Franklin Vale Catchment

Condition Assessment

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For:

Ipswich City Council to inform the Franklin Vale Creek Catchment Initiative

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Contents

1. Introduction

1.1 Context

The Franklin Vale catchment is a small catchment (~138 km^2) approximately 35 km south-west of Ipswich in south-east Queensland. Franklin Vale Creek drains into the Bremer River (via Western Creek) which, in turn, is a tributary of the Brisbane River. The catchment has a small community of landholders and supports a range of land uses including grazing, cropping, forestry and conservation. Significant vegetation clearing has occurred in the catchment since it was settled by Europeans in the mid 1800s. A lack of vegetation, especially in riparian areas, in combination with steep slopes and grazing pressure have been associated with bank instability and erosion in the catchment's waterways, as well as gully erosion in the broader catchment (Alluvium, 2014a, b). While instability of sediments in the catchment was identified as being high compared to other catchments within the Ipswich City Council (Council) area, such instability is unlikely to be major contributor to sediment loads in the lower Bremer River (Alluvium, 2014a, b).

To address concerns associated with the degradation of water quality and the ecological values of the Franklin Vale catchment and its receiving waters, as well as the catchment's agricultural productivity, Ipswich City Council (Council) has established the *Franklin Vale Creek Catchment Initiative*. This programme seeks to enhance and restore the ecological condition of the Franklin Vale Creek and its catchment by working with landholders to mitigate threats, and rehabilitate and renew degraded areas through the implementation of on-ground actions (e.g., revegetation). The Initiative is funded by Council's stormwater quality offsets scheme.

In late 2020, Council engaged a project team from the Australian Rivers Institute at Griffith University to develop a catchment restoration plan to inform the design and development of the *Franklin Vale Creek Catchment Initiative*.

1.2 Purpose

The main purpose of the Franklin Vale catchment restoration plan is to support decision-making regarding the selection, prioritisation and implementation of restoration actions in the Franklin Vale catchment. More specifically, the aims of the plan are to:

- synthesise existing knowledge concerning the ecology of the Franklin Vale catchment;
- assess current ecological conditions of the Franklin Vale catchment, including its key values and threats to these;
- provide a strategic plan for prioritising on-ground actions; and
- identify monitoring and evaluation needs to assess the effectiveness of these interventions and guide future adaptive management.

1.3 Approach

To develop a catchment restoration plan for the Franklin Vale catchment, three work packages were completed as follows.

1. *Catchment condition assessment:*
    - compilation of an information log for the catchment
    - synthesis of available relevant knowledge
    - an evaluation of key ecological values of the catchment
    - an assessment of the major risks and vulnerabilities facing the catchment

2. *Strategic Plan development:*
    - co-design of restoration objectives for the Franklin Vale catchment
    - compilation of a catalogue of potential on-ground interventions
    - identification of priority actions to address restoration goals

3. *Monitoring and Evaluation guidelines:*
    - design and testing of rapid field condition assessment methods
    - intervention monitoring methodology
    - water quality monitoring protocols
    - longer-term catchment-scale condition monitoring and evaluation

To support the development of this catchment restoration plan, thorough searches of published and unpublished literature were conducted and existing sources of relevant regional data (e.g., LiDAR, satellite imagery, regional ecosystem mapping) were identified. This knowledge was then synthesised and analysed to describe the status of key catchment components with respect to five themes (land, water, plants, animals and people) and to identify appropriate restoration approaches. A comprehensive information log is provided in Appendix 1. Detailed methods of the spatial data analysis are provided in Appendix 2.

Additionally, field surveys were conducted at 30 sites along Franklin Vale Creek and main tributaries to provide a rapid condition assessment of these waterways including bank condition and erosion, riparian vegetation cover and condition (including exotic species), water quality and stream condition (sedimentation, aquatic vegetation), animal habitat (instream and terrestrial) and infrastructure. Detailed methods are provided in Appendix 3.

Two community workshops were also held during the project, to ascertain community values and collate local knowledge regarding the condition of the catchment and its vulnerability, as well as ascertain the level of interest and support for various management approaches. A summary of each event is provided in Appendix 4.

This project was initially designed during the 2020 Covid-19 lockdown period. Consequently, neither field work nor face-to-face community events were included in the budget or timeline, but were conducted as the opportunity arose.

1.4 Structure of this document

This document presents the outputs of the first work package – the catchment condition assessment. A brief overview of the catchment is presented, initially including a classification of major geomorphic zones and waterway sizes in the catchment. This information is used to structure the subsequent assessment. Following this overview, the condition assessment is presented under five broad themes – land, water, plants, animals and people. In each theme, key values are outlined as well as major threats to these. Current condition for each component is then assessed, drawing on information collected during this project. A synthesis of key findings is presented in conclusion.

2. The Franklin Vale catchment

2.1 Setting

Franklin Vale catchment is a sub-catchment of the Bremer River which, in turn, flows into the Brisbane River. These systems are major hydrologic features of southeast-Queensland. Situated around 35 km south-west of Ipswich, the catchment has an area of approximately 138 km^2 of which 125 km^2 lies within the Ipswich City Council boundary and the remaining 13 km within the Lockyer Valley Council area and Scenic Rim Council (Figure 1). The Franklin Vale Creek rises in the Mount Beau Brummel Conservation Park at the highest elevation (640 m) of the Council area (Alluvium, 2014a, b). The creek flows in a north-easterly direction through a steep confined valley into a partly confined valley setting and then meanders across a floodplain before entering Western Creek.

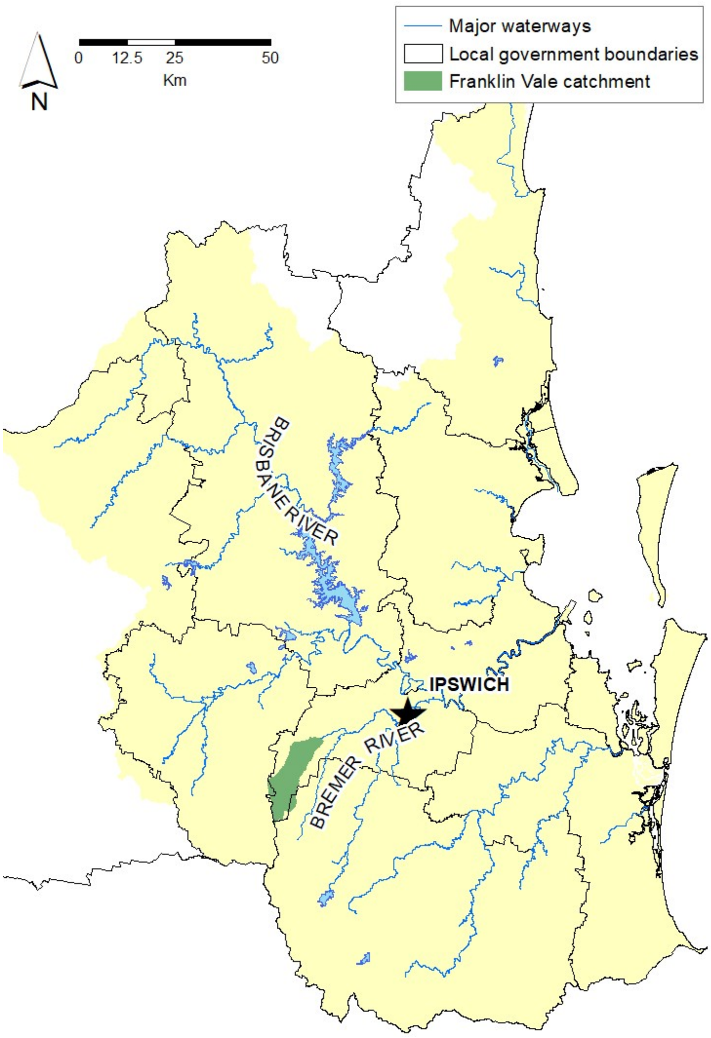

Figure 1. Map showing the location of the Franklin Vale catchment in relation to other river catchments and local government areas in southeast-Queensland.

2.2 Climate and hydrology

Franklin Vale catchment has a subtropical climate with mild dry winters and warmer, wet summers. Average annual maximum and minimum temperatures are 27.5°C and 12.8°C. The catchment received average annual rainfall of 770 mm (± 277 mm standard deviation) during the past 20 years (Figure 2; http://www.bom.gov.au/, rainfall data from station number: 40374, Franklyn vale; temperature data from station number: 40004 Amberly). Most rainfall occurs in the summer months and there is large variability between years. This results in highly variable run-off and stream flow conditions with periods of drought interspersed by extreme rainfall years that generate flooding. Notable climatic events in the catchment include damaging floods in 1893, 1974, 2011 and 2013 and the Millennium Drought from 2002-2009 (Alluvium, 2014a, b). The years of 2019 and 2020 were particularly dry, with annual totals of 269 and 248 mm, respectively.

Projected climate changes

Climate change is likely to result in altered temperature and extreme event (flood, drought, fire) regimes for southeast-Queensland. Little information exists regarding projected climate changes for the Franklin Vale Creek catchment. Throughout southeast-Queensland, temperature is likely to increase 0.4 – 1.3°C by 2030 and up to 2.5 – 4.7°C by 2090 above 1985 - 2005 levels under a high emissions scenario (RCP 8.5; CSIRO and BOM; 2021). Isolated hot days and the length and intensity of heatwaves are expected to increase. Additionally, drought conditions are projected to increase, as well as the intensity of extreme rainfall events leading to flooding. Conditions conducive to fire events are likely to increase with increased temperature and evaporation (CSIRO and BOM; 2021).

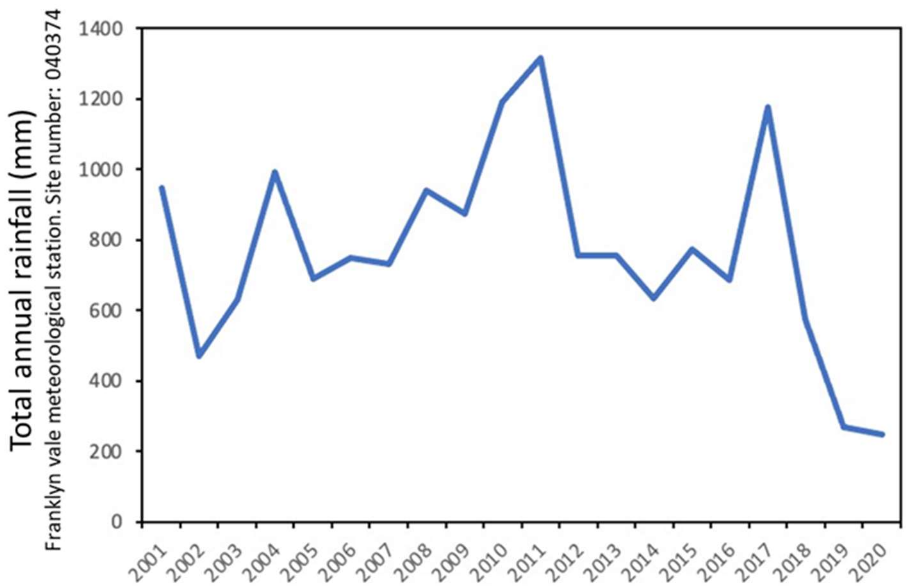

Figure 2. Average annual rainfall in the Franklin Vale catchment during the past 20 years. Data from Australian Government Bureau of Meteorology (http://www.bom.gov.au/, station number: 40374, Franklyn vale, -27.76, 152.46, 105 asl.)

2.3 Geomorphic zones

For the purposes of this condition assessment, we defined four geomorphic zones of the Franklin Vale catchment based on slope, geology, soils and topography (Table 1, Figure 3): Uplands, Foothills, Upper Alluvium and Lower Alluvium. Upper and lower Alluvial zones were separated from each other by a natural constriction in the middle of the catchment.

Table 1. Description of geomorphic process zones of the Franklin Vale catchment

Zone	**Slope**	**Geology**	**Soils**	**Area**
Uplands	Generally > 6°	Mostly basalt	Generally non-cracking clay to clay loam	~32 km^2
Foothills	Alternating between greater than and less than 6°	Marburg and Walloon formations	Generally sodic and non-sodic texture contrast. Sodic soils tend to disperse and lose their structure when wet. If these sodic soils occur beneath the surface, this often leads to gully erosion.	~73 km^2
Upper alluvium	Generally flat	Alluvium	Generally cracking clay	~17 km^2
Lower alluvium	Generally flat	Alluvium	Generally cracking clay	~15 km^2

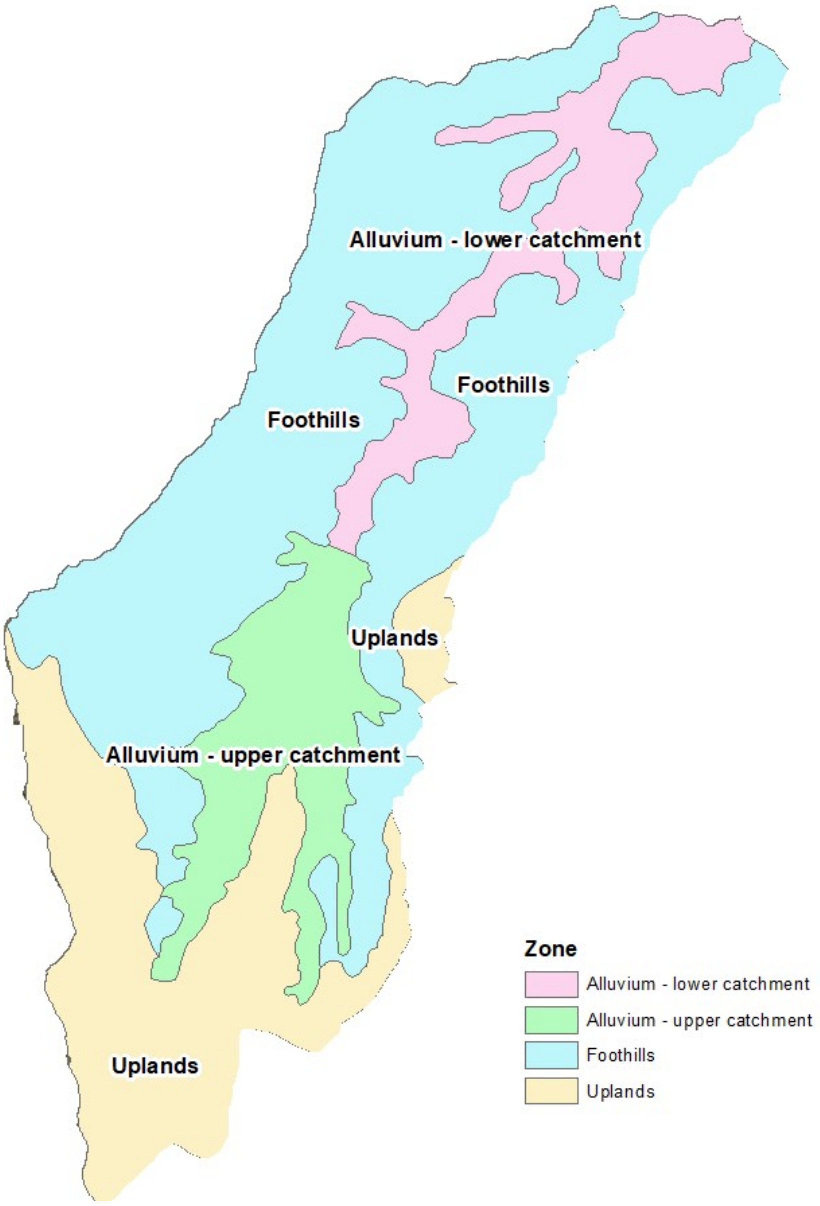

Figure 3. Broad geomorphic process zones of the Franklin Vale catchment informed by catchment slope, geology and soils.

2.4 Waterway size

For the purposes of this condition assessment, waterways of different sizes were defined based on 'stream order', where larger numbers refer to larger waterways (Table 4; see Appendix 2 for further details). This allowed the total length of different sized waterways in each geomorphic zone to be determined (Table 2).

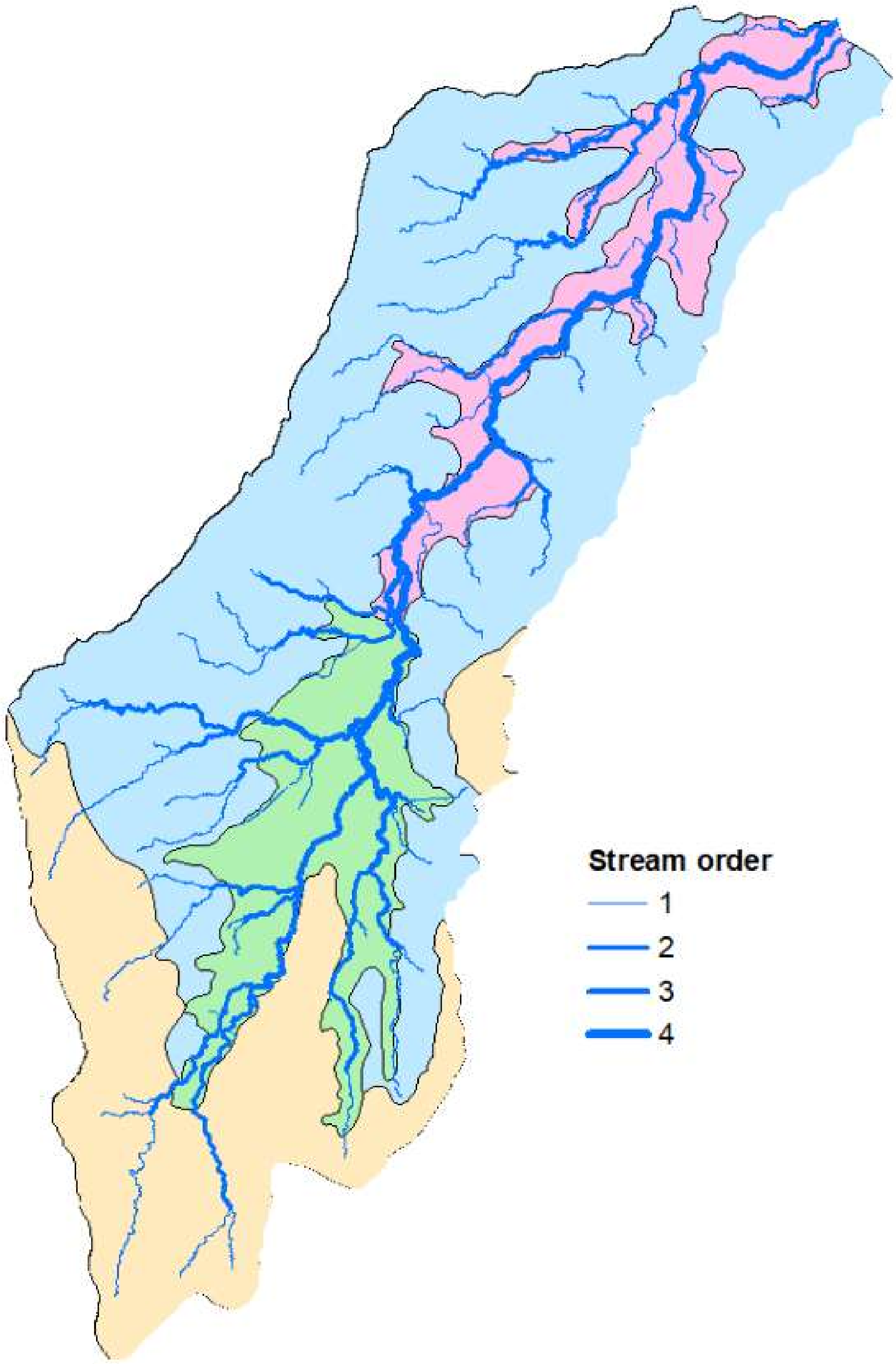

Figure 4. Waterways of different stream order across the Franklin Vale catchment.

