



Australian Government
Commonwealth Environmental Water Office



Long Term Intervention Monitoring Project

Lachlan River System Selected Area

Observations Report

Report period: *1 January 2017 to 31 March 2017*





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Cover Photo: Joanne Lenehan and Fiona Dyer discussion the inundation of Lake Ita vegetation plots. Photo: Alica Tschierschke (University of Canberra)

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075032: Hillston

Month	Rainfall (mm)	Mean rainfall (mm)	Median Rainfall (mm)
Jul	50	30	25
Aug	68	30	28
Sep	178	28	22
Oct	35	35	28
Nov	22	28	22
Dec	50	30	20
Jan	7	30	18
Feb	5	28	16
Mar	12	33	17

049055: Oxley

Month	Rainfall (mm)	Mean rainfall (mm)	Median Rainfall (mm)
Jul	35	25	22
Aug	55	25	22
Sep	145	22	15
Oct	5	30	22
Nov	35	25	20
Dec	28	25	15
Jan	25	28	16
Feb	0	28	10
Mar	2	22	12

2016 **2017**

■ Rainfall ■ Mean rainfall ■ Median Rainfall

Page 3

2 Objectives of Commonwealth environmental water use in the Lachlan River system during 2016-17

2.1 Commonwealth and NSW environmental water use

As at 30 March 2017, a combination of 28,969 ML of Commonwealth environmental water and 5,250 ML NSW Adaptive Environmental Water has been used in the Lachlan River system in two joint actions. These were:

- 1) 33,168 ML (27,918 ML of Commonwealth environmental water and 5,250 of NSW Adaptive Environmental Water) targeting improvements in dissolved oxygen levels and provision of in-channel refuge in the mid Lachlan River; and
- 2) 1,051 ML Commonwealth environmental water supporting water levels at the second bird breeding colony in the Booligal Wetlands.

Planned environmental water also contributed to both actions (see below).

2.2 Planned environmental water: translucent releases, Water Quality Allowance and Environmental Water Allowance

The flood conditions within the river system in 2017 also triggered the delivery of translucent releases, as required under the Lachlan Regulated River Water Sharing Plan (<http://www.water.nsw.gov.au/water-management/water-sharing/plans-commenced/water-source/lachlan>) as well as the release of water from Wyangala Dam to maintain airspace during the height of the flood.

Planned environmental water managed by the NSW Office of Environment and Heritage also contributed to the above actions:

- 1) 15 000 ML of Water Quality Allowance (WQA) targeting improvements in dissolved oxygen levels and provision of in-channel refuge in the mid Lachlan River; and
- 2) 3,153 ML of Environmental Water Allowance (EWA) supporting water levels at the second bird breeding colony in the Booligal Wetlands.

3 Summary on progress against core monitoring and evaluation activities

ACTIVITIES	PROGRESS TO DATE	UPCOMING ACTIVITIES
<i>Monitoring activities</i>		
Ecosystem type	<ul style="list-style-type: none"> Data collection complete and suggested Australian National Aquatic Ecosystems (ANAE) types for all sites included in the Monitoring and Data Management System (MDMS). 	<ul style="list-style-type: none"> No more data collection required
Fish (river)	<ul style="list-style-type: none"> Fish community sampling has been completed 	<ul style="list-style-type: none"> Processing samples QA/QC Data analysis and evaluation
Fish (larvae)	<ul style="list-style-type: none"> Processing of larval samples 	<ul style="list-style-type: none"> Data analysis and evaluation
Waterbird breeding (optional)	<ul style="list-style-type: none"> Data analysis and evaluation has commenced 	<ul style="list-style-type: none"> Data analysis and evaluation
Water quality and stream metabolism	<ul style="list-style-type: none"> Data loggers have been checked, calibrated and downloaded Some loggers are missing and searching has commenced for these 	<ul style="list-style-type: none"> Searching for loggers QA/QC Analysis of data
Vegetation diversity	<ul style="list-style-type: none"> Most of remaining spring sites assessed Partial processing of field samples completed 	<ul style="list-style-type: none"> Remaining Spring sampling Autumn sampling Processing of field samples QA/QC Data analysis
Frogs (optional)	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None
<i>Evaluation activities</i>		
Monitoring data entry	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Data uploaded once either MDMS available (larval fish and waterbirds) or QA/QC completed
<i>Communication and engagement</i>		
Selected Area Working Group	<ul style="list-style-type: none"> Covered by TAG meeting (24/2/2017) and EWAG (15/3/2017) 	<ul style="list-style-type: none"> Q2 meeting
Project team teleconference	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Teleconference to be held in April
Other Stakeholder Engagement	<ul style="list-style-type: none"> Quarterly report 10 was finalised in February 	<ul style="list-style-type: none"> Quarterly report to be provided to landholders and other stakeholders

