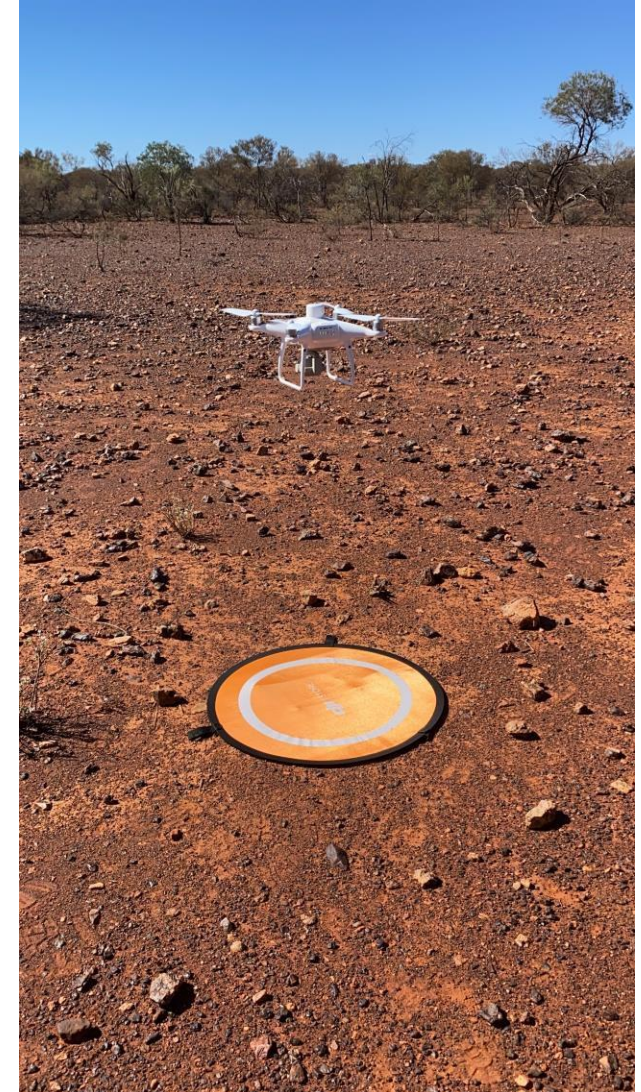
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ENVIRONMENT | SCIENCE | KNOWLEDGE



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