Table 2. Length of different sized waterways in each geomorphic zone in the Franklin Vale catchment

Zone	**Stream order**			
	1	**2**	**3**	**4**
Uplands	12%	8%		
Foothills	38%	30%		
Alluvium – upper	17%	34%	75%	22%
Alluvium – lower	32%	28%	25%	78%
Total length (km)	**103**	**57**	**15**	**21***

* The 4th order streams represent the main stem of the Franklin Vale Creek.

2.5 Waterway buffers

The land frequently inundated by a waterway will have the largest influence on water quality (Sheldon et al., 2012). However, the area of land inundated by a waterway will vary in relation to waterway size. To reflect this variation, we created a series of different sized riparian 'buffers' based on waterway size for the Franklin Vale catchment. Buffers of 15, 20, 25, and 35 meters width were used for first, second, third and fourth order waterways respectively, where the centre of the buffer is aligned to the centre of the waterway.

3. Land

3.1 Values

The Franklin Vale catchment is characterised by relatively steep slopes in its headwaters, including the highest elevations of the Council area. However, the slope reduces considerably in the middle and lower reaches of the catchment which serves to slow runoff, resulting in a greater floodplain extent in this catchment compared with that of Reynolds Creek, the upper parts of Western Creek, or other sub-catchments of the Bremer (WetlandInfo, 2016). Although the diversity of physical landforms within the catchment is limited, a range of river forms is present including headwaters, meandering and anabranching channels (Alluvium, 2014a).

Landform stability is a major value of the catchment as hillslope, gully and riverbank erosion can result in loss of productive agricultural land and deliver sediment and nutrients into waterways, contributing to water quality decline and the degradation of aquatic ecosystems both within the catchment and in receiving waters. Data collected in regional catchments indicate that < 10 % of the sediment delivered to waterways is from hillslope erosion (Saxton et al., 2011). Gully erosion can be substantial in some regional catchments (Olley et al., 2009), however substantial riverbank erosion has been reported in regional catchments in response to recent floods (McMahon et al., 2017, 2020; Croke et al., 2013; Grove et al .,2013; Thompson et al., 2013).

3.2 Threats

Poor management of rural land has been identified as a key threat to the ecological function of the Franklin vale catchment (Alluvium, 2014 a, b). Grazing pressure is associated with riverbank erosion in the catchment, particularly where there is a lack of riparian vegetation (Alluvium, 2014 a, b).

Dispersive sodic soils, such as those found in the Foothills zone, are prone to gully erosion in some instances. Two major tributaries which drain the east of the catchment have historically undergone incision and gully erosion (Alluvium, 2014 a).

The impact of land use changes on water quality is often realised during extreme hydrological events, such as floods and droughts. These hydrological extremes are predicted to become more frequent in the future (see section 2.2).

3.3 Condition

Prior assessment

Geomorphic condition and stability of waterways in the Franklin Vale catchment have previously been assessed as mostly of moderate condition, with some upstream reaches being unstable and in poor condition and only minor instabilities in lower reaches (Alluvium 2014 b). Alluvium (2014 a) classified 22% of waterways in the catchment as having poor geomorphic condition, 76 % with moderate condition and 2% as good. With regard to geomorphic stability, 2% of waterways were assessed as stable, 76% had minor instabilities, 5% had moderate instabilities, and 17% major instabilities.

Current assessment

Spatial analysis results

The volume of riverbank erosion (m^3) between 2009 and 2014 was assessed for waterway buffers related to each stream order for the Franklin Vale catchment. Buffer width was determined based on stream order, i.e. a larger buffer width was assessed for larger streams (see Appendix 2 for details). These values indicate the variation in relative erosion rate across the catchment over this period. Average values of erosion were found to be fairly consistent across the catchment and did not vary substantially between the four geomorphic zones or amongst the different stream orders (Table 3). However, higher erosion rates were detected for a small number of second and third order stream segments in the Upper Alluvium zone as well as one fourth order segment in the Lower Alluvium zone (Figure 5).

Table 3. Erosion rate (m^3 m^{-2}) based on the difference between 2009 and 2014 LiDAR data for each stream order buffer and geomorphic zone in the Franklin Vale catchment

Stream order		**1**	**2**	**3**	**4**
Overall	Average	0.02	0.05	0.06	0.04
	Range	0 - 0.12	0 - 0.32	0 - 0.23	0 - 0.11
Uplands	Average	0.05	0.07	-	-
	Range	0.01 - 0.09	0.06 - 0.07	-	-
Foothills	Average	0.03	0.03	-	-
	Range	0 - 0.12	0 - 0.07	-	-
Upper Alluvium	Average	0.01	0.07	0.07	0.02
	Range	0 - 0.04	0 - 0.31	0.01 - 0.23	0.01 - 0.04
Lower Alluvium	Average	0.01	0.04	0.05	0.05
	Range	0 - 0.03	0 - 0.11	0 - 0.15	0 - 0.11

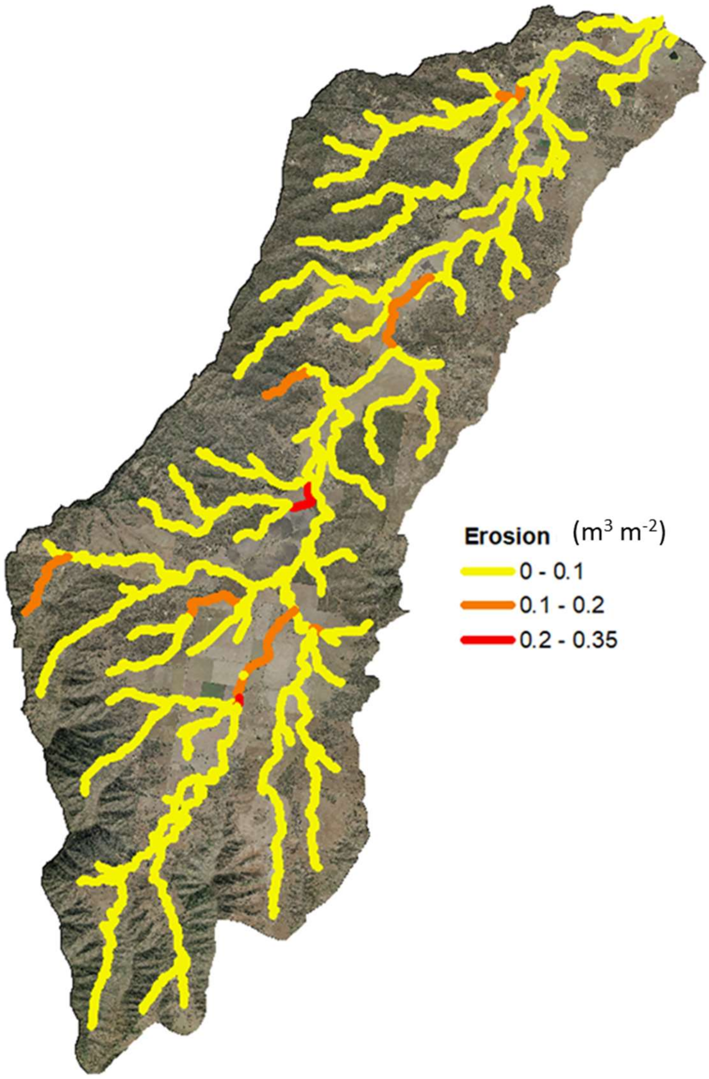

Figure 5. Distribution of erosion rate (based on the difference between 2009 and 2014 LiDAR data) within riparian buffers across the Franklin Vale catchment (note: variation in buffer width not represented).

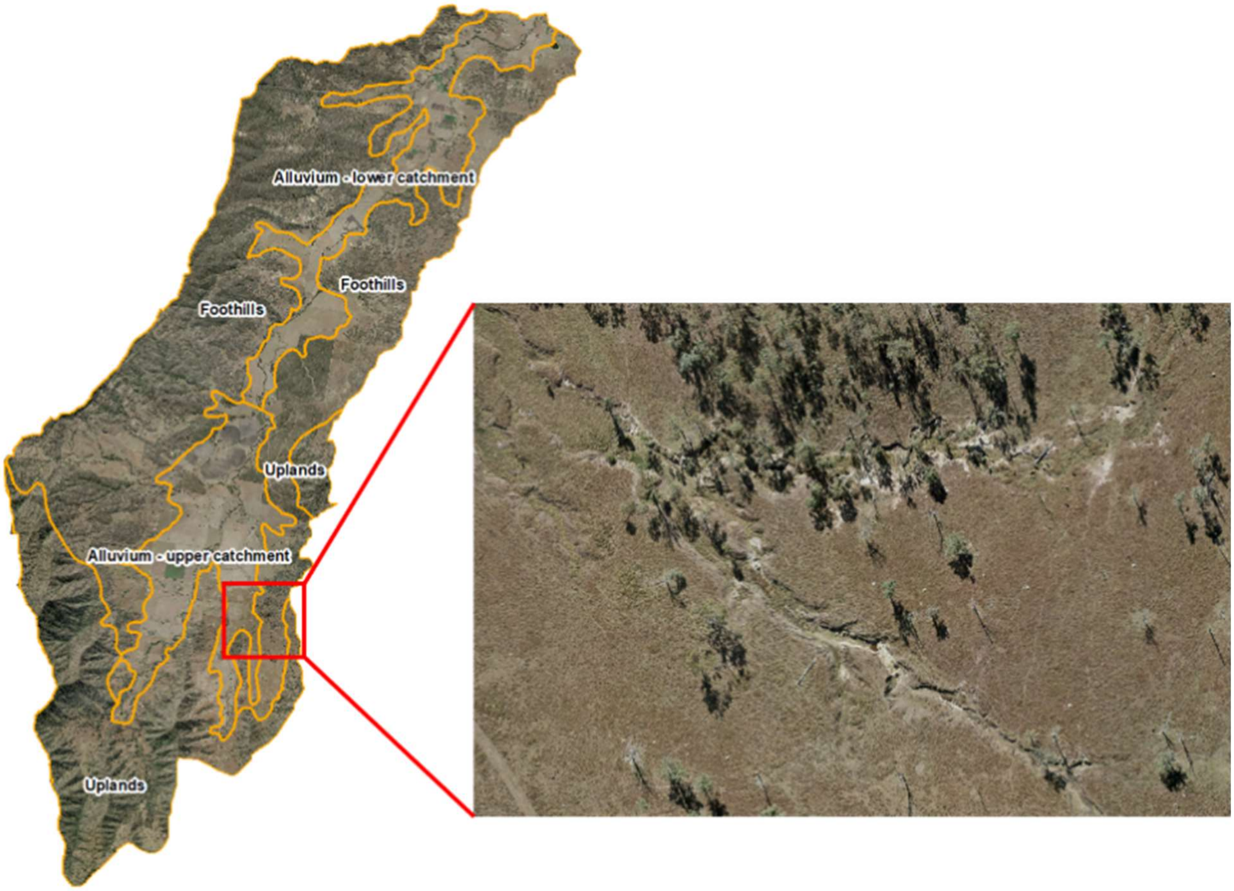

Figure 6. One of the few examples of gully erosion visible in the Franklin Vale aerial imagery from 2016.

Only limited examples of gully erosion were observed in aerial imagery of the Franklin Vale catchment (Figure 6) and adjacent to roadways. This suggests this process is not substantial in the catchment.

Field survey results

The majority of sites (66%) surveyed exhibited low to moderate levels of erosion. Erosion was highest in mid order streams (Figure 7, Table 4). High slope was generally an indicator of high erosion, although the majority of sites had flat to moderate slope (66%).

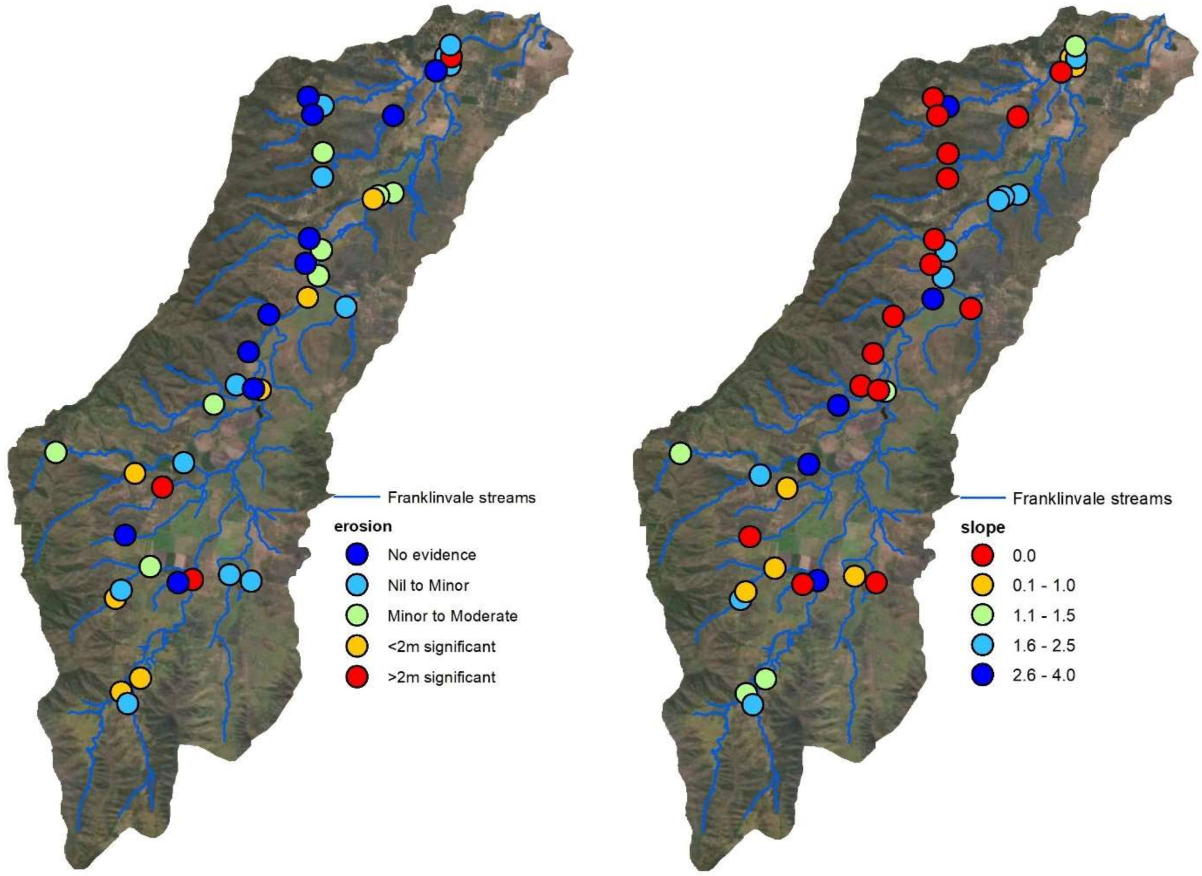

Figure 7. Erosion and slope recorded at field survey sites in the Franklin Vale catchment.

Table 4. Summary of average slope, erosion and riparian width within each process zone and stream order from field survey data

Zone / Stream order	Slope	Erosion	Riparian width (m)
Foothills	1.18	2	4.2
Alluvium – Upper	1.66	1.94	4.16
Alluvium – Lower	1.95	2.2	4.8
1	1.3	1.9	4.2
2	1.59	2.09	4.86
3	1.83	3.5	3.33
4	1.5	1.55	3.75

4. Water

4.1 Values

Waterways and wetlands

Franklin Vale catchment has 196 km of waterways based on analysis of the digital elevation model. More than half of these channels are first order streams, i.e., headwater streams which have no other streams flowing into them (Table 2). Approximately 30% of waterways are second order streams and the remainder are of third and fourth order, including the main stem of the Franklin Vale Creek.

Remotely sensed data indicate the presence of approximately 15 waterholes across the catchment (http://www.dnrm.qld.gov.au/mapping-data). Information from Queensland Department of Environment and Science, Wetland Info has identified areas potentially containing artificial, spring, tree swamp, herbaceous swamp, and riverine wetlands within the catchment (Figure 8, Table 5, https://wetlandinfo.des.qld.gov.au/wetlandmaps). However, this may be an overestimate of the true wetland extent as Queensland Globe data predicts only one wetland at the downstream end of the catchment (https://qldglobe.information.qld.gov.au/). Waterholes and wetlands are valuable to the catchment as they provide refuge for animals during periods of drought.

Table 5. The number and extent of wetlands of different types present in the Franklin Vale Catchment (Source: Wetland Info)

Wetland system	Number of polygons	Total area (km^2)
Lacustrine	13	0.186
Palustrine	11	0.175
Palustrine	7	0.132
Palustrine	1	0.009
Palustrine	11	0.597
Riverine	97	2.885

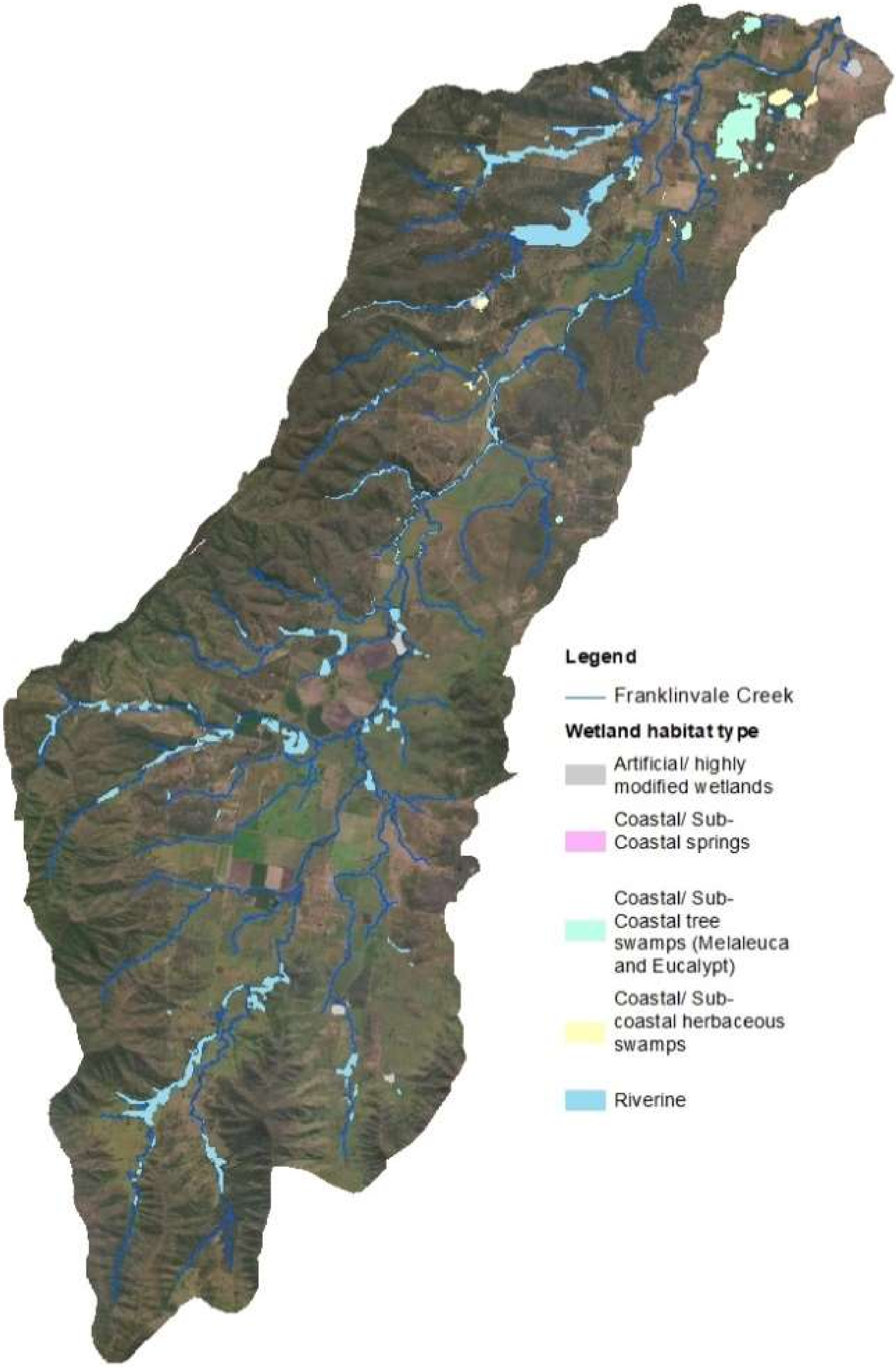

Figure 8. Wetland areas within Franklin Vale Creek catchment delineated by QLD wetland mapping methodology showing artificial, spring, tree swamp, herbaceous swamp, and riverine wetlands. Data source: QLD wetland mapping, Department of Environment and Science 2020.