Note: for the Long-Term Intervention Monitoring Project, Lachlan River system selected area:

- **Appendix A** provides additional information about the project for the Lachlan system and its context in terms of ecological monitoring and evaluation within the Murray-Darling Basin
- **Appendix B** provides a map showing the location of hydrological zones that will be monitored
- **Appendix C** provides a summary of monitoring to be undertaken under the project from 2014-2019.

4 Observations

4.1 Hydrology

The most recent flood in the Lachlan River is one of the largest on record. Flows peaked at Willandra weir at 20,853 ML/day on 26 October 2016. As the flood passed down the river, peak flows decreased significantly as flows became distributed through the system. At Four Mile (the gauge nearest the Cumbung Swamp) flows peaked at 1275 ML/day on 30 December 2016, but were above 1200 ML/day for 3 months (between 12 November 2016 and 14 January 2017) illustrating the broad hydrograph that typically occurs in floods in the lower river system (Figure 2).

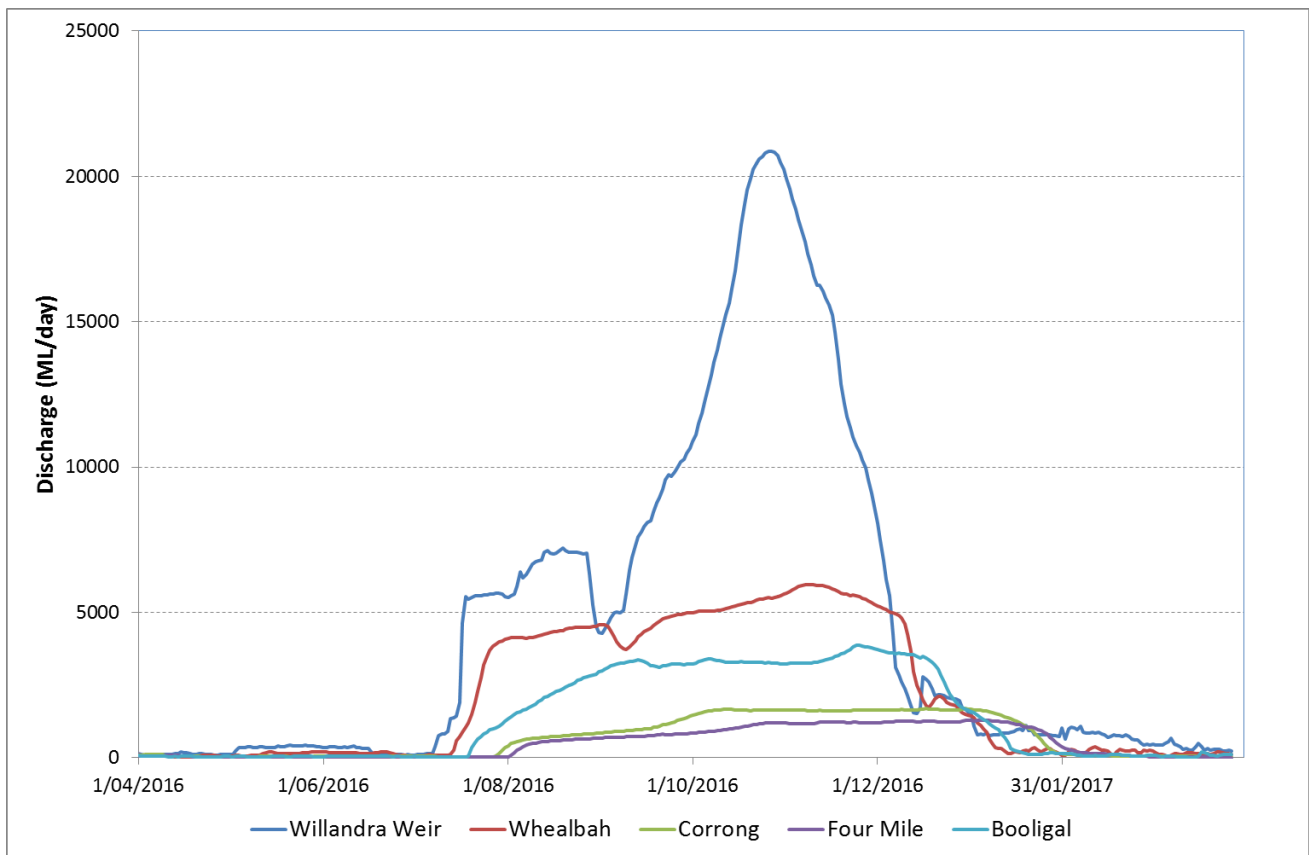