Water regimes

There are two gauging sites on the Bremmer River which provide information on the likely magnitude of recent and historic flows in the Franklin Vale catchment, one upstream and another downstream of the confluence of Western Creek/Franklin Vale Creek (Figure 9). This data indicates that flow in Franklin Vale Creek is likely to be highly seasonal, with substantial flows only occurring in wet summer months, typically January to March. During the base flow period the creek is likely to consist of interspersed dry riverbed and pools or seeping water. Recently, major flooding events occurred in 2010/2011, 2013 and 2017, as in the Bremmer River.

Yu et al. (2018) used spatial data to predict the duration of zero flow days for waterways in southeast-Queensland (Figure 10). Based on their predictions, the main stem of Franklin Vale Creek had zero flow for 2-5 months of the year on average between 1900 to 2016, while in the driest year flow occurred for less than 2 months. Yu et al. (2018) classified Franklin Vale Creek catchment as “strongly to weakly intermittent” on an average rainfall year. The term “intermittent” has been used to refer to all temporary, ephemeral, seasonal, and episodic streams and rivers with defined channels (Datry et al., 2014). Flowing water during a portion of each year is of major value to the catchment and the landowners. Flowing water is important to maintain the extent and quality of waterholes for animals that live in or use them and to provide drinking water for landowners’ stock and pumped offtakes.

Water quality

High quality water in waterholes and flowing portions of Franklin Vale Creek is of major value to support healthy freshwater communities and protect the health of animals and people who access this water. The Ecosystem Health Monitoring Program (EHMP) run by Healthy Land and Water provides an assessment of the health of waterways in major catchments and sub-catchments in southeast-Queensland. There are no EHMP monitoring sites in Franklin Vale catchment and the nearest site is on Western Creek, approximately 10 km upstream of the Franklin Vale confluence. There are also sites on the Bremer River up and downstream of the Western Creek confluence (Figure 9). In terms of ecosystem heath, across all sites, the Bremer River catchment has scored a D- to D+ over the past 5 years (https://reportcard.hlw.org.au/results). Physical and chemical (indicative of water quality) and ecosystem process index scores for the Bremer catchment have improved over the last 5-10 years as the system recovered from the millennium drought and 2010/2011 floods.

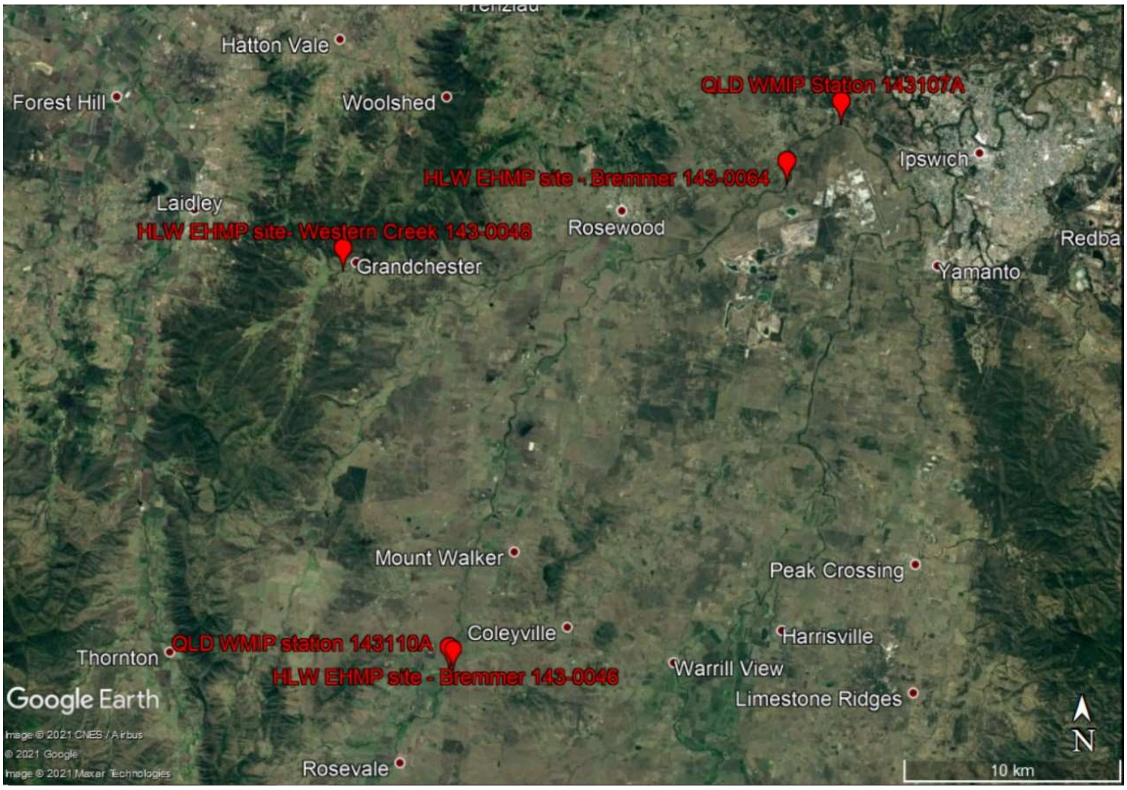

Figure 9. Location of Queensland Government Water Monitoring Information Portal gauging sites on the Bremer River upstream (143110A, Adam's Bridge) and downstream (143107A, Walloon) of the confluence with Western Creek. Location of Healthy Land and Water EHMP monitoring sites in proximity to Franklin Vale Creek.

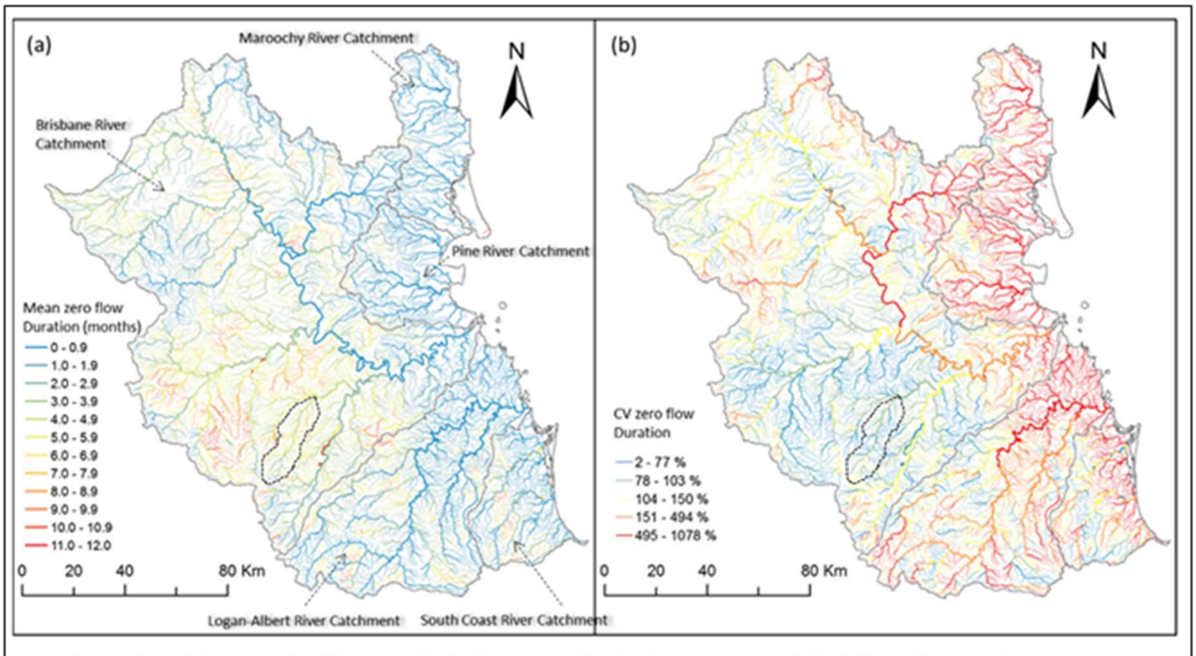

Fig. 6. The spatial extent of flow intermittency presented by (a) mean zero flow duration per year across 1900–2016 and (b) its coefficient of variation (CV).

Figure 10. Figure 6 from Yu et al., (2018) which has been modified to highlight the extent of the Franklin Vale Creek Catchment. This shows the mean duration of predicted zero flow days and its coefficient of variation.

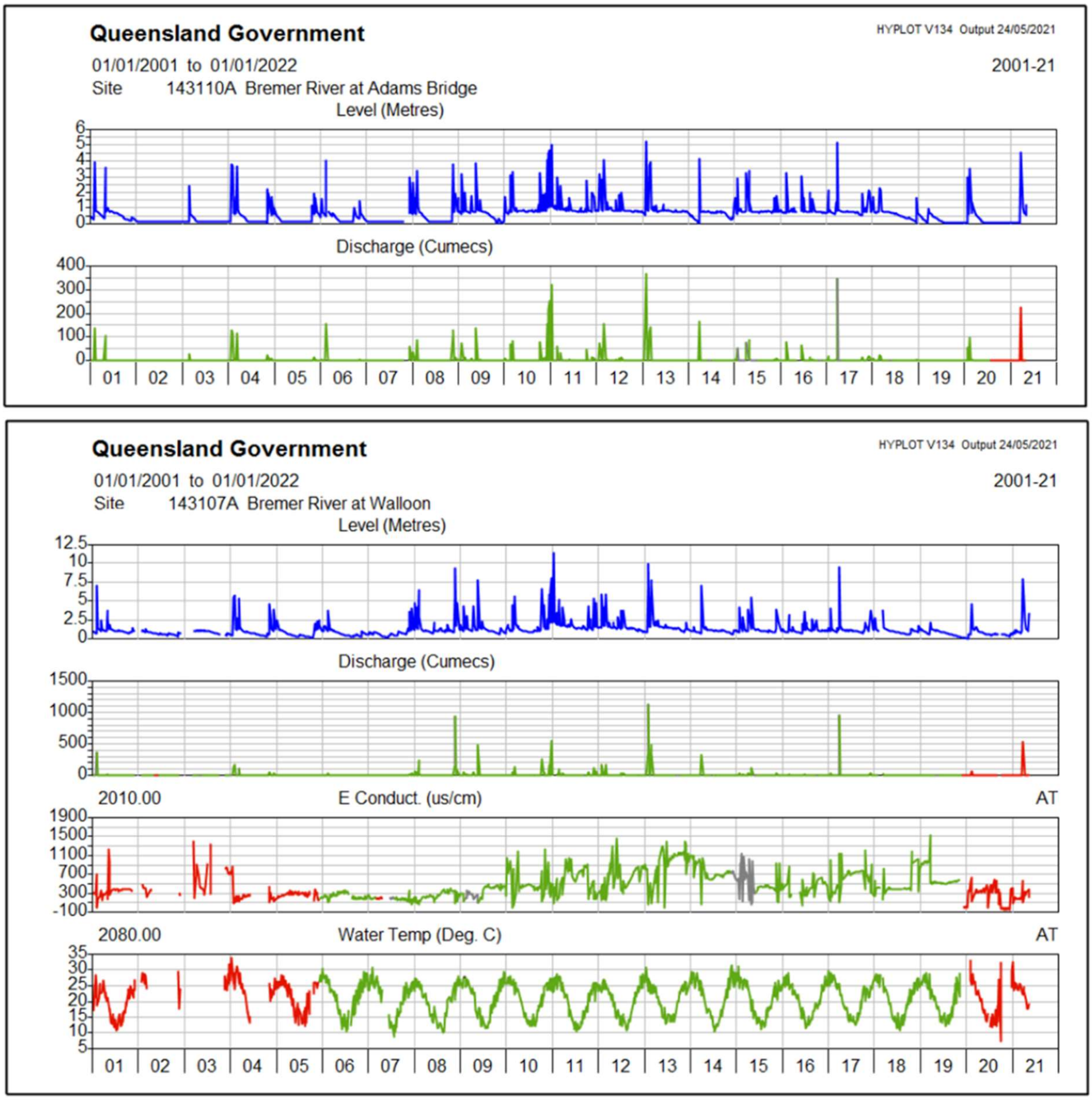

Figure 11. Records for previous 20 years for water level, discharge, electrical conductivity and temperature recorded at a gauging station on the Bremer River at Adams Bridge (27°49'39.8"S, 152°30'42.0"E, upstream of Western Creek confluence) and Walloon (27°36'06.9"S, 152°41'38.3"E, downstream of confluence). Conductivity and temperature data not available at Adams Bridge. Data sourced from Queensland Government Water Monitoring Information Portal, https://water-monitoring.information.qld.gov.au/host.htm

4.2 Threats

Key threatening processes to water quantity and quality in the Franklin Vale catchment and broader Council area, identified by Alluvium (2014a, b) include water extraction, loss of vegetation cover, sediment runoff and agri-chemical loads. Groundwater and surface water extractions for irrigation agriculture are concentrated along the main waterways of Franklin Vale catchment (Alluvium 2014a, b).

Riverbank erosion is the main process delivering sediment to waterways in southeast-Queensland (Olley et al., 2013; Wallbrink, 2004) and is a threat to water quality (sediment and total nutrient loads) in the Franklin Vale creek during high rainfall events. Stock access to the creek via unfenced riverbanks and crossing increases the risk of pathogenic microbes entering waterways (Smolders et al. 2015) and poses a threat to Franklin Vale Creek. Climate change is also likely to pose a significant threat to flows and water quality in the Franklin Vale catchment.

4.3 Condition

Prior assessment

Prior condition assessments have deemed there to be insufficient information to evaluate water quality in the Franklin Vale catchment as there are no Healthy Waterways EHMP or any other water quality monitoring sites present (Alluvium, 2014b). There is also no data for recent or historic water flow in Franklin Vale Creek.

Current assessment

Field survey results

Field data was collected during March-April 2021, 5-29 days after a significant rainfall event, which was likely to impact the amount and condition of water in the channels of the Franklin Vale at the time of sampling (Figure 12). In March 2021 a substantial amount of water flowed through the catchment for the first time since 2017 (Figure 11). After receiving roughly 300 mm of rainfall over the preceding 10 days, discharge peaked at 225 $m^3\ s^{-1}$ in the upper Bremmer (Adams Bridge, 143110A) on 23/3/2021 and 529 $m^3\ s^{-1}$ in the lower Bremer (Walloon, 143107A) downstream of the confluence of Franklin Vale Creek on the 24/3/2021 (Figure 12).

Of the 30 sites sampled on Franklin Vale Creek and tributaries, seven were completely dry - mostly smaller first or second order stream channels (Table 6). At sites with continuous wetted riverbed at the time of sampling, around 60 % were dominated by pool-type habitat and the remainder by runs. Riffle habitat was present at only a few sites. Aquatic macrophytes were present at 23% of survey sites (1-30% cover), dominated by emergent species. The average width and depth at these sites were 5.9 and 0.5 m, respectively (see Table 6 for details by stream order). Two fourth order sites contained large pools, approximately 10-20 m wide and up to 4 m deep.

Shading of the riverbed by riparian trees was highly variable (0-100% shade recorded), but sites on third and fourth order streams tended to have more shade than smaller headwater streams (first and second order) (Table 6). Dissolved oxygen concentrations were moderate at all sites (mean of 75% of saturation across all sites), equivalent to approximately 6 mg L^{-1}. The mean conductivity across all sites with water present was 304 ± 59 mS cm^{-1} and mean turbidity was 38 ± 5 NTU. Turbidity was slightly higher at downstream (fourth order sites) compared to those upstream, potentially reflecting the transit time of sediment in flood waters moving through the catchment. There was either not enough water present or access conditions restricted collection for measurement of the water quality parameters at most first and third order sites.

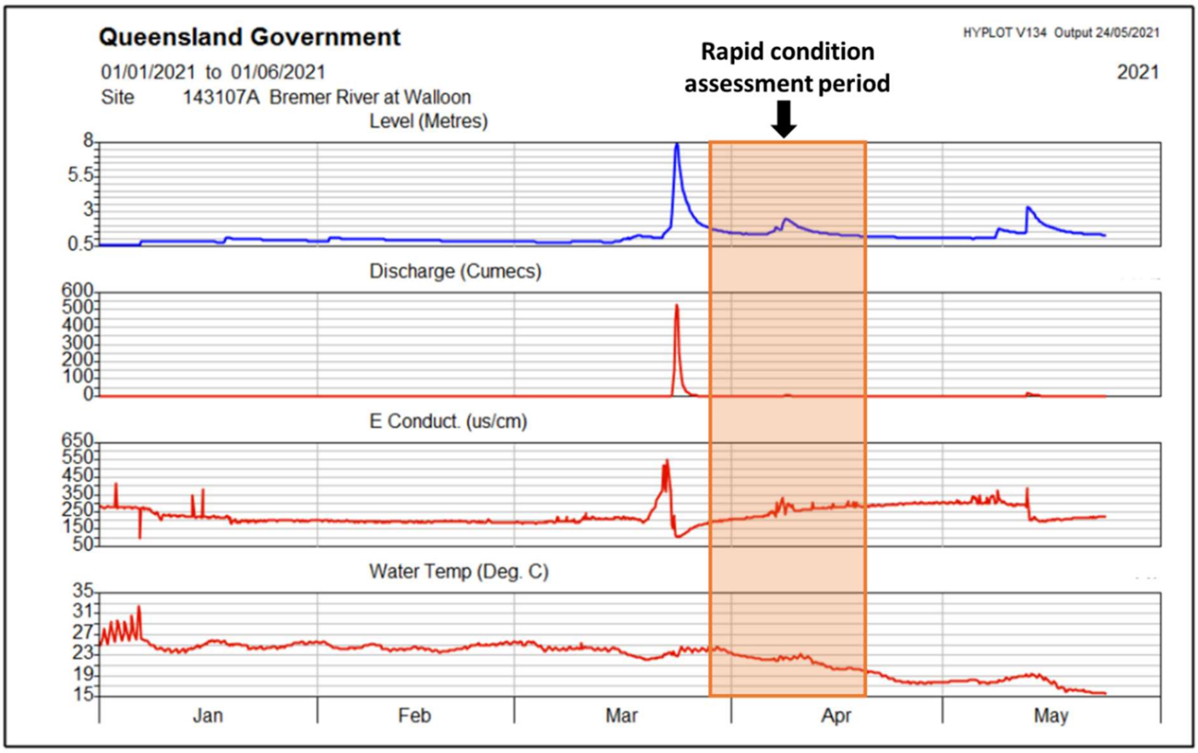

Figure 12. Water level, discharge, electrical conductivity and temperature recorded at a gauging station on the Bremmer River at Walloon (27°36'06.9"S, 152°41'38.3"E, downstream of the confluence of Western Creek) during 2021 prior to and during the rapid condition field assessment period. Data sourced from Queensland Government Water Monitoring Information Portal, https://water-monitoring.information.qld.gov.au/host.htm

Table 6. Summary (mean ± standard error) of water quality and riverbed condition data collected during the field survey over March-April 2021

	Stream order				
	1	**2**	**3**	**4**	**Whole catchment**
Number of sites	6	11	3	10	30
Precent of sites dry (%)	67	18	0	10	23
Average wetted width (m)	6.9 ± 1.5	4.6 ± 1	5 ± 1.2	7.6 ± 1.6	5.9 ± 1.4
Average wetted depth (m)	0 ± 0	0.4 ± 0.2	0.2 ± 0.2	1.4 ± 0.6	0.5 ± 0.2
Percent riparian shade (%)	34 ± 10.7	41.1 ± 9.8	60 ± 30.6	56 ± 8.3	47.8 ± 14.8
Turbidity (NTU)	NA	29.3 ± 11.7	37.6 ± 0	45.8 ± 10.3	37.5 ± 11
Conductivity (mS cm^{-1})	NA	402 ± 89.7	286.9 ± 0	223.1 ± 27.6	304 ± 58.7
Dissolved oxygen (%)	NA	73.1 ± 2.5	82.4 ± 0	74 ± 7.7	76.5 ± 5.1
Precent cover of riverbed with sediment (%)	40 ± 16.7	33 ± 17.9	NA	15 ± 0	29.3 ± 17.3

5. Plants

5.1 Values

Vegetation diversity

Remnant vegetation has been retained in approximately half of the Franklin Vale catchment, mainly in the Uplands zone, which is dominated by open forest and woodland of river red gum or blue gum and/or coolabah (Table 7). In the Foothills zone, the dominant remnant vegetation mostly comprises woodland of red ironbark, grey ironbark, dusky-leaved ironbark and Shirley's silver-leaved ironbark. Although historically dominant in this zone, very little remnant spotted gum forest and woodland has been retained (Table 7). The small amount of remnant vegetation remaining in the Alluvial zones includes open forest and woodlands dominated by river red gum or blue gum and/or coolabah and woodland of red ironbark, grey ironbark, dusky-leaved ironbark and Shirley's silver-leaved ironbark (Table 7).

Over 140 plant species have been recorded from the Franklin Vale catchment according to the Atlas of Living Australia (Appendix 4). Eleven plant species of conservation status are known to occur in the Council LGA (Table 8). Three of these have been observed within the Franklin Vale catchment.

Table 7. Pre-clearing and current vegetation in each geomorphic process zone based on broad vegetation group data from the Queensland Herbarium. Full table of regional ecosystem descriptions and area provided in appendix

Zone	RE code	Regional ecosystem type	Original area	Current area
Uplands		Cleared	-	53%
	16a	Open forest and woodlands dominated by river red gum or blue gum and/or coolabah	89%	41%
		Other remnant categories	11%	6%
		Total area (km^2)	32 km^2	
Foothills		Cleared	-	70%
	10b	Moist open forests to woodlands dominated by spotted gum	44%	4%
	13c	Woodlands of red ironbark, grey ironbark, dusky-leaved ironbark and shirley's silver-leaved ironbark	39%	23%

		Other remnant categories	17%	3%
		Total area	73 km^2	
Alluvium – upper catchment		Cleared	-	99%
	13c	Woodlands of red ironbark, grey ironbark, dusky-leaved ironbark and shirley's silver-leaved ironbark	7%	0%
	16a	Open forest and woodlands dominated by river red gum or blue gum and/or coolabah	7%	0.5%
	16c	Woodlands and open woodlands dominated by coolabah, black box or blue gum	85%	-
		Other remnant categories	1%	0.5%
		Total area	17 km^2	
Alluvium – lower catchment		Cleared	-	93%
	13c	Woodlands of red ironbark, grey ironbark, dusky-leaved ironbark and shirley's silver-leaved ironbark	13%	3%
	16a	Open forest and woodlands dominated by river red gum or blue gum and/or coolabah	3%	2%
	16c	Woodlands and open woodlands dominated by coolabah, black box or blue gum	75%	0%
		Other remnant categories	9%	2%
		Total area	15 km^2	

Table 8. Environmentally significant native plant species known to occur in the Ipswich City Council LGA (https://www.ipswich.qld.gov.au/live/animals/wildlife/significant-flora-and-fauna) and their conservation status in the QLD Nature Conservation Act (1992)

Species	**Conservation Status**
Sophora fraseri (Bush Sophora)	Vulnerable
Notelaea ipsviciensis (Cooneana olive) * **(ALA data not confident with species)**	Critically Endangered
Planchonella eerwah (Flinders Plum)	Endangered
Plectranthus harbrophyllus	Endangered
Notelaea lloydii (Lloyds native olive) * **(ALA data not confident with species)**	Vulnerable
Cupaniopsis tomentella (Boonah tuckeroo)	Vulnerable
Gossia gonoclada (Angle stemmed myrtle)	Endangered
Callitris baileyi (Bailey's cypress) *	Near Threatened
Eucalyptus curtisii (Plunkett mallee)	Near Threatened
Marsdenia coronata (Slender milkvine)	Vulnerable
Melaleuca irbyana (Swamp tea tree) *	Endangered

* species recorded in FV catchment from Atlas of Living Australia data (see Appendix 4).

Vegetation function

There are well established relationships between the amount of remnant vegetation and water quality and aquatic ecosystem health in the region, with greater proportions of remnant vegetation strongly associated with higher water quality (Olley et al., 2015) and improved aquatic ecological health (Sheldon et al., 2012). While vegetation across the entire catchment, including that on hillslopes, can influence water quality, these studies demonstrate that riparian vegetation (i.e., vegetation that occurs immediately bordering waterways) is particularly important, with improvements to the condition of this vegetation having a more immediate effect on water quality and aquatic ecological health.

Studies relating vegetation to water quality and aquatic ecosystem health in the region (e.g., Olley et al., 2015) often focus on 'remnant' vegetation which is defined by the Queensland Herbarium as follows: "vegetation where the dominant canopy has > 70% of the height and > 50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy" (Neldner et al., 2005). Vegetation with characteristics that differ substantially from this definition of remnant vegetation, however, may still play a significant role in reducing the magnitude of riverbank erosion, even in large magnitude floods such as occurred in 2011 (McMahon et al., 2020). The response of different catchments to vegetation change, however, varies substantially. In south-eastern Australia, for example, substantial erosion occurred after vegetation clearing and flooding (Brooks et al., 2003), while the Brisbane River has remained remarkably resilient to a similar combination of vegetation clearing and flooding in most locations (McMahon et al., 2020). It is likely that such non-remnant vegetation continues to have a beneficial effect on nutrient transport rates also.

5.2 Threats

The greatest threat to vegetation diversity and function in the Franklin Vale catchment has been the significant, large-scale clearing of vegetation, especially in riparian and floodplain habitats of the alluvial zones (Table 7). Channel banks throughout the catchment have been subject to selective clearing while the floodplains have been mostly cleared of native vegetation for grazing, with some areas also supporting irrigated crops and forestry plantations.

Exotic plant species are prevalent in the Franklin Vale catchment and potentially pose a threat to native plant species and vegetation function, including habitat provision to terrestrial and aquatic fauna, as well as agricultural productivity (Table 9).

Current land use in the catchment may further threaten native vegetation diversity and function. Grazing, for example, is likely to exert a direct influence on the composition and structure of floodplain vegetation and significantly constrain the regeneration of woody plants through selective grazing, especially during periods of drought. Grazing may also affect vegetation diversity and function indirectly by increasing geomorphic instability and compacting soils (Trimble and Mendel 1995). Plantation forests and their management are also likely to influence vegetation diversity and function especially, e.g., effects on water quality of run-off.

Climate change can be expected to have a considerable influence on vegetation in the catchment as a result of increased CO_2, warming and altered hydrological regimes. Riparian and floodplain vegetation is likely to be particularly sensitive to the increases in the frequency and severity of droughts, increased flashiness of intense rainfall and flood events and increased fire weather that are anticipated in south-east Queensland (see Section 2.2; Capon et al., 2013).

Table 9. List of exotic plant species likely to occur within the Franklin Vale Creek catchment area. (Based on weed spatial data polygons that overlap the FV catchment - https://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={20F76BD3-970B-4EBD-A690-BA51BC081F57})

Species	**Common Name**	**State weed declaration**
Baccharis halimifolia	Goundsel bush	Cat 3
Gleditsia triacanthos	Honey locust	Cat 3
Schinus terebinthifolius	Chinese pepper	Cat 3
Cinnamomum camphora	Camphor laurel	Cat 3
Macfadyena unguis-cati syn. Dolichandra	Cats claw creeper	Cat 3
Celtis sinensis	Chinese elm	Cat 3
Senecio madagascariensis	Fireweed	Cat 3
Lycium ferocissimum	African boxthorn	Cat 3
Ambrosia artemisiifolia	Annual ragweed	Cat 3
Asparagus aethiopicus, other asparagus species	Asparagus weeds	Cat 3
Lantana camara	Lantana	Cat 3
Anredera cordifolia	Maderia vine	Cat 3
Bryophyllum delagoense	Mother of millions	Cat 3
Opuntia	Prickly pears (tiger, westwood, drooping)	Cat 3
Sporobolus spp.	Rats rail grasses	
Eragrostis curvula	Africa lovegrass	
Eichhornia crassipes	Water hyacinth	Cat 3
Neptunia oleracea	Water mimosa	Cat 2,3,4,5
Harrisia matinii, tortuosa, pomanensis	Harrisia cactus	Cat 3
*Senna pendula**	Easter Cassia	
*Solanum elaeagnifolium**	silver leaf nightshade	

*Solanum mauritianum**	Wild tobacco	
Parthenium hysterophorus	Parthenium weed	Cat 3
Pistia stratiotes	Water lettuce	Cat 3

* exotic species recorded in FV catchment in Atlas of Living Australia (see Appendix 4)

5.3 Condition

Prior assessment

In 2008, riparian condition was deemed poor at five sites and moderate at two sites with seven riparian weed species recorded (Alluvium 2014b). The condition of riparian vegetation in the Franklin Vale catchment was deemed to be moderate overall in 2014 based on subsequent field assessments of two sites in 2013/14 along with spatial analyses of 2012 imagery (Alluvium 2104 b). More specifically, riparian condition was classed as poor along 52 % of waterways in the catchment, moderate only 43 % of waterways and good along only 5 % of waterways (Alluvium 2014a).

Current assessment

Spatial analysis results

Significant changes in vegetation extent have occurred in the Franklin Vale catchment since European settlement (Figure 13). The Uplands zone retains the most remnant vegetation followed by the Foothills zone (Figure 13, Table 10). Very little remnant vegetation is present in either Alluvial zone (Figure 13, Table 10). Additionally, available spatial data suggests that vegetation on the western flank of the catchment has shifted from “open forests to woodlands dominated by spotted gum” to “woodlands dominated by ironbark" (Figure 13).

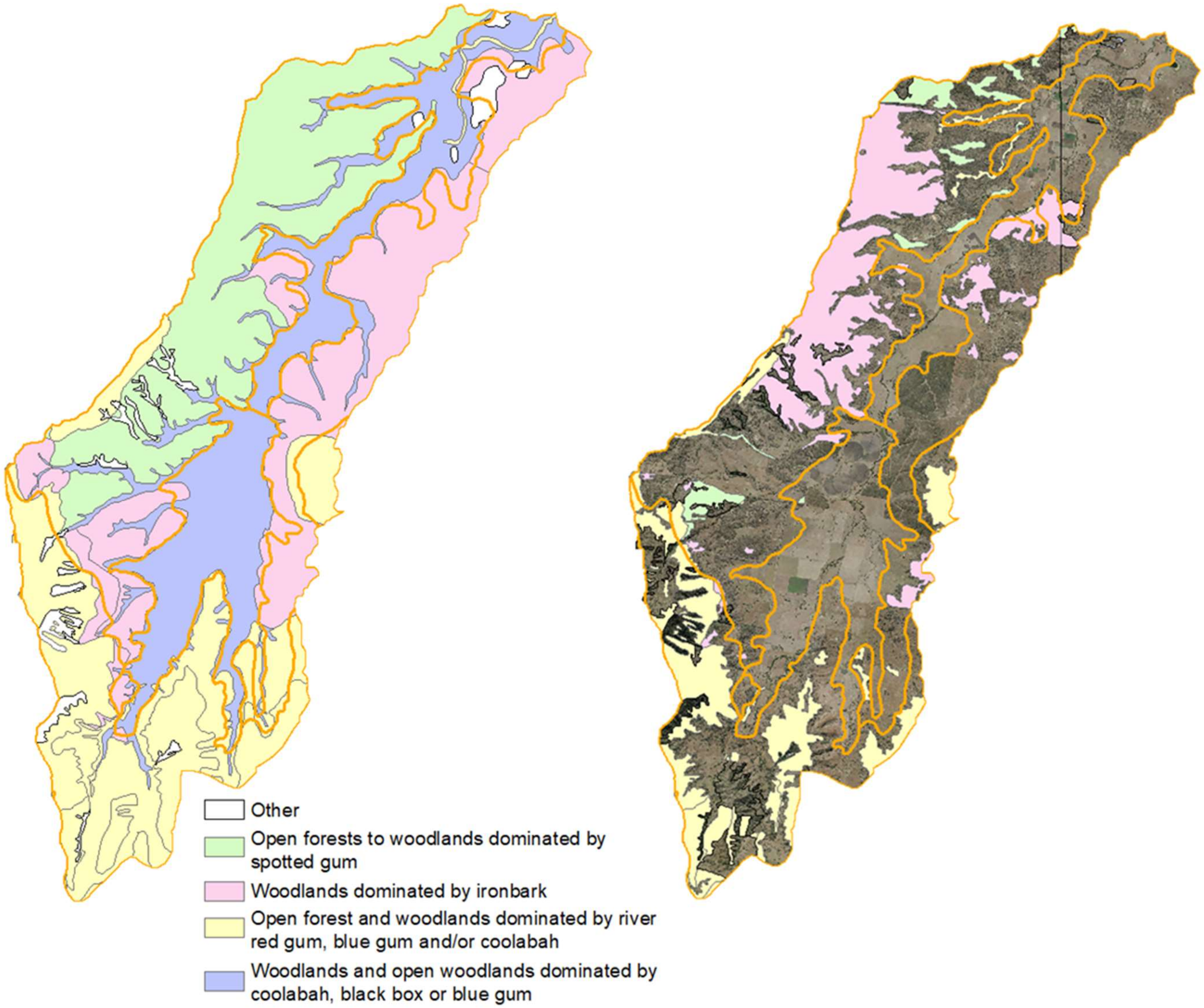

Figure 13. Pre-clearing (left) and current (right) remnant vegetation categories defined by the Queensland Herbarium in the Franklin Vale catchment.

Table 10. Percent of remnant and cleared vegetation in each geomorphic process zone as defined by the Queensland Herbarium. Full table of regional ecosystem descriptions and area provided in appendix

Zone	Remnant	Cleared
Uplands	47%	53%
Foothills	30%	70%
Alluvium - Upper Catchment	1%	99%
Alluvium - Lower Catchment	7%	93%

A substantial amount of vegetation is present in the catchment which does not meet the Queensland Herbarium definition of remnant vegetation (Figure 14). It is highly probable, however, that this other vegetation would still provide significant benefits for water quality and other ecological functions. When considering all vegetation within riparian buffers adjacent to waterways in the catchment (Figure 4, Table 11), it is apparent that the canopy cover of vegetation between 1 and 5 m height is generally low (i.e., < 10%; Figure 15). However without ground truthing the LiDAR data, this cannot be confirmed and may be an artefact of the limitations of the LiDAR data capture. In contrast, the percent canopy cover of vegetation of vegetation greater than 5 m in height is relatively high. For vegetation within this height category, average canopy cover is around 30 % for first and second order streams with some very high values (> 95%) also apparent. For the fourth order main stem of Franklin Vale Creek, average canopy cover of vegetation > 5 m is approximately 45% (Table 11; Figure 16).

Looking at the extent of riparian vegetation in relation to different sized waterways in each zone in the catchment (Table 12), a similar pattern emerges with respect to canopy cover of vegetation in the 1-5 m and > 5 m height categories. Firstly, vegetation cover for the 1-5m height category is generally low throughout the catchment. The > 5 m height category, however, has some high values occurring in the Uplands zone, particularly for second order streams. In the upper and lower Alluvial zones, canopy cover is consistently between 10-30 % for first, second and third order streams while fourth order streams in this zone (i.e. the main stem of the Franklin Vale Creek) have reasonable canopy cover, with average values of 45-47 %.

Figure 14. All vegetation cover (green shading) in the Franklin Vale catchment as derived from the 2014 LiDAR data. Orange borders represent geomorphic process zones.