Figure 2. Flow in the Lachlan River from the gauges at Willandra weir (412038), Whealbah (412078), Booligal (412005), Corrong (412045) and Four Mile (412194) showing the passage of the flood through the study reach. Data are from NSW Department of Primary Industries (<http://www.water.nsw.gov.au/realtime-data>).

4.2 Water Quality

While the water quality loggers were unable to be accessed and serviced during the flood event we were fortunate that one of the loggers remained fully functional for the entire period of the flooding. The data from this logger shows the major drop in the concentration of dissolved oxygen in the river between late September and mid November (Figure 3) with concentrations reaching as low as 0.5 mg/L on 23 November 2016 before recovering to above 4 mg/L in mid December 2016.

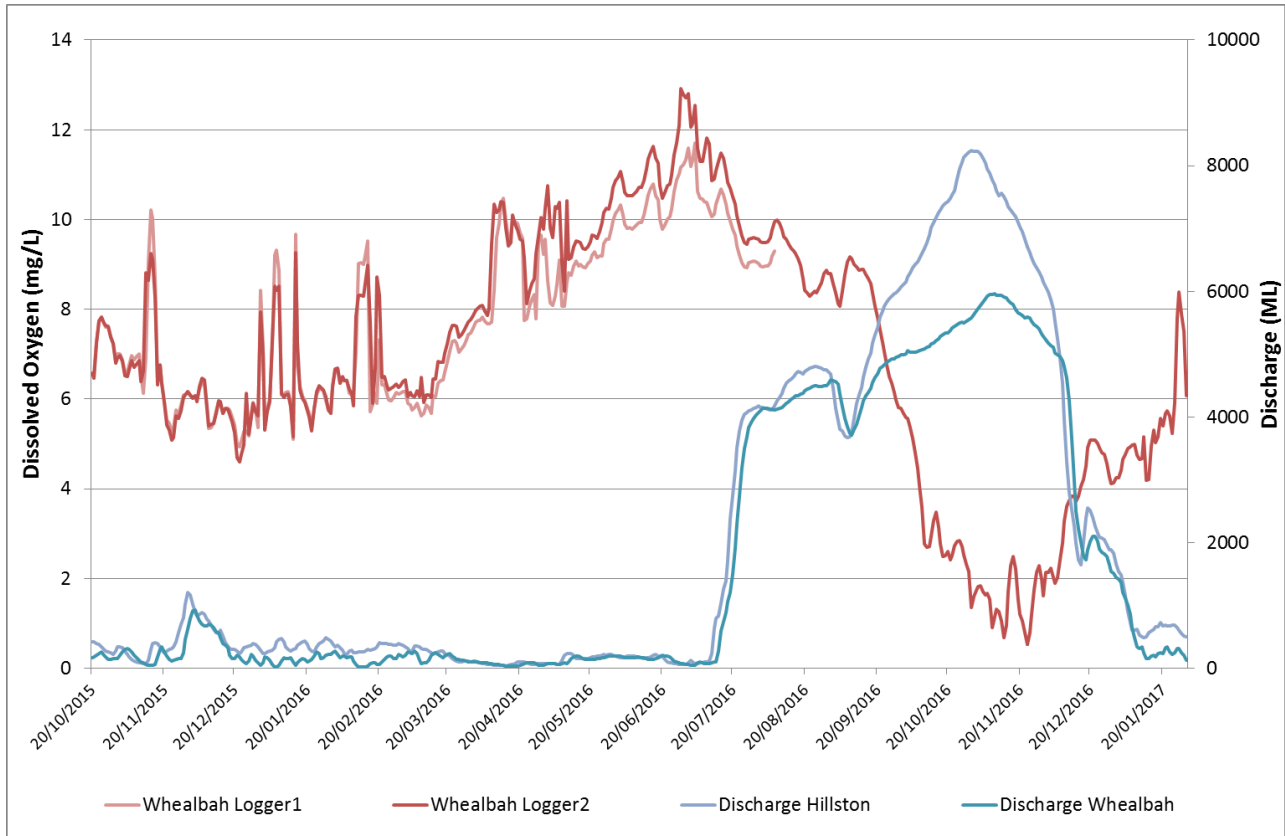


Figure 3. Flow and dissolved oxygen concentrations at Whealbah. Dissolved oxygen concentrations are from LTIM loggers and the flow is from NSW Department of Primary Industries (<http://www.water.nsw.gov.au/realtime-data>).