Table 11. Vegetation canopy cover (derived from 2014 LiDAR data) within riparian buffers for each stream order in the Franklin Vale catchment

Stream order		**1**	**2**	**3**	**4**
Vegetation cover 1-5m high (%)	Average	3	4	4	8
	Range	0 - 16	0 - 16	0 - 14	4 - 13
Vegetation cover higher than 5m (%)	Average	30	31	19	46
	Range	0 - 96	0 - 95	0 - 52	21 - 61

Table 12. Vegetation canopy cover (derived from 2014 LiDAR data) within riparian buffers for each stream order and geomorphic zone in the Franklin Vale catchment

Zone	Stream order		1	2	3	4
Uplands	Vegetation cover 1-5m high (%)	Average	10	9	-	-
		Range	5 - 14	3 - 14	-	-
	Vegetation cover higher than 5m (%)	Average	61	81	-	-
		Range	47 - 76	68 - 95	-	-
Foothills	Vegetation cover 1-5m high (%)	Average	5	6	-	-
		Range	0 - 16	1 - 16	-	-
	Vegetation cover higher than 5m (%)	Average	44	45	-	-
		Range	0 - 96	21 - 73	-	-
Alluvium - upper	Vegetation cover 1-5m high (%)	Average	1	3	6	5
		Range	0 - 6	0 - 13	0 - 14	5 - 7
	Vegetation cover higher than 5m (%)	Average	10	20	24	47
		Range	0 - 45	0 - 80	0 - 52	41 - 51
Alluvium - lower	Vegetation cover 1-5m high (%)	Average	2	3	1	9
		Range	0 - 9	0 - 12	0 - 2	4 - 13
	Vegetation cover higher than 5m (%)	Average	22	26	13	45
		Range	0 - 55	0 - 76	0 - 29	21 - 61

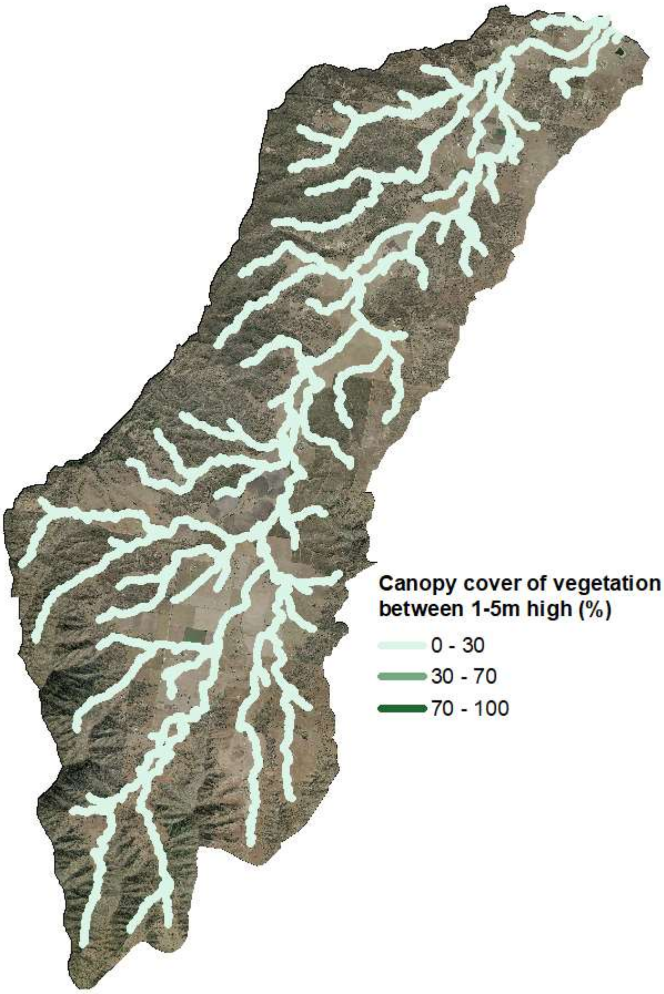

Figure 15. Distribution of percent canopy cover (based on 2014 LiDAR data) of vegetation between 1 and 5 metres in height within riparian buffers across the Franklin Vale catchment (note: variation in buffer width not represented).

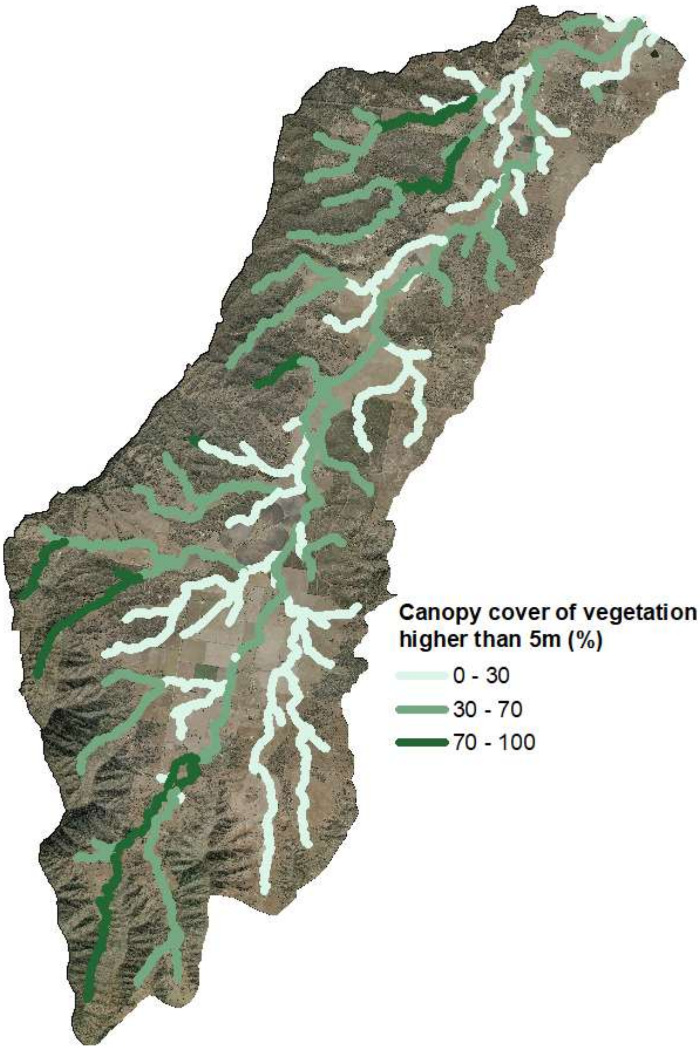

Figure 16. Distribution of percent canopy cover (based on 2014 LiDAR data) of vegetation greater than 5 metres in height within riparian buffers across the Franklin Vale catchment (note: variation in buffer width not represented).

Field survey results

The average continuity of riparian vegetation at field sites was 55 % with vegetation continuity typically lower than this in the Upper Alluvial zone. Canopy cover of riparian vegetation was generally moderate to high (> ~30%) although seven sites, mostly in the Upper Alluvial zone, had no canopy. Where a canopy was present, native species tended to be dominant and accounted for approximately 70% of canopy species observed.

Understorey vegetation (i.e., shrubs) was variable across the field sites surveyed with no understorey present at 30 % of sites. Where a shrub layer was present, it tended to be dominated by exotic species (e.g., *Lantana camara*) with approximately 30% of shrubs observed being native. Groundcover vegetation tended to be high throughout the catchment with > 60% groundcover observed at 80% of sites. Groundcover vegetation also comprised a high proportion of weed species (~ 7 %).

In general, vegetation cover (understorey, groundcover, canopy cover) was moderate along the main stem of the Franklin Vale Creek (4^{th} order stream) in the Lower Alluvial zone. Canopy cover was highest in the low order streams (1^{st}) which also supported the highest proportion of native species. Understorey cover (i.e., shrubs) was lowest along the main channel but these sites had the highest proportion of native shrub species. Groundcover was generally lower along mid-order streams, but these sites also had the highest percentage of native groundcover species. Two sites (i.e., Grey Plains Rd – site #5 and Grandchester-Mt Mort Rd – site #9) had consistently low cover in all three strata. Vegetation continuity was highest in the Lower Alluvial zone and along the larger, fourth order streams while sparser riparian vegetation was observed in the Foothills zone (Table 13).

Over 20 weed species were observed in the riparian vegetation during field surveys, although grasses were not all identified. These exotic plants included nine species restricted under the Queensland Biosecurity Act 2014 as well as other introduced plants that are not listed as restricted (Table 14).

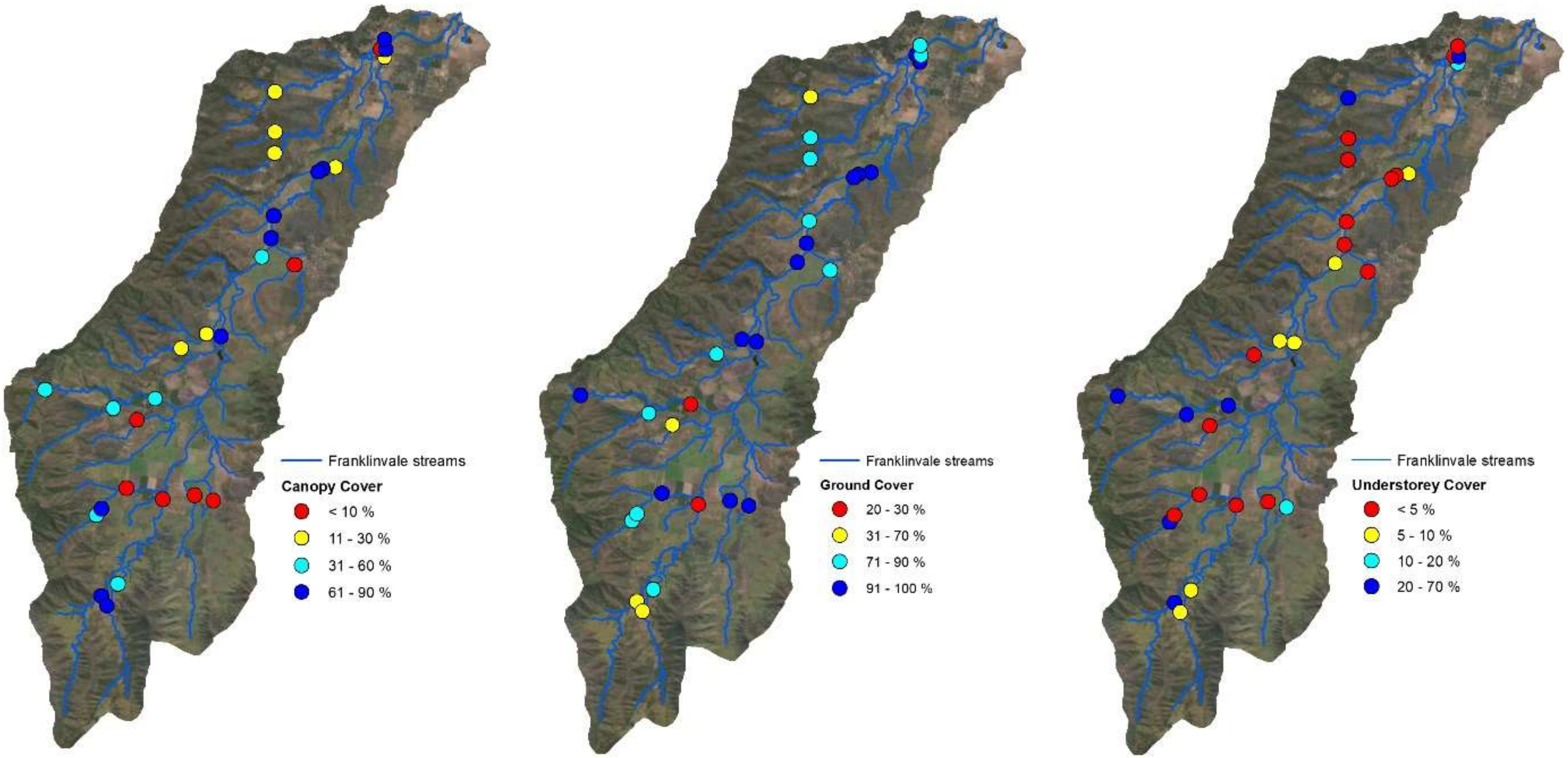

Figure 17. Percentage vegetation cover (canopy, understorey and groundcover) recorded at field survey sites in the Franklin Vale catchment. Point colour represents category of vegetation cover.

Table 13. Summary of vegetation condition metrics within each process zone and stream order based on field condition assessment showing average score for each metric

	Process zone			Stream order			
Attribute	**Foothills**	**Alluvium – Upper**	**Alluvium – Lower**	**1**	**2**	**3**	**4**
Canopy Cover (Average %)	31.36	28.44	55.5	44	34.63	36.66	38.5
Canopy (Native %)	72.27	62.22	87	98	65.45	40	79.5
Understorey Cover (Average %)	22.45	14.55	10.45	17	22.36	35	3.65
Understorey (Native %)	25.09	26.66	40.75	40.2	18.18	18.33	46.75
Groundcover (Average %)	83.64	71.11	95	83	76.82	76.66	92
Groundcover (Native %)	42.72	26.11	29	27	36.36	36.66	34
Vegetation continuity (Average %)	41.8	54.4	70.4	55	52.9	50	56.5
Aquatic leaf litter (% cover)	12.5	1.43	4.5	1.66	15	0	2.5
Terrestrial leaf litter (% cover)	45	30.63	65.5	45	41.66	40	57

Table 14. Weed species observed in the riparian vegetation during field surveys. Note: R indicated Restricted invasive plant status under the Biosecurity Act 2014, indicates an introduced but not a prohibited or restricted invasive plant

Species	**Status**	**# Sites observed**
Alternanthera philoxeroides (alligator weed)	R	1
Asparagus africanus (climbing asparagus fern)	R	1
Baccharis halimifolia (groundsel bush)	R	1
Celtis sinensis (chinese celtis)	R	7
Lantana camara (lantana)	R	8
Lantana montevidensis (creeping lantana)	R	1
Macfadyena unguis-cati (cat's claw creeper)	R	3
Sphagneticola trilobata (Singapore daisy)	R	1
Schinus terebinthifolius (pepper tree)	R	6
Koelreuteria elegans (golden rain tree)	I	2
Leucaena leucocephala	I	2
Macroptilium atropurpureum (siratro)	I	2
*Neonotonia wightii (*glycine)	I	11
Solanum mauritianum (wild tobacco)	I	1

6. Animals

6.1 Values

The Franklin Vale Creek catchment provides a range of habitats that are important in the larger context of the Ipswich City Council LGA and within southeast-Queensland. These habitats support a diverse community of terrestrial and aquatic fauna including three species listed as vulnerable in the QLD Nature Conservation Act (1992): Glossy black cockatoo (*Calyptorhynchus lathami*), Brush-tailed rock wallaby (*Petrogale penicillata*), and Koala (*Phascolarctos cinereus*) (Table 15). In addition, at least 220 fauna species have been recorded in the Atlas of Living Australia database: including 128 bird species, 58 insect species, 10 reptiles, 9 spiders, 9 mammals, and 5 frogs (Appendix 4, Table 22Table 22. Fauna species list extracted from Atlas of Living Australia within Franklin Vale Creek Catchment boundary). Other animals such as various turtles, platypus, and large bodied fish species have also been observed in the main creek channel anecdotally, although there is little quantitative evidence of such species and other aquatic animals.

Aroona station, in the southern end of the catchment, managed by Queensland trust for nature, and Old Hiddenvale Nature Reserve, on the western uplands, provide important protected habitat for several significant species, i.e., grey-headed flying fox (*Pteropus poliocephalus*), powerful owl (*Ninox strenua*), and glossy black cockatoo (*Calyptorhynchus lathami*).

Table 15. List of environmentally significant species (threatened, endangered, invasive) recorded within the Franklin Vale Creek catchment area. Data extracted from Atlas of Living Australia. Full table of species occurrences included as appendix

Species	**Common Name**	**Family**	**State conservation status**	**Class**
*Rhinella marina**	Cane toad	Bufonidae	Introduced	Amphibia
*Acridotheres tristis**	Indian Myna / Common Myna	Sturnidae	Introduced	Aves
*Hemidactylus frenatus**	Asian house gecko	Gekkonidae	Introduced	Reptilia
Calyptorhynchus lathami	Glossy black cockatoo	Cacatuidea	Vulnerable	Aves
Petrogale penicillata	Brush tailed rock wallaby	Macropodidae	Vulnerable	Mammalia
Phascolarctos cinereus	Koala	Phascolarctidae	Vulnerable	Mammalia

6.2 Threats

Franklin Vale catchment is home to several significant introduced and invasive species; including the cane toad (*Rhinella marina*), Asian house gecko (*Hemidactylus frenatus*) and the Common/Indian myna (*Acridotheres tristis*) all recorded in the ALA species database. Other pest animals include wild dogs and foxes which have been reported anecdotally.

The loss of habitat, through direct vegetation clearing, thinning of understorey, and increasing fragmentation between quality habitat patches, is a significant threat to the faunal community of Franklin Vale. Shrubby understorey, although commonly composed of exotic species such as lantana, is important habitat for small bird species (Parsons et al., 2008). the decline of koala populations nationally has been attributed to Large-scale vegetation clearing (Melzer et al., 2000). Fragmentation and loss of connectivity between remnant habitat patches is also likely to pose a threat to fauna.

Quality and quantity of water is important for aquatic fauna habitat. The intermittence of flow regimes within the Franklin Vale Creek catchment (Section 4) suggests that aquatic species may travel through waterways seeking adequate habitat throughout the year, dispersing during wetter periods and contracting to waterholes during dry periods (Marshall et al., 2016). Loss of these refugial habitats due to sediment infilling, human modification, and extreme drought could have dramatic effects on the aquatic fauna community, and the terrestrial species which also rely on these waterholes. Log jams and overhanging roots are important habitat for many aquatic fauna species, removal of these through river desnagging or physical bank stabilisation works can reduce the productivity of stream environments (Treadwell et al., 2007).

Runoff of sediment and chemicals from agricultural land is another significant threat for the Franklin Vale Creek affecting water quality, which alters the habitat suitability for aquatic species. The high proportion of agricultural land uses within the catchment (Section 3) suggests that a significant load of sediments and nutrients would be transported to the waterways during high flow periods, although there is little information of runoff water quality for this catchment.

Extreme climatic events such as fire and drought pose another threat to the fauna of Franklin Vale, both of which are likely to increase in frequency and severity with projected climate change.

Finally, a lack of information regarding wildlife, especially for aquatic species, poses a key threat to the conservation of wildlife in the Franklin Vale catchment. No local surveys have been conducted.

6.3 Condition

Prior assessment

The condition of aquatic habitat in the Franklin Vale catchment has previously been assessed as being in moderate condition overall, based on the observations of woody debris, hydraulic diversity and bank habitat (overhang, roots and vegetation) (Alluvium 2014 b). Insufficient information exists to assess the aquatic macroinvertebrate or fish communities (Alluvium 2014b). No assessment of terrestrial fauna community or habitat condition has been conducted.

Current assessment

Field survey results

Field assessment of catchment condition assessed the presence of instream and stream bank habitat features (e.g., log jams, overhanging roots, leaf litter, aquatic vegetation) rather than a rigorous survey of faunal communities.

The field assessment identified at least one aquatic habitat feature recorded in 63% of sites (examples in figure 18). Where aquatic habitat features were not observed, significant bank and stream bed modification had occurred to maintain road crossing stability. Visible log jams were more common in lower order streams of the headwaters. Aquatic vegetation was low throughout the catchment (only recorded at 7 sites) which was generally submerged grasses that likely grew during dry periods.

Aquatic habitat (water) was observed at 76% of sites during the field assessment. At these sites, pool habitats were dominant at 60% while run habitats were dominant at the remainder. Terrestrial habitat features included leaf litter, hollow bearing trees, and fallen logs. Hollow bearing trees and fallen logs were observed at 40% and 46% of sites respectively. Terrestrial leaf litter on stream banks was generally high (average 48% cover), apart from areas which had experienced significant erosion in the large rainfall events preceding the field assessment.

Figure 18. Examples of instream aquatic habitat observed during field assessment of Franklin Vale Creek catchment condition. Left: log jam. Right: instream emergent vegetation. Images: R. Grieger

7. People

7.1 Values

Community

The people of Franklin Vale catchment represent a great asset and resource upon which restoration success and sustainable management practices can and should rely. Understanding the values and history of the people, coupled with analyses of the region's population and demographics, represents an important first step in engaging in restoration works.

The Franklin Vale catchment has an indigenous history that is neither well documented nor well understood (see Appendix 7). However, understanding the connections between First Nations peoples and their country, both in terms of natural resource management and stories, represents an important starting point for understanding the human and environmental values of the Franklin Vale Catchment.

The modern history of the Franklin Vale catchment started with early colonisation of the region for sheep and cattle grazing. The first known settlers were the Mort Family, who moved into the region around 1840.

The current residents of the Franklin Vale catchment represent a diverse group of landholders, some with deep historical ties to the country and others that are relatively recent residents in the region. The current population density is less than 1 person per ha, although the scale of land use and land modifications in the region belies this relatively small population footprint.

Land use

Franklin Vale Creek runs from south to north through agricultural properties, with the dominant land use being grazing, but with some dryland agriculture in the alluvial areas. The Franklin Vale catchment was first colonised by the European settlers in the 1840s by the Mort Family for purpose of grazing sheep and cattle. Since then, more of the low lying and flatter parcels of land have been cleared for agricultural purposes leaving little remnant canopy or sub-canopy in place in some areas (see earlier sections of this report). This has led to degradation of the creek in some areas resulting in erosion and sediment flow out of the catchment (Evolve, 2018, plus earlier sections of this report).

The Franklin Vale catchment supports a range of agricultural land uses, predominantly grazing and dryland cropping, but also with some areas of irrigated crops (Figure 19, Table 16). Forestry and conservation also comprise significant land uses in the catchment.

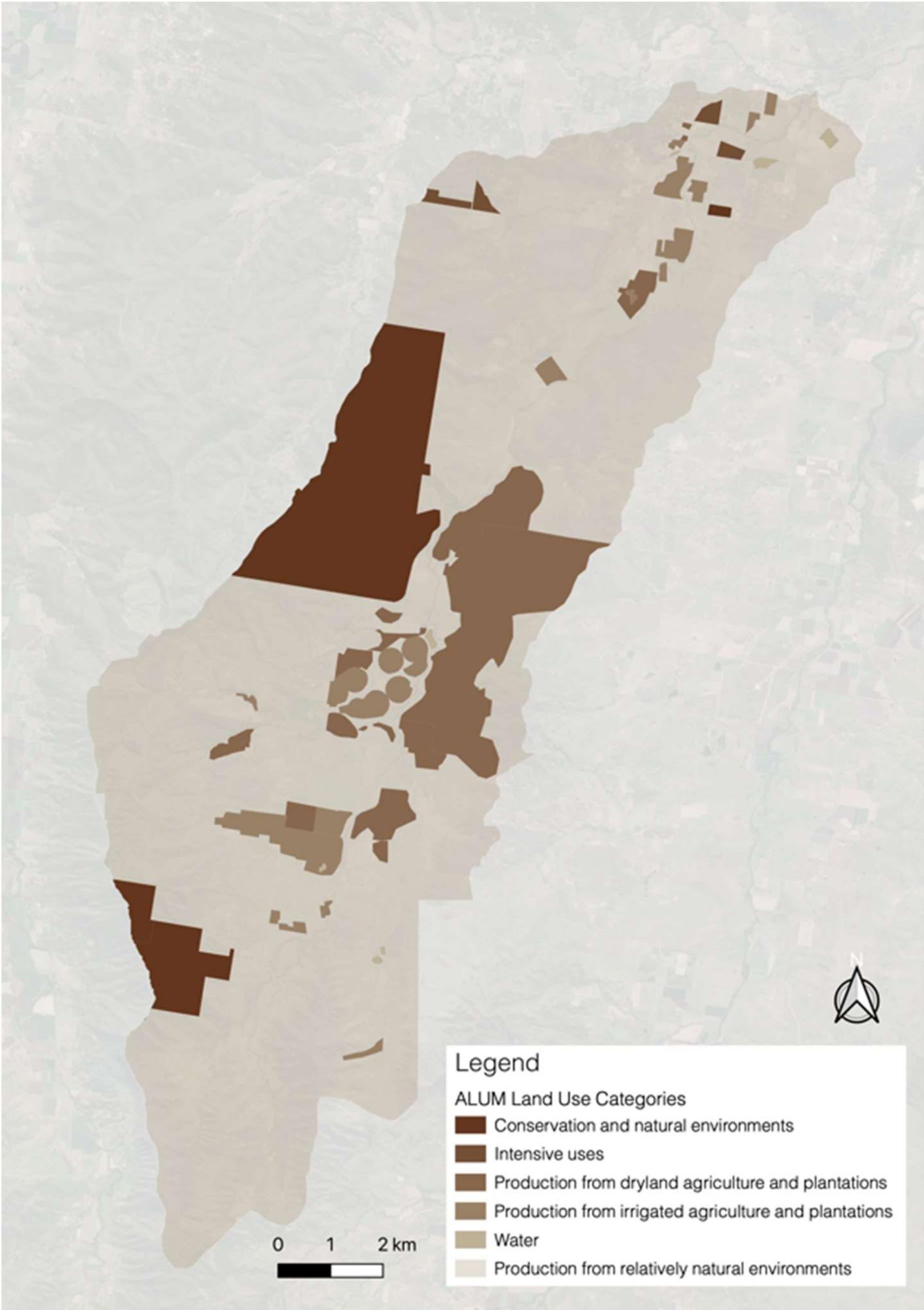

Figure 19. Land use across the Franklin Vale catchment.

Table 16. Land use in each geomorphic process zone derived from the Queensland Land Use Mapping Program (QLUMP). Note: Production form relatively natural environments includes grazing

Zone	Land use	Area
Uplands	Conservation and natural environments	8%
	Production from dryland agriculture	1%
	Production from relatively natural environments	91%
	Total area	32 km^2
Foothills	Conservation and natural environments	15%
	Intensive uses	1%
	Production from dryland agriculture	9%
	Production from relatively natural environments	75%
	Total area	73 km^2
Alluvium – Upper Catchment	Production from dryland agriculture	15%
	Production from irrigated agriculture	18%
	Production from relatively natural environments	67%
	Total area	17 km^2
Alluvium – Lower Catchment	Conservation and natural environments	2%
	Intensive uses	1%
	Production from dryland agriculture	14%

	Production from irrigated agriculture	7%
	Production from relatively natural environments	76%
	Total area	15 km^2

7.2 Threats

Beyond the threats to land and land use, which are covered in earlier sections of this report, it is also clear that there are ongoing and emerging threats to the lives of people living in the Franklin Vale Catchment. Threats linked to agricultural production systems, including geomorphic instability, declining water quantity and quality, floods and drought are longstanding challenges for residents. Importantly, current practices and interventions (including those driven by Ipswich City Council) are already addressing some of these threats. Indeed, ongoing weed management programs and the riparian restoration activities underway represent activities that are engaging the whole community, both in terms of actions and knowledge sharing and these should be continued and encouraged to foster ongoing action and goodwill throughout the Franklin Vale catchment.

The emerging concerns around fire and climate change related risks – extreme weather events beyond those that have been previously experienced, represent an ongoing challenge for the people of Franklin Vale catchment. On one hand, day-to-day operations still dominate the thought processes of many people, so longer-term and slightly fewer tangible threats are not easily seen or responded to. On the other hand, there remains some uncertainty and amongst some community members regarding the implications climate change may have for them, their families and their businesses. Ongoing consultation and engagement will be necessary to help the people of the Franklin Vale catchment community understand and incorporate their knowledge of changing climatic conditions into their own lives and livelihoods to minimise or avoid catastrophic consequences into the future.

7.3 Condition

Prior assessment

Previous assessments of catchment condition in the Franklin Vale catchment did not assess or consider the community, so no prior assessment is possible.

Current assessment

Field survey results (creek crossing assessment)

Field assessment of catchment condition revealed that significant modifications to channel form and complexity are evident at all creek crossing sites. These represent challenges both in terms of erosion potential and in terms of habitat quality and complexity for aquatic fauna. Many sites had significant bankside works around bridges, which included rocks and concrete (Figure 21).

In addition, across the surveyed sites, a wide range of culvert types and sizes was observed – some were as small as being 30 cm in diameter, others were greater than 3m in diameter. One of the smaller culverts was blocked at the time of the survey and there was evidence of significant downstream erosion (Figure 20). Although a detailed analysis of culverts throughout the entire catchment was not conducted, there are certainly concerns around the degree to which this infrastructure may be a threat to the condition of the catchment and the water quality exiting the catchment.

Figure 21. Banks around large bridges (left: Schmidt’s Bridge – Grandchester-Mt Mort Rd, right: Franklyn vale Rd) reinforced with large rocks and concrete. Images: R. Grieger

Figure 20. Erosion following a small blocked culvert at one creek crossing. Image: R. Grieger

While access to private properties was limited in the field survey activities, it has been noted that there are generally fewer bank modifications on private properties, perhaps only except for areas where cattle gain access to, or are able to cross, the streambed.

Other infrastructure includes the use of fencing, with fences present in some areas along the tops of steep stream banks. While there appeared (in the field survey) to be minimal use of fences on lower banks, there was also minimal evidence of heavy stock access. More work is clearly required to understand the interactions between stock management practices and the use of infrastructure to protect stream banks on private properties throughout the Franklin Vale Catchment.

Community engagement lessons

Recognising that people sit at the heart of land and water management, this project has sought to actively engage with the Franklin Vale Catchment community. Two substantial stakeholder events have placed the community at the heart of project activities (see Appendix 6).

With the assistance of Ipswich City Council, the project team has achieved a high level of community engagement, with many attendees at both events. More importantly, it must be acknowledged that the Franklin Vale Catchment community has been actively engaged throughout the project. Not only has this resulted in rich sharing of knowledge and stories of the catchment, but it has also enabled Ipswich City Council and the landholders in the Franklin Vale Catchment to get to know each other – more than any other analysis provided in this report, the relationships forged through the stakeholder engagement part of this project will enable cohesive and well-informed acceptance of restoration and protection actions in the catchment. Indeed, stories shared, and lessons learned from the stakeholder workshops have revealed both a high level of understanding of land management as well as a range of individual actions that have been taken to maintain the condition of natural resources in the Franklin Vale Catchment. The people of Franklin Vale Catchment and their cohesion, having been brought together successfully in two community events throughout the life of this project, represent a tremendous resource and opportunity for ongoing works in the catchment. Beyond the goodwill fostered during this project, there is now momentum and support for a more engaged community-level organisation that will support catchment-focused interventions, share knowledge and lever additional sources of funding to support ongoing works in the region.

8. Synthesis and key findings

8.1 Key findings

Land

- Rates of erosion are generally low across the catchment based on both remotely sensed data and field inspections.

- A small number of sites appear to be experiencing relatively high rates of erosion. These comprise locations on second and third order streams in the Upper Alluvium zone, as well as a stream segment along a fourth order stream in the Lower Alluvium zone.

Water

- There was a large amount of water present in the catchment at the time of the field survey and water quality physical conditions were generally good (i.e., dissolved oxygen), likely reflecting inflows from recent rainfall.
- Large and smaller pools present at many sites offer potential habitat for fish, turtles, and habitat.
- There was no data available to assess water quality in terms of sediment, nutrient and pathogen loads present in Franklin Vale Creek during baseflow conditions or rainfall events. This data would be valuable to understand the quality of water exiting the catchment which is transported downstream to the Bremer River.

Plants

- Approximately 50% of the Uplands zone is covered by remnant vegetation of open forest and woodlands dominated by river red gum or blue gum and/or coolabah.
- The Foothills zone retains approximately 30% remnant vegetation. However, on the western flank of the catchment, this appears to have shifted from open forest and woodlands dominated by spotted gum (prior to European settlement) to ironbark woodlands.
- Very little remnant vegetation is present on floodplains of either Alluvial zone with historically prevalent woodlands and open woodlands dominated by coolabah, black box or blue gum, having been entirely extirpated.
- Within riparian buffers, the main stem of the Franklin Vale Creek is relatively well vegetated as are first order streams of the Uplands zone.
- Riparian vegetation cover is relatively low in second and third order streams of both Alluvial zones (though higher in the Lower Alluvium).
- Invasive plants, including Chinese elm and lantana, are prevalent in riparian zones of the catchment. While riparian canopies are mostly dominated by native species, shrub and groundcover layers, where present, have a high proportion of exotic species.

Animals

- While broadscale data, such as presented in the Atlas of Living Australia, indicates a diverse community of terrestrial and aquatic species is likely to inhabit the Franklin Vale catchment, there is very little locally collected data available to support assessment of aquatic and terrestrial fauna in the catchment.
- Field assessment supports prior claims of moderate condition instream habitat.
- Terrestrial and aquatic habitat highly variable throughout field sites, further assessment of temporal and spatial variability required.

People

- Road crossings were variable in structure and condition. Smaller culverts blocked with debris have resulted in significant downstream erosion.
- Franklin Vale catchment has a diverse but cohesive community. Community activities conducted during this project indicate that there is a wealth of knowledge regarding the catchment and a strong interest in engaging and supporting catchment restoration and management.

8.2 Synthesis

Despite high levels of vegetation clearing across the catchment, Franklin Vale exhibits relatively stable geomorphic conditions, although there are several areas of localised instability and erosion evident (Table 17). These mostly occur along second and third order streams of the Upper Alluvial zone as well as a small stretch of a fourth order stream in the Lower Alluvial zone. These areas are also associated with low to moderate levels of riparian canopy cover and lower continuity of riparian vegetation as well as lower levels of shrub and groundcover.

While the Franklin Vale catchment is unlikely to be a major contributor of sediment to the Bremer River, multiple sources of evidence indicate that it is relatively unstable compared with other catchments in the Council's LGA. The catchment also has high ecological and agricultural productivity values as well as a highly engaged and cohesive community. Consequently, the Franklin Vale catchment provides a unique and ideal setting for developing a holistic, scientifically informed, and collaborative approach to catchment restoration to achieve local water quality and land stability benefits as well as multiple beneficial outcomes for biodiversity and people, many of which are likely to be regionally significant.

Table 17. Synthesis of condition assessment by geomorphic zone

	Uplands	Foothills	Upper Alluvium	Lower Alluvium	Overall
Land	Generally stable	Generally stable	Generally stable, with some examples of localised instability	Generally stable, with some examples of localised instability	Generally stable, with some examples of localised instability
Water	Substantial amounts of water likely to be only present during events (1st and 2nd order streams only). Most sites dry at the time of sampling.		Water likely to persist longer in these zones following events and some large pools were present. Water present at most sites at the time of sampling, with good dissolved oxygen levels.		More data is required to determine the impact of rainfall events on sediment, nutrient and pathogens in the creek.
Plants	Relatively well vegetated with ~ 50 % remnant vegetation and >50 % canopy cover in riparian buffers.	Relatively well vegetated with ~ 30 % remnant vegetation. Shift from spotted gum woodlands to ironbark wetlands appears to have occurred on western flank. Moderate to high canopy cover (44-45 %) in riparian buffers.	Lower continuity and lower canopy cover of riparian vegetation. Higher canopy cover on main stem.	Lower continuity (but higher than Upper Alluvium zone) and lower canopy cover of riparian vegetation. Higher canopy cover on main stem.	Moderate to high clearing of remnant vegetation across the catchment. Moderate continuity and canopy cover of riparian vegetation, with mostly native species. High prevalence of exotic species in shrub and groundcover layers.
Animals	Some instream and bank habitat features recorded throughout suggesting moderate condition, although further surveying of faunal communities is required to understand condition. Further understanding of hydrology and water persistence will inform aquatic habitat condition.				
People	The people of Franklin Vale Catchment represent a diverse, yet cohesive, community with a strong interest in maintaining the quality of their environment and supporting livelihoods of all residents in the catchment. Ongoing engagement represents a tremendous opportunity to lever the goodwill generated through stakeholder events and build more momentum to support catchment-focused interventions that will improve land, water, plants, animals and the people of the region.				

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Appendix 1. Information Log

Table 18. Spatial data

Name	Focus	Publisher	Extent	Year Published	Temporal extent	Resolution	References
Land use mapping - 1999 to 2013 - South East Queensland NRM	Land use	Department of Science, information technology innovation Queensland Land Use Mapping Program	Southeast-Queensland NRM region	2014	1999-2013	1:50,000	http://www.qld.gov.au/environment/land/vegetation/mapping/qlump
Wooded extent and foliage projective cover	Vegetation	QLD, Department of Environment and Science	Statewide	2015	1988-2013	30 x 30m	Armston, J.D., Denham, R.J., Danaher, T.J., Scarth, P.F. and Moffiet, T., 2008, Prediction and validation of foliage projective cover from Landsat-5 TM and Landsat-7 ETM+ imagery for Queensland, Australia. Journal of Applied Remote Sensing, 3: 033540-28. Kitchen, J., Armston, J., Clark, A., Danaher, T., and Scarth, P., 2010, Operational use of annual Landsat-5 TM and Landsat-7 ETM+ image time-series for mapping wooded extent and foliage projective cover in north-eastern Australia. Proceedings of the 15th Australasian Remote Sensing and Photogrammetry Conference, Alice Springs, Australia, 13 - 17 September 2010.
2009 Ipswich City Council LiDAR	Land surface					1 x 1m; 0.15m vertical accuracy	
2014 Ipswich City Council LIDAR	Land surface, and canopy height and extent					1 x 1m; 0.3m vertical accuracy	

Name	Focus	Publisher	Extent	Year Published	Temporal extent	Resolution	References
2011 Scenic Rim Council LiDAR	Land surface					1 x 1m; 0.15m vertical accuracy	
Bremer catchment Digital Terrain Model	Topography	Ipswich City Council	Bremer catchment within Council LGA	2020	2019		
Catchment Franklin Vale creek DTM 2019	Topography	Ipswich City Council	Franklinvale creek catchment	2020	2019		
Wetland extent	Wetlands	QLD, Department of Environment and Science	Statewide	2019	2019	1:100,000	
Regional Ecosystem mapping - preclear and remnant	Vegetation/ecosystems	QLD, Department of Environment and Science	Statewide	2021	2019		
SLATS data 1988-2018	Vegetation	QLD, Department of Environment and Science	Statewide	2019	1988-2018	1:100,000	
Fire extent and severity 2019-2020	Fire	Department of Environment and science	SEQ	2020	2019-2020		

Name	Focus	Publisher	Extent	Year Published	Temporal extent	Resolution	References
Queensland weed distribution - current	Vegetation	Department of Agriculture and Fisheries	QLD	2018	2017		

Table 19. Reports

Name	Focus	Publisher	Extent	Year Published	Temporal extent	References
Aquatic conservation assessment using AQUABAMM for riverine and non-riverine wetlands in SEQ				2015		EHP. 2015. An Aquatic Conservation Assessment for the riverine and non-riverine wetlands of southeast-Queensland catchments. Brisbane: Department of Environment and Heritage Protection, Queensland Government.
Ipswich City Council geomorphology and vegetation assessment of waterways	Goemorphology and vegetation	Alluvium	Ipswich Council LGA	2014	2014	Alluvium (2014). Ipswich City Council geomorphology and vegetation assessment of waterways. Report P413022_R01by Alluvium Consulting Australia for Ipswich City Council
Assessing values and condition of waterways in Ipswich City Council LGA	Stream condition	Alluvium	Ipswich Council LGA	2014	2014	see page 152 for additional data sources Alluvium (2014). Assessing values and condition of waterways in Ipswich City Council Local Government Area. Report P413022_R02by Alluvium Consulting Australia for Ipswich City Council

Name	Focus	Publisher	Extent	Year Published	Temporal extent	References
Land use summary 1999-2012	Land uses	QLD gov	Bremer river catchment	2014	1999-2012	DSITIA. 2014,Land use Summary 1999–2012: Bremer River sub-catchment,Department of Science, Information Technology, Innovation and the Arts, Queensland Government.