4.3 Fish monitoring

Drift nets were set at each site fortnightly for the five sampling events from mid October to mid December 2016 despite the challenges of the floodwaters. These conditions prevented the use of light traps for the entire sampling season. The last sampling event in December was the only one where the river had returned to in-channel flows. The first sampling event was the only one that significant numbers of fish were captured and they all predominantly came from one net at one site (Wallanthery) with almost 900 carp larvae recorded. No fish were captured from the second sampling event and three larval fish were captured from the third sampling event. A total of 10 carp were caught from the last two sampling events, (six and four respectively), and all the fish were juveniles (50-115 mm). No native fish or eggs were detected for all five sampling events for 2016. In the last few sampling events visual observations were made at each site of large numbers of juvenile carp jumping. It is suggested that the very high flows and low dissolved oxygen that occurred during the known spawning window of native fish in this area, produced unfavourable conditions for these species to spawn.

4.4 Vegetation monitoring

The spring vegetation sampling was seriously hampered by the flooding with most monitoring sites underwater for the majority of the spring and many roads were cut preventing access. Sites within the mid to lower part of the Selected Area were visited in February and the vegetation response was marked. All sites had been inundated by between 0.5 and 2 m of water. The response of aquatic vegetation was noted with species such as nardoo (*Marsillea drummondii*), water ribbons (*Triglochin sp*) and spike rush (*Eleocharis sp*) appearing at sites.

Vegetation species richness had increased at many of the sites. The most noticeable was within the Black Box community upstream of Lake Ita which had previously displayed one of the lowest numbers of species, with around 10-12 species recorded during past visits. During February, we recorded 44 species (Figure 4).



Figure 4. Vegetation plots within the Lake Ita Black Box community. The upper image is taken in spring 2014 and shows low ground cover and few groundcover species present. The lower image was taken in February 2017 and shows a marked change in the number of groundcover species and the proportion of groundcover.

Appendix A: The Long-Term Intervention Monitoring Project for the Lachlan River system and its context in terms of ecological monitoring and evaluation within the Murray-Darling Basin.

The Long Term Intervention Monitoring (LTIM) Project for the Lachlan river system selected area is funded by the Commonwealth Environmental Water Office. The project is being delivered by a consortium of service providers lead by University of Canberra and includes NSW Office of Environment and Heritage, NSW Department of Primary Industries (Fisheries), Central Tablelands Local Land Services, NSW Department of Primary Industries (Office of Water), University of New South Wales and Charles Sturt University.

The LTIM project is based on a clear and robust program logic, as detailed in the [Long-Term Intervention Monitoring Project Logic and Rationale Document](#). That document sets out the scientific and technical foundations of long-term intervention monitoring and is being applied to areas where LTIM projects are being undertaken. It also provides links between Basin Plan objectives and targets to the monitoring of outcomes from Commonwealth environmental watering actions. For more information, see [Monitoring and evaluation for the use of Commonwealth environmental water](#).

Many different agencies play a role in the reporting on environmental outcomes, consistent with the Basin Plan (see figure 12 below). The Murray Darling Basin Authority is responsible for reporting on achievements against the environmental objectives of the Basin Plan at a basin-scale, which are broadly focussed on flows and water quality, fish, vegetation and birds across the whole of the Basin. State Governments are responsible for reporting on achievements against the environmental objectives of the Basin Plan at an asset-scale i.e. rivers, wetlands, floodplains. The Commonwealth Environmental Water Holder is responsible for reporting on the contribution of Commonwealth environmental water to the environmental objectives of the Basin Plan (at multiple-scales).