Table 20. Other resources

Name	Focus	Publisher	Extent	Year Published	Temporal extent	References
Bureau of Meteorology	Weather	Bureau of Meteorology	Franklin Vale creek catchment	2021	2000-2021	
Atlas of Living Australia	Flora and fauna	ALA	Franklin Vale creek catchment	2021	continuing	

Appendix 2. Spatial data analysis methods

- Created DEM of whole catchment by merging the 2009 COUNCIL DEM with the 2011 Scenic Rim DEM
    - Total catchment area of 138 km^2
- Used this DEM to define
    - Slope in degrees
    - Streams
        - Used complete DEM and extracted waterways in the catchment based on flow accumulation
- Stream order
    - Used waterways to identify Strahler stream order
- Defined geomorphic zones
    - Used slope, geology and soil spatial layers, and soil definitions presented in ICC (undated)
    - Upland
        - Slope higher than 6°
        - The 'tertiary basalt' geology category identified upland areas well
        - Dominated by Dermosol soils, which are non-cracking clay to clay loam
        - ~32 km^2
    - Foothills
        - Majority (but particularly the Western flank) also characterised by slopes higher than 6°, however not as consistent and indicates undulating hills with slopes alternating between > and < 6°
        - Dominated by the Marburg and Walloon geologies
        - Dominated by Sodosol/Chromosol soils, which are sodic and non-sodic texture contrast
        - ~73 km^2
    - Alluvium
        - Combined the 'Quaternary alluvium' and 'Tertiary-Quaternary alluvium' categories
        - Alluvium is dominated by Vertosol soils (cracking-clays), with some small pockets of Sodosol/Chromosol
        - Divided into Upper and Lower catchment based on the choke point near the centre of the catchment
        - Upper: ~17 km^2
        - Lower: ~15 km^2
- Processing
    - At each of the four process zones
        - Determined the pre-clearing and current vegetation composition for broad categories of cleared and not cleared, and also for the actual species composition
    - For different stream orders
        - Defined buffers of different sizes centred on the thalweg depending on stream order
            - 1st order: 15m
            - 2nd order: 20m

        - 3rd order: 25m
        - 4th order: 35m
    - Canopy cover
        - Looked at 2014 LiDAR derived canopy height model (CHM) and divided into two height categories
            - 1-5m
            - >5m
        - Calculated the percent canopy cover of each vegetation height category in each stream order buffer
        - Identified issues
            - The southeast corner of the catchment was not captured in the 2014 LiDAR and therefore it was not possible to derive a canopy cover estimate.
            - The CHM occasionally captured powerlines and/or buildings. This occurred infrequently and is most likely a minor issue.
    - Erosion
        - Subtracted the 2014 DEM from the 2009 DEM to determine erosion between the two time periods. Only looked at erosion greater than a threshold 0.5m to have greater confidence in identifying true erosion.
        - Divided the volume of erosion in each stream order segment by the area of that segment to derive a m3/m2 erosion rate to allow buffers of different lengths and areas to be compared.
        - Identified issues
            - The southeast corner of the catchment was not captured in the 2014 LiDAR and therefore it was not possible to derive an erosion estimate. However this is most likely a minor issue as inspection of aerial imagery at this location indicated relatively minor erosion.
            - Incorrectly identifying erosion
                - In areas of dense veg cover
                - When waterways cross a dam or water storage whose level changed between LiDAR capture dates
                - When water levels in the channel changed between LiDAR capture dates. This seems to be a bigger issue on the fourth order streams when more water is present at baseflow
            - If a segment has a reasonable amount of erosion and it is relatively short it shows up as having a high erosion per area. This is accurate, however may not be completely appropriate to target this small segment for rehabilitation works.
- For stream order and zone
    - The stream order segments falling within each zone were extracted

- As not everywhere will respond to vegetation clearing in a similar way due to variation in flow energy and resistance of channel banks, erosion was used as the primary factor guiding investment
- Within the higher eroding segments, current vegetation extent was used to further refine priority areas

Appendix 3. Rapid field assessment methods and data processing

This method is based on several rapid assessment methods that are widely used by natural resource managers to assess stream and riparian condition (e.g. rapid appraisal of riparian condition – Jansen et al., 2005, state of the rivers – QLD department of natural resources and mines, 2003). Our method is designed to be comprehensive and rigorous yet easily applicable at a variety of sites, rapid, and transferrable between catchments.

1. **Desktop analysis**

Prior to fieldwork, a desktop analysis of the catchment was conducted to select sites suitable for the assessment. Satellite images, stream network information and analysis of road networks were used to select sites at intersection of creeks and roads. Additional sites were also selected in consultation with landholders who agreed to property access.

2. **Fieldwork**

At selected locations, at least a 30 m transect was assessed for the survey. Sites at road crossings were assessed approximately 10 m either side of the road or within the road buffer before fencing restricted access. Sites on private property were established as 30 m along the stream. Five categories of stream condition were assessed: land, water, flora, animals, and people. Photographs were taken at each location for future references.

i) **Land.** Riparian width (width of woody vegetation from banks to the end of the riparian zone – determined by fencing or clear delineation between riparian and upland) and presence or absence of a fence and its functionality (quality) were recorded. Banks' slope (vertical, steep, moderate, low, and flat) and shape (concave, convex, stepped, wide lower bench, or undercut) were determined, any evidence of active erosion was assessed. Erosion was presented in four categories: nil to minor (minimal exposed bank, no evidence of recent gullying), minor to moderate (small areas of ripped bank, not continuous along bank), significant less than 2 m (ripped banks and strong visible evidence of erosion along lower banks), and significant more than 2 m (strong visible evidence of major erosion along all banks). Stock grazing pressure (none, low to moderate, high) and stock type were identified, as well as any evidence of heavy stock usage.

ii) **Plants.** The continuity of riparian vegetation within the transect on each bank (estimated percentage of bank covered with continuous canopy vegetation - greater than 2 m) was measured, and a number of significant discontinuities (breaks in canopy cover) recorded. Total canopy, understory, and ground cover for both banks were estimated, with an additional indication of a percentage of native and introduced (exotic) species for each stratum. Any additional vegetation features of interest (e.g. identified species, thickets of invasive plants, native regrowth, large native or exotic trees etc.) were described.

iii) **Water.** The wetted stream width and depth for three to five chosen points distributed evenly along the transect were recorded. The percentage of shading of the stream bed and stream's visible depth were estimated. When water was present in the creek, turbidity, conductivity, pH, and dissolved oxygen at three points of the transect were measured with a YSI multiprobe. When water was not turbid or not present, a percentage of fine sediment covering the stream bed was estimated. Three quadrats (1 m x 1 m) were set up to examine sediment composition, and the percentages of rocks, cobbles, pebbles, gravel, sand, and silt were recorded.

iv) **Fauna.** Aquatic habitat features rather than presence of animals were assessed. The leaf litter within stream channel at every site was recorded in percentage, while individual submerged logs, twigs, branches, log jams, and root overhang were tallied. The continuity for fish passage was investigated and possible obstructions in the waterway (e.g. high dam, weir or waterfall, cascade rapid, log jam, culvert, logs, but also low features like sand bars, etc.) identified and recorded as presence/absence. The presence of terrestrial and aquatic habitat features was indicated: leaf litter cover on banks, the presence of hollow bearing trees and a presence of fallen logs. Any fauna seen at a site was counted and recorded, as well as indicators of its presence (e.g. nests, scats, mark on tree bark etc.).

v) **People.** Any infrastructure present at a site (e.g. bridge, weir, artificial bank protection structure, fencing) was described, and its photo reference taken.

3. Data analyses

The collected data was summarised for the whole catchment, as well as within each process zone and stream order, with average calculated for quantitative variables. Points were mapped by site location and colour coded by attribute score.

Appendix 4. Species lists

Table 21. Flora species list extracted from Atlas of Living Australia within Franklin Vale Creek Catchment boundary

Species name	Common Name	State conservation status	Endemicity
Acacia decora	Western Silver Wattle	Least Threatened	Native
Acacia glaucocarpa	Hickory Wattle	Least Threatened	Native
Acacia maidenii	Maiden's Wattle	Least Threatened	Native
Acanthospermum hispidum	Starburr		Naturalised
Achyranthes aspera	Chaff Flower	Least Threatened	Naturalised
Agathis robusta	QLD Kauri pine	Least Threatened	Native
Alectryon diversifolius	Holly bush / Scrub Boonaree	Least Threatened	Native
Alloteropsis semialata	Cockatoo grass	Least Threatened	Native
Alstonia constricta	Quinine bush	Least Threatened	Native
Amaranthus macrocarpus	Dwarf amaranth		
Amaranthus viridis	Green pigweed		
Ambrosia artemisiifolia	Annual rag weed		Naturalised
Ambrosia psilostachya	Perennial ragweed		
Amyema cambagei	Shea oak mistletoe	Least Threatened	Native
Angophora subvelutina	Broad leaved apple	Least Threatened	Native
Anoda cristata	Anoda weed		
Anredera cordifolia	Maderia vine		Naturalised
Apowollastonia spilanthoides	Rock daisy	Least Threatened	Native
Asclepias curassavica	Red-headed cotton bush		Naturalised
Asplenium australasicum	birds nest fern	Least Threatened	

Species name	**Common Name**	**State conservation status**	**Endemicity**
Auranticarpa rhombifolia	Hollywood	Least Threatened	Native
Bothriochloa bladhii	Forest bluegrass	Least Threatened	
Brachychiton populneus	Kurrajong		
Callitris baileyi	Bailey's Cypress	Near Threatened	
Calotis cuneata	blue burr daisy	Least Threatened	Native
Calotis lappulacea	yellow burr daisy/ bogan flea	Least Threatened	Native
Capparis mitchellii	Bimbil / wild orange	Least Threatened	Native
Cassinia laevis	cough bush / dead finish	Least Threatened	Native
Cayratia clematidea	Slender grape		Native
Cenchrus longisetus	feather top		Naturalised
Cenchrus setaceus	African fountain grass		Naturalised
Cheilanthes sieberi			
Chloris virgata	Feather top rhodes grass	Least Threatened	Naturalised
Chrysocephalum apiculatum	Common everlasting		Native
Coleus graveolens		Least Threatened	Native
Convolvulus arvensis	Field bindweed		Naturalised
Convolvulus graminetinus		Least Threatened	Native
Corchorus trilocularis	Wild jute	Least Threatened	Native
Corymbia clarksoniana	Grey bloodwood	Least Threatened	Native
Corymbia intermedia	Pink bloodwood	Least Threatened	Native
Corymbia tessellaris	Moreton Bay ash	Least Threatened	Native
Crotalaria brevis		Least Threatened	Native
Crotalaria lanceolata	Lance Leaf Rattlepod		Naturalised
Crotalaria montana		Least Threatened	Native

Species name	**Common Name**	**State conservation status**	**Endemicity**
Cyanthillium cinereum	Vernonia		
Cymbidium canaliculatum	black orchid	Least Threatened	Native
Cyperus brevifolius	Mullumbimby couch		Naturalised
Cyperus sanguinolentus		Least Threatened	Native
Dendrobium gracilicaule	Slender orchid	Least Threatened	Native
Dendrophthoe vitellina	Lnog-flowered mistletoe	Least Threatened	Native
Desmodium gangeticum		Least Threatened	Native
Dockrillia schoenina	Pencil Orchid	Least Threatened	Native
Dodonaea viscosa	Sticky hopbush		Native
Eragrostis brownii	Brown's Lovegrass	Least Threatened	Native
Erythrina numerosa		Least Threatened	Native
Eucalyptus crebra	Narrow leaved iron bark	Least Threatened	Native
Eucalyptus melanophloia	Silver ironbark	Least Threatened	Native
Eucalyptus melliodora	Yellow box	Least Threatened	Native
Eucalyptus tereticornis	Forest Red gum	Least Threatened	Native
Evolvulus alsinoides	baby blue eyes	Least Threatened	Native
Exocarpos cupressiformis	Native Cherry	Least Threatened	Native
Ficus coronata	Creek Sandpaper fig	Least Threatened	Native
Ficus opposita	Sandpaper fig	Least Threatened	Native
Fimbristylis dichotoma	Common fringe rush	Least Threatened	Native
Flindersia schottiana	Bumpy Ash/ Cudgerie	Least Threatened	Native
Fumaria muralis	Wall fumitory		Introduced
Gahnia aspera	Cut sedge/ saw sedge	Least Threatened	Native

Species name	Common Name	State conservation status	Endemicity
Gleditsia triacanthos	McConnels Curse / Honey Locust tree		Introduced
Glossocardia bidens	native cobblers pegs	Least Threatened	Native
Gomphocarpus fruticosus	narrow leaved cotton bush		Introduced
Gomphocarpus physocarpus	balloon cotton bush		Introduced
Gomphrena celosioides	Gomphrena weed/soft khakiweed		Introduced
Grewia latifolia	Dysentery plant	Least Threatened	Native
Hardenbergia violacea	False sarsparilla	Least Threatened	Native
Heliotropium amplexicaule	blue heliotrope		Introduced
Heteropogon contortus	black speargrass	Least Threatened	Native
Hyparrhenia filipendula	Tambookie grass	Least Threatened	Native
Hyparrhenia rufa	Thatch grass		Introduced
Indigofera linnaei	Birdsville indigo / nine leaved indigo	Least Threatened	Native
Iphigenia indica		Least Threatened	Native
Ipomoea batatas	Sweet potato		Introduced
Ipomoea plebeia	Bellvine	Least Threatened	Native
Jacaranda mimosifolia	Jacaranda		Introduced
Jacksonia scoparia	Dogwood	Least Threatened	Native
Jagera pseudorhus	Ferntree / foambark	Least Threatened	Native
Lantana camara	Lantana		Introduced
Lespedeza juncea		Least Threatened	Native
Lomandra laxa	Broad leaved matrush	Least Threatened	Native
Lophostemon suaveolens	Swamp box	Least Threatened	Native

Species name	Common Name	State conservation status	Endemicity
Ludwigia octovalvis	Willow primrose	Least Threatened	native
Lysiana subfalcata	Northern mistletoe	Least Threatened	Native
Maclura cochinchinensis	Cockspurthorn	Least Threatened	Native
Macroptilium lathyroides	Phasey Bean		Introduced
Macrotyloma uniflorum	Horsegram		Introduced
Maireana microphylla	small-leaved bluebush	Least Threatened	Native
Mallotus philippensis	red kamala	Least Threatened	Native
Melaleuca irbyana		Endangered	Native
Melaleuca styphelioides	Prickly paperbark	Least Threatened	Native
Melia azedarach	White cedar	Least Threatened	Native
Melinis repens	red natal grass		Introduced
Murdannia graminea	murdannia	Least Threatened	Native
Neptunia gracilis	Sensitive plant	Least Threatened	Native
Oplismenus compositus	running mountain grass	Least Threatened	Native
Oxalis dillenii	wood sorrel		
Panicum decompositum	Native millet	Least Threatened	Native
Petalostigma pubescens	quinine tree/ bitter bark		
Pimelea glauca	smooth riceflower	Least Threatened	Native
Plectranthus graveolens	fleabush		Native
Polygonum aviculare	wireweed		Introduced
Polymeria calycina	pink bindweed	Least Threatened	Native
Portulaca oleracea	pigweed		Introduced
Portulaca pilosa	hairy pigweed		Introduced
Psydrax odorata			

Species name	**Common Name**	**State conservation status**	**Endemicity**
Pterocaulon redolens			
Ptychomitrium australe			
Rhaponticum australe			
Rhinerrhiza divitiflora			
Rivina humilis			
Rosulabryum subfasciculatum			
Salvia reflexa	Mintweed		Introduced
Schinus terebinthifolia	Broad leaved pepper tree		Introduced
Senecio madagascariensis	fireweed		Introduced
Senna didymobotrya			
Senna pendula	Easter Cassia		Introduced
Sida cordifolia			
Sida hackettiana			
Sida spinosa			
Smilax australis			
Solanum elaeagnifolium	silver leaf nightshade		Introduced
Solanum mauritianum	Wild tobacco		Introduced
Solanum seaforthianum	Brazillian nightshade		Introduced
Solidago altissima			
Spermacoce brachystema			
Tetrastigma nitens			
Triticum aestivum			
Vallisneria nana			
Verbena gaudichaudii			

Species name	**Common Name**	**State conservation status**	**Endemicity**
Verbena rigida			
Viscum articulatum			
Vittadinia dissecta			
Wahlenbergia capillaris			
Zinnia peruviana			
Zornia dyctiocarpa			

Table 22. Fauna species list extracted from Atlas of Living Australia within Franklin Vale Creek Catchment boundary

Species	Common Name	State conservation status
Acanthiza chrysorrhoa	Yellow rumped thornbill	Least Concern
Acanthiza reguloides	Buff rumped thornbill	Least Concern
Acanthorhynchus tenuirostris	Eastern spinebill	Least Concern
Accipiter cirrocephalus	Collared sparrowhawk	Least Concern
Accipiter fasciatus	Brown goshawk	Least Concern
Accipiter novaehollandiae	Grey goshawk	Least Concern
Achyra affinitalis	Cotton web spinner	
Acontia nivipicta	Blotched shoulder	
Acridotheres tristis	Indian Myna / Common Myna	Introduced
Acrocephalus australis	Australian reed warbler	Least Concern
Alisterus scapularis	Australian king parrot	Least Concern
Anas gracilis	Grey teal	Least Concern
Anas superciliosa	Pacific black duck	Least Concern
Anhinga novaehollandiae	Australasian darter	Least Concern
Anilios ligatus	Robust blind snake	Least Concern
Anthrax maculatus	Anthrax bee fly	
Anthus novaeseelandiae	Australasian pipit	Least Concern
Aphaenogaster longiceps	Funnel ant	
Aphaenogaster pythia	Funnel ant	
Apiomorpha conica	Egg shaped gumtree gall	
Apiomorpha floralis		
Apiomorpha munita	Four horned gumtree gall	
Apiomorpha strombylosa	Eucalypt gall	

Species	Common Name	State conservation status
Apiomorpha urnalis	Urn shaped gumtree gall	
Aquila audax	Wedgetailed eagle	Least Concern
Ardea alba	Eastern great egret	Least Concern
Bubulcus ibis	Cattle egret	Least Concern
Ardea intermedia	Intermediate egret	Least Concern
Ardea pacifica	White necked heron	Least Concern
Argiope protensa		
Armadillidium vulgare	roly poly	
Artamus cyanopterus	Dusky woodswallow	Least Concern
Asota plagiata	two spots tigermoth	
Asperala erythraea		
Austracantha minax	Australian jewel spider	
Aviceda subcristata	Pacific bazar	
Aythya australis	Hardhead	Least Concern
Barea leucocephala		
Boiga irregularis	Brown tree snake	Least Concern
Cacatua galerita	Sulphur crested cockatoo	Least Concern
Cacatua sanguinea	Little corella	Least Concern
Cacomantis flabelliformis	Fantailed cuckoo	Least Concern
Calcarifera ordinata	Wattle cup caterpillar	
Caligavis chrysops	Yellow faced honeyeater	Least Concern
Calomela ruficeps	metallic green acacia beetle	
Calyptorhynchus lathami	Glossy black cockatoo	Vulnerable
Centropus phasianinus	Pheasant coucal	Least Concern