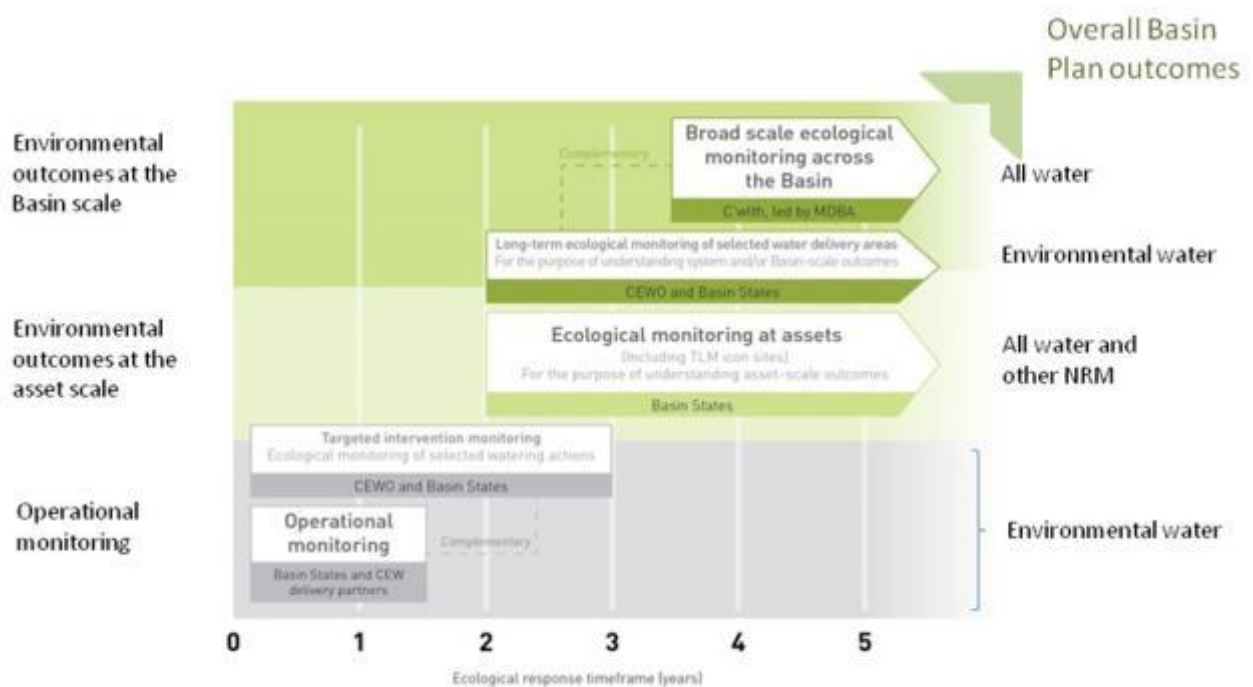


Figure 12. A summary of roles various agencies play in the reporting on environmental outcomes, consistent with the Basin Plan.

Appendix B: Hydrological zones and monitoring sites of the lower Lachlan for the Long-Term Intervention Monitoring Project.