Species	**Common Name**	**State conservation status**
Chelodina longicollis	Eastern snake necked turtle	Least Concern
Chenonetta jubata	Australian wood duck	Least Concern
Cisticola exilis	Golden headed cisticola	Least Concern
Colepia ingloria	Robber fly	
Colluricincla harmonica	Grey shrike thrush	Least Concern
Comostola laesaria	Red dotted emerald moth	
Coracina novaehollandiae	Black faced cuckoo shrike	Least Concern
Corvus orru	Torresian crow	Least Concern
Coturnix ypsilophora	Brown quail	Least Concern
Cracticus nigrogularis	Pied butcherbird	Least Concern
Cracticus torquatus	Grey butcherbird	Least Concern
Crinia parinsignifera	Beeping froglet	Least Concern
Cryptoblepharus pulcher	Elegant snake eyed skink	Least Concern
Cyclorana brevipes	Superb collared frog	Least Concern
Cystosoma saundersii	Bladder cicada	
Dacelo novaeguineae	Laughing kookaburra	Least Concern
Danaus chrysippus	Lesser wanderer	
Daphoenositta chrysoptera	Varied sittella	Least Concern
Deinopis subrufa	rufus nes casting spider	
Dendrocygna eytoni	Plumed whistling duck	Least Concern
Diathrausta ochreipennis		
Dicaeum hirundinaceum	Mistletoe bird	Least Concern
Dicranolaius bellulus		
Dicrurus bracteatus	Spangled drongo	Least Concern

Species	**Common Name**	**State conservation status**
Didymuria violescens	Spurr legged phasmid	
Digitonthophagus gazella	Gazella dung beetle	
Diplacodes haematodes	Scarlet percher	
Distipsidera undulata	tree trunk tiger beetle	
Donuca castalia	brown white banded noctuid	
Egretta novaehollandiae	White faced heron	Least Concern
Elanus axillaris	Black shouldered kite	Least Concern
Elseyornis melanops	Black fronted dotterel	Least Concern
Entomyzon cyanotis	Blue faced honeyeater	Least Concern
Eolophus roseicapilla	Galah	Least Concern
Eopsaltria australis	Eastern yellow robin	Least Concern
Ephippitytha trigintiduoguttata	Spotted katydid	
Ethmia sphaerosticha		
Eudynamys orientalis	Pacific koel	
Eurystomus orientalis	Oriental dollarbird	Least Concern
Falco berigora	Brown falcon	Least Concern
Falco cenchroides	Nankeen kestrel	Least Concern
Gallinula tenebrosa	Dusky moorhen	Least Concern
Geopelia humeralis	Bar shouldered dove	Least Concern
Geopelia striata	Peaceful dove	Least Concern
Gerygone fusca	Western gerygone	Least Concern
Gerygone mouki	Brown gerygone	Least Concern
Gerygone olivacea	White throated gerygone	Least Concern
Grallina cyanoleuca	Magpie lark	Least Concern
Grammodes pulcherrima		

Species	**Common Name**	**State conservation status**
Gymnorhina tibicen	Austrlaian magpie	Least Concern
Habronestes raveni		
Haliaeetus leucogaster	White bellied sea eagle	Least Concern
Haliastur sphenurus	Whistling kite	Least Concern
Haliplus wattsi		
Hemidactylus frenatus	Asian house gecko	Introduced
Himantopus himantopus	black winged stilt	Least Concern
Hirundo neoxena	Welcome swallow	Least Concern
Hypolimnas bolina	Varigated eggfly	
Hypseleotris galii	Firetail gudgeon	
Iridomyrmex purpureus		
Isopedella flavida	Huntsman spider	
Johannica gemellata		
Junonia villida	Meadow argus	
Lachnodius eucalypti	Redgum pit scale	
Lalage leucomela	Varied triller	Least Concern
Lichmera indistincta	brown honeyeater	Least Concern
Litoria caerulea	Common green tree frog	Least Concern
Litoria peronii	Emerald spotted tree frog	Least Concern
Lonchura castaneothorax	Chestnut breasted mannikin	Least Concern
Lophoictinia isura	Square tailed kite	Least Concern
Lopholaimus antarcticus	Topknot pidgeon	Least Concern
Lophyrotoma interrupta	Green longwinged sawfly	
Macropus giganteus	Eastern grey kangaroo	Least Concern

Species	Common Name	State conservation status
Macropygia phasianella	Brown cuckoo dove	Least Concern
Malurus cyaneus	Superb fairy wten	Least Concern
Malurus melanocephalus	Red backed fairy wren	Least Concern
Manorina melanocephala	Noisy miner	Least Concern
Manorina melanophrys	Bell miner	Least Concern
Megalurus timoriensis	Tawny grassbird	Least Concern
Melanitis leda	Evening brown	
Meliphaga lewinii	Lewin's honeyeater	Least Concern
Melithreptus albogularis	White throated honeyeater	Least Concern
Melithreptus lunatus	White naped honeyeater	Least Concern
Merops ornatus	Rainbow bee-eater	Least Concern
Micraspis frenata	Striped ladybird	
Microcarbo melanoleucos	Little pied cormorant	Least Concern
Microeca fascinans	Jackywinter	Least Concern
Morelia spilota	Carpet python	Least Concern
Myiagra rubecula	Leaden flycatcher	Least Concern
Myrmecia gilberti		
Myrmecia nigrocincta	Jumping jack	
Myzomela sanguinolenta	Scarlet honeyeater	Least Concern
Neochmia temporalis	Red browed finch	Least Concern
Ninox novaeseelandiae	Southern boobook	Least Concern
Notamacropus parryi	Whiptail wallaby	Least Concern
Notamacropus rufogriseus	Red necked wallaby	Least Concern
Nycticorax caledonicus	Nankeen night heron	Least Concern
Ochrogaster lunifer	Bag shelter moth	

Species	Common Name	State conservation status
Ocyphaps lophotes	Crested pidgeon	Least Concern
Omoedus orbiculatus	Round ant eater	
Ophiusa tirhaca	Green drab	
Opisthopsis rufithorax	Strobe-ant	
Oriolus sagittatus	Olivebacked oriole	Least Concern
Orthetrum caledonicum	Blue skimmer	
Oxyopes macilentus	Lean lynx spider	
Pachycephala pectoralis	Golden whistler	Least Concern
Pachycephala rufiventris	Rufous whistler	Least Concern
Papilio aegeus	Orchard swallowtail	
Paralongidorus sacchari		
Pardalotus punctatus	Spotted pardalote	Least Concern
Pardalotus striatus	Striated pardalote	Least Concern
Paropsis obsoleta	banded leaf beetle	
Parvipsitta pusilla	Little lorikeet	Least Concern
Pediana regina	Bark huntsman	
Pelecanus conspicillatus	Australian pelican	Least Concern
Petaurus breviceps	Sugar glider	Least Concern
Petrochelidon ariel	Fairy martin	Least Concern
Petrochelidon nigricans	Tree martin	Least Concern
Petrogale penicillata	Brush tailed rock wallaby	Vulnerable
Petroica rosea	Rose robin	Least Concern
Phalacrocorax carbo	Great cormorant	Least Concern
Phalacrocorax sulcirostris	Little black cormorant	Least Concern
Phalacrocorax varius	Pied cormorant	Least Concern
Phaps chalcoptera	Common bronzewing	Least Concern

Species	**Common Name**	**State conservation status**
Phascolarctos cinereus	Koala	Vulnerable
Philemon citreogularis	Little friarbird	Least Concern
Philemon corniculatus	Noisy friarbird	Least Concern
Phrissogonus laticostata	Apple looper	
Physopelta gutta		
Platalea flavipes	Yellow billed spoonbill	Least Concern
Platalea regia	Royal spoonbill	Least Concern
Platycercus adscitus	Pale headed rosella	Least Concern
Plectorhyncha lanceolata	Striped honeyeater	Least Concern
Pogona barbata	Bearded dragon	Least Concern
Pogonortalis doclea	Boatman fly	
Pomatostomus temporalis	Grey crowned babbler	Least Concern
Porphyrio porphyrio	Purple swamphen	Least Concern
Porzana pusilla	Baillon's crake	Least Concern
Psephotus haematonotus	Red rumped parrot	Least Concern
Pseudechis porphyriacus	Red bellied black snake	Least Concern
Psophodes olivaceus	Eastern whipbird	Least Concern
Rhinella marina	Cane toad	Introduced
Rhipidura albiscapa	Grey fantail	Least Concern
Rhipidura leucophrys	Willie wagtail	Least Concern
Rhipidura rufifrons	Rufous fantail	Special least concern
Rhytiphora solida	Acacia longhorn beetle	
Scythrops novaehollandiae	Channel billed cuckoo	Least Concern
Sericornis frontalis	White browed scrubwren	Least Concern
Simaetha tenuidens	Brown jumpers	

Species	Common Name	State conservation status
Smicrornis brevirostris	Weebill	Least Concern
Sphecotheres vieilloti	Australasian figbird	Least Concern
Spoladea recurvalis	Beet webworm moth	
Stizoptera bichenovii	Double barred finch	Least Concern
Strepera graculina	Pied currawong	
Sturnus vulgaris	Common starling	
Tachybaptus novaehollandiae	Australasian grebe	Least Concern
Teleogryllus commodus	Black field cricket	
Tenodera australasiae	Purple winged mantis	
Threskiornis moluccus	Australian white ibis	Least Concern
Threskiornis spinicollis	Strawnecked ibis	Least Concern
Thwaitesia nigronodosa	Neon spider	
Todiramphus sanctus	Sacred kingfisher	Least Concern
Trichoglossus chlorolepidotus	Scaly breasted lorikeet	Least Concern
Trichoglossus haematodus	Rainbow lorikeet	
Trichosurus caninus	Short eared possum	Least Concern
Trichosurus vulpecula	Common brushtail possum	Least Concern
Trigonodes hyppasia	Triangles	
Ubida ramostriellus		
Uroplata girardi	Lantana leafminer	
Vanellus miles	Masked lapwing	Least Concern
Varanus varius	Lace monitor	Least Concern
Vermicella annulata	Bandy bandy	Least Concern
Wallabia bicolor	Swamp wallaby	Least Concern
Zonopetala correcta		
Zosterops lateralis	Silver eye	Least Concern

Appendix 5. Regional Ecosystems

Table 23. Preclear and remnant regional ecosystems, their areas, percentage of total catchment area, and percentage change between preclear and remnant. Data extracted from QLD regional ecosystems mapping

Regional Ecosystem code	Description	Vegetation management act class	Broad vegetation management group	Preclear area	Percentage of total area - preclear	Current area	Percentage of total area - current	Percentage change
12.3.3	*Eucalyptus tereticornis* woodland on Quaternary alluvium	Endangered	16c/21b	2.34	1.71	0.1	0.07	-95.73
12.3.7	*Eucalyptus tereticornis*, *Casuarina cunninghamiana subsp. cunninghamiana* +/- *Melaleuca* spp. fringing woodland	Least Concern	16a	0.48	0.35	0.65	0.47	35.42
12.3.7/12.3.3			16a	0.38	0.28	0.05	0.04	-86.84
12.3.8	Swamps with *Cyperus* spp., *Schoenoplectus* spp. and *Eleocharis* spp.	Of Concern	34c	0.08	0.05	0.08	0.05	0
12.8.14	*Eucalyptus eugenioides*, *E. biturbinata*, *E. melliodora* +/- *E. tereticornis*, *Corymbia intermedia* open forest on Cainozoic igneous rocks	Least Concern	9a	1.23	0.9	1.23	0.9	0
12.8.16/12.8.17/12.8.9			16a	0.84	0.61	0.83	0.6	-1.19
12.8.17	Eucalyptus melanophloia +/- *E. crebra*, *E. tereticornis*, *Corymbia tessellaris* woodland on Cainozoic igneous rocks	Least Concern	16a	13.02	9.46	2.55	1.85	-80.41
12.8.17/12.8.16			16a	9.82	7.14	5.03	3.66	-48.78
12.8.17/12.8.16/12.8.9			16a	4.81	3.5	3.79	2.76	-21.21
12.8.9	*Lophostemon confertus* open forest on Cainozoic igneous rocks	Least Concern	8a	0.44	0.32	0.42	0.31	-4.55

Regional Ecosystem code	Description	Vegetation management act class	Broad vegetation management group	Preclear area	Percentage of total area - preclear	Current area	Percentage of total area - current	Percentage change
12.9-10.11	*Melaleuca irbyana* low open forests on sedimentary rocks	Endangered	29b	0.89	0.65	0.07	0.05	-92.13
12.9-10.17	*Eucalyptus acmenoides, E. major, E. siderophloia +/- Corymbia citriodora subsp. variegata* open forest on sedimentary rocks	Least Concern	28e	0.43	0.32	0.07	0.05	-83.72
12.9-10.17/12.3.7			28e	0.46	0.34	0.43	0.31	-6.52
12.9-10.2/12.9-10.7			10b	1.62	1.18	1.62	1.18	0
12.9-10.7	*Eucalyptus crebra +/- E. tereticornis, Corymbia tessellaris, Angophora* spp. and *E. melanophloia* woodland on sedimentary rocks	Of Concern	13c	0.48	0.35	3.04	2.21	533.33
12.9-10.7/12.9-10.17			13c	2.11	1.53	0.35	0.25	-83.53
12.9-10.7/12.9-10.2			13c	4.59	3.34	14.28	10.38	210.73
12.9-10.7/12.9-10.3			13c	0	0	2.30	1.67	100
12.3.3/12.3.7			16a	30.94	22.50	0.00	0.00	-100
12.8.17/12.8.9/12.8.16			16a	5.93	4.31	0.00	0.00	-100
12.9-10.7/12.9-10.3/12.9-10.2			16a	18.23	13.25	0.00	0.00	-100
12.9-10.7/12.8.17/12.9-10.3			16a	4.78	3.47	0.00	0.00	-100
12.9-10.2/12.9-10.7/12.9-10.17			10b	31.05	22.58	0.00	0.00	-100
non remnant				0.00	0.00	99.20	72.14	100

Appendix 6. Summary of landholder events

Event 1. Walking the catchment

Participants: COUNCIL team, GU team, 13 landholders, two representatives from Queensland Trust for Nature.

Goals:

- to explore, through guided, informal conversation with landholders
- the perceived values,
- threats,
- observed changes in the Franklin Vale Creek catchment.

Specific focus in the conversation was given to five broad themes – land, water, plants, animals, and people, with the focus on historical view – what have landholders seen and learnt from their time in Franklin Vale.

Following the introduction, a short catchment history was presented by the Old Hidden Vale Station manager, an overview of previous restoration works by one of the landowners, and 'Walking the catchment' activity was held, which helped to address the meeting goals.

The information was recorded, some areas of significant changes were highlighted on a map, and potential sites for rapid catchment assessment were identified.

Event 2. Franklin Vale of the Future

Participants: 15 landholders, COUNCIL team, GU team. Guests - Scenic Rim Council representatives

Goals:

Inform the landholders and Ipswich City Council on the results of the condition assessments of the catchment completed after the first meeting.

Understand what the landholders want the creek to look like in the future.

Identify actions that could help to achieve the desired outcome.

The meeting started with a report on the progress of the project and the results of the condition assessments (LiDAR and fieldwork). After the presentations, the landholders were asked to share their vision for the Franklin Vale catchment in 2050, concentrating on five main features - land, water, plants, animals and people, and think of goals they want to achieve. Those goals were then prioritized by all meeting participants, and actions that can help to achieve the desired condition were identified.

Identified goals

Water

Landholders wanted to see water flowing in the creek, and the quality of the water improved. Some of the important goals that many expressed were the importance of slowing the water down during big rain events, and faster recovery and reduced damage from big floods. The other goals included water security and the construction of healthy billabongs. It was also pointed out that current and future infrastructure must not impede the water flow.

Land

Most agreed that vegetation is important to protect the banks and that erosion should be minimised for bank stability. Some mentioned that physical structures for road crossings need to be improved. Making productivity sustainable was also important for some, while the others did not want the catchment to be divided into smaller plots.

Plants

In the future, landholders would like to see less woody and herbaceous weeds and have a strategy/guideline developed for weed control. They would also like to see more tall trees in the catchment and more native understory cover, but also a higher species diversity.

Animals

The control of dog and fox populations was seen as an important goal. At the same time, landholders wanted to have more birds in the catchment, fish in the waterholes, as well as their stable populations. Some said that it is necessary to improve landholders' understanding of native species populations. The importance of cattle for weed management was also mentioned.

People

One of the most important goals for the future was the ability for the landholders to have a say in the decision-making process regarding catchment management. Some thought that the catchment needs coordination which could include regular landholders meetings, as well as meetings with the Council, which was expected to provide continuous support for the community. Many landholders said that it is important to record the history of Franklin Vale. Some mentioned that it would be good to keep the current population density and others noted that picnic spots by the creek could be a good idea.

Identified actions

Water

Landholders decided that riparian fencing is necessary for water quality, as it helps to manage the stock, but also protects newly planted riparian vegetation. Some noted that fences should be removed when the vegetation is established. It was suggested that water velocity can be reduced with large wood and small weirs and its quality can be further improved by introducing aquatic plants. Aquifer recharge needs to be managed.

Many felt that it is important to monitor the water quality, and citizen science could be part of it.

Land

Erosion was seen by many as a problem, and it was decided that its hot spots need to be identified and evaluated. Many felt that they want to see a promotion of sustainable property management practices.

Plants

Landholders wanted to understand weed dynamics but also to see their weeds managed in a well-organised way so that all properties get the same treatments, which could partly be achieved with a catchment weed management group. Spraying and chipping were seen as the most appropriate methods for weed treatment. Some thought that it is important to encourage she-oaks and bottlebrushes in the channel and others wanted to see more incentives for planting in the future. All agreed that good governance of fire management is necessary.

Animals

It was stated that in the future riparian areas can be fenced but the stock has to have some access to water.

People

Many landholders felt like they want to see a recorded history of the Franklin Vale. There were suggestions to establish a Franklin Vale web portal and have a link with the Ipswich City Council history unit. There was also interest in registering as an official FV authority and holding regular Franklin Vale meetings.

Appendix 7. First Nations history of the region

Franklin Vale is home to the Jagera people. According to the Indigenous Languages Map of Queensland, two languages were possibly spoken in the area – Jagara and Wuli Wuli (State Library's Indigenous Languages Project, retrieved on 18/06/2021).

The indigenous history of Franklin Vale itself is not well known, but one of the first explorers to mention the presence of the aboriginal people in the region was Allan Cunningham (Lilley, 1982), who was travelling just north of the catchment in 1829. Some information about the area near Franklin Vale Creek called Rosewood Scrub was recorded by Dr Ray Kerkhove in 2015 in his Indigenous Use and Indigenous History of Rosewood Scrub report. It is possible that aboriginal camps were located between the waterbodies of Rosewood and Calvert, with a major gathering place at Old Man's waterhole (Calvert). Early settlers also mention that aboriginal people held initiation ceremonies at bora rings, which could be found throughout Rosewood Scrub (Kerkhove, 2015).