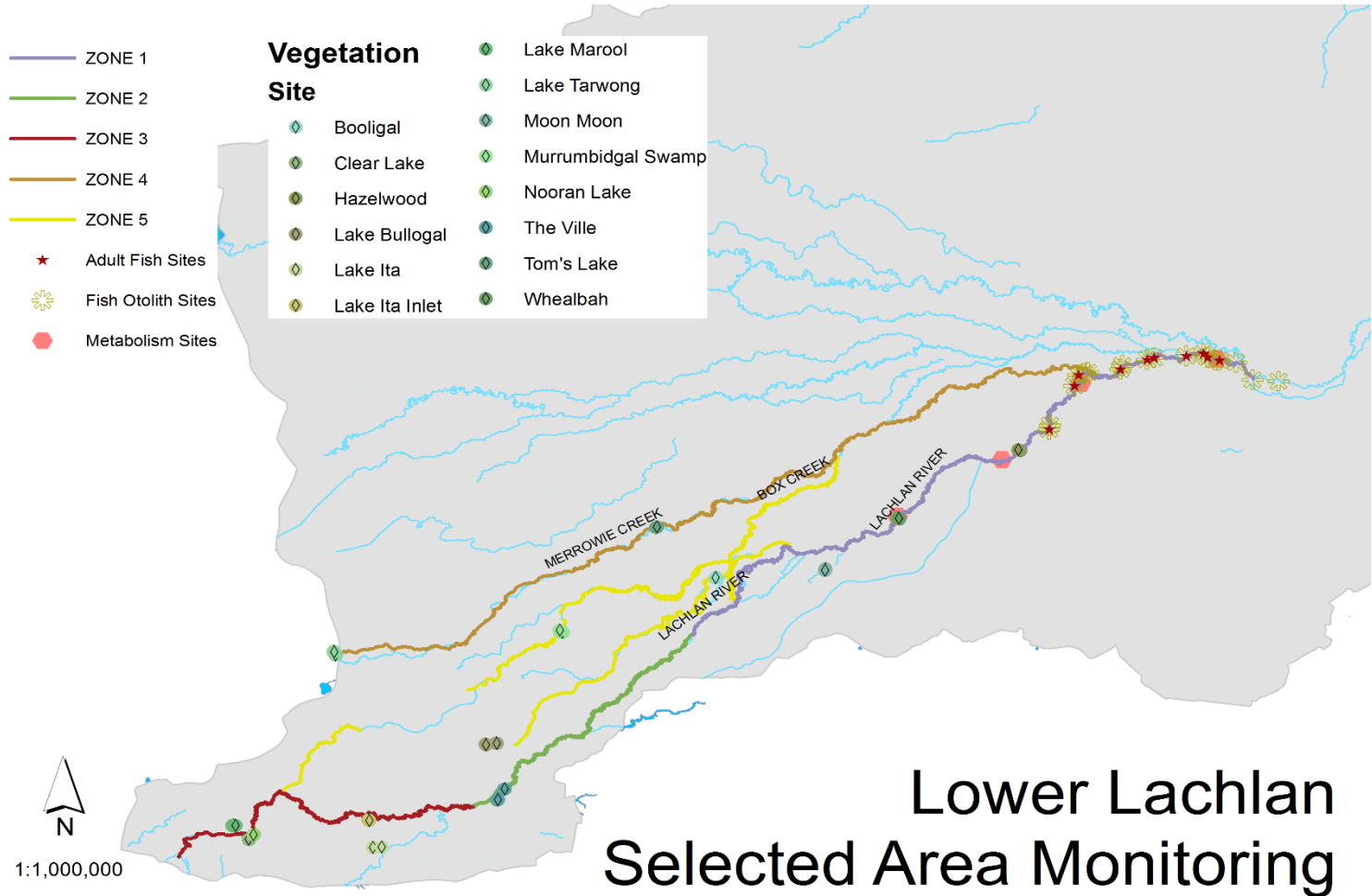


Figure 13. Lower Lachlan LTIM monitoring sites, hydrological zones and NSW gauging stations

Appendix C: Summary of monitoring to be undertaken in the Lachlan system for the Long Term Intervention Monitoring Project from 2014-2019

The five year monitoring schedule has been based around the expected watering options and is focussed on the monitoring of Basin Indicators. Monitoring effort is consistent across the five years with the exception of monitoring Waterbird Breeding and Frogs which are options that can be implemented on the basis of a request from the CEWO.

INDICATOR	ZONE	EVALUATION OF RESPONSES TO COMMONWEALTH ENVIRONMENTAL WATERING	DATA CONTRIBUTES TO EVALUATION OF RESPONSES TO COMMONWEALTH ENVIRONMENTAL WATERING AT WHOLE OF BASIN-SCALE	MONITORING FREQUENCY	SITES	EXPECTED SCHEDULE
Ecosystem type	All	✓	✓	Once only	All sites for other indicators	Establishment of ANAE type at the start of the LTIM Project. Expected August-December 2014
Riverine fish	1	✓	✓	ANNUAL	Basin Evaluation: 10 fixed sites within Zone 1	Annual sampling between March and May
Larval fish	1	✓	✓	ANNUAL	3 fixed riverine sites in Zone 1	Annual sampling 5 times during breeding season (September to February)
Stream metabolism	1	✓	✓	CONTINUOUS REGULAR	Four fixed sites matched to riverine fish sampling sites in Zone 1	Continuous monitoring of dissolved oxygen and temperature. 6 weekly sampling of nutrients and water quality attributes.
Hydrology (River)	1	✓	✓	CONTINUOUS	Gauging sites	
Vegetation diversity and condition	All	✓		ANNUAL & EVENT BASED	12 fixed sites	Before and after watering (expected to be April/May and 3 months after first fill)
Waterbird breeding (Option)	1	✓		EVENT-BASED (on request from the CEWO)	One fixed site – Booligal wetland	Fortnightly surveys of bird breeding triggered by breeding events in Booligal wetland.
Frogs (Option)	All	✓		EVENT-BASED (on request from the CEWO)	15 sites comprising 2 to 8 wetland sites and 2 to 7 riverine sites depending on watering targets	3 sampling events between August and February (one sample in each of winter, spring and summer).

Hydrology (wetland – Option)		✓		EVENT-BASED (in conjunction with Waterbird Breeding or Frog monitoring)	Cameras at 6 roving wetland sites	Cameras installed prior to targeted watering each year and downloaded after the watering event has passed
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