



Australian Government



Hydrologic Modelling for the Northern Basin Review – Interim Decision Scenario Addendum



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1. Introduction

The Northern Basin Review (NBR) modelling report describes the extensive modelling program that was undertaken to inform the Authority's re-examination of Basin Plan settings in the Northern Basin (MDBA 2016a). Modelling scenario results and associated social, economic and environmental outcomes were presented to the Authority for assessment over an extended period (MDBA 2016c). Based partly on these results, but also incorporating community feedback, the Authority made its interim NBR recommendation to change sustainable diversion limits (SDLs) in late 2016. Overall, it was recommended that the 390 GL recovery volume adopted in 2012 should be reduced to 320 GL, subject to Basin governments committing to the implementation of a number of complementary 'toolkit measures'. Furthermore, due to the enhanced knowledge base compared to the 2012, the Authority were able to provide more specificity on the distribution of this recovery volume across the Northern Basin.

This addendum describes the whole-of-north model scenario that was completed to reflect the recommended settings. This scenario had been completed and results were presented to the Authority prior to the release of the recommended change to Northern Basin settings in November 2016.

The pattern of recovery incorporated in the 320 GL recommendation was informed by the Authority's assessment of previous scenarios. This scenario can be considered to be the final refined scenario — see section 7.3 of modelling report (MDBA 2016a). This scenario does not include explicit modelling of all toolkit measures as some of these measures cannot be represented in a hydrologic model. Overall, the modelling assumptions remain unchanged from the two previous refined scenarios (see Figure 1; this is a modified version of Figure 13 on page 41 of the NBR modelling report; MDBA 2016a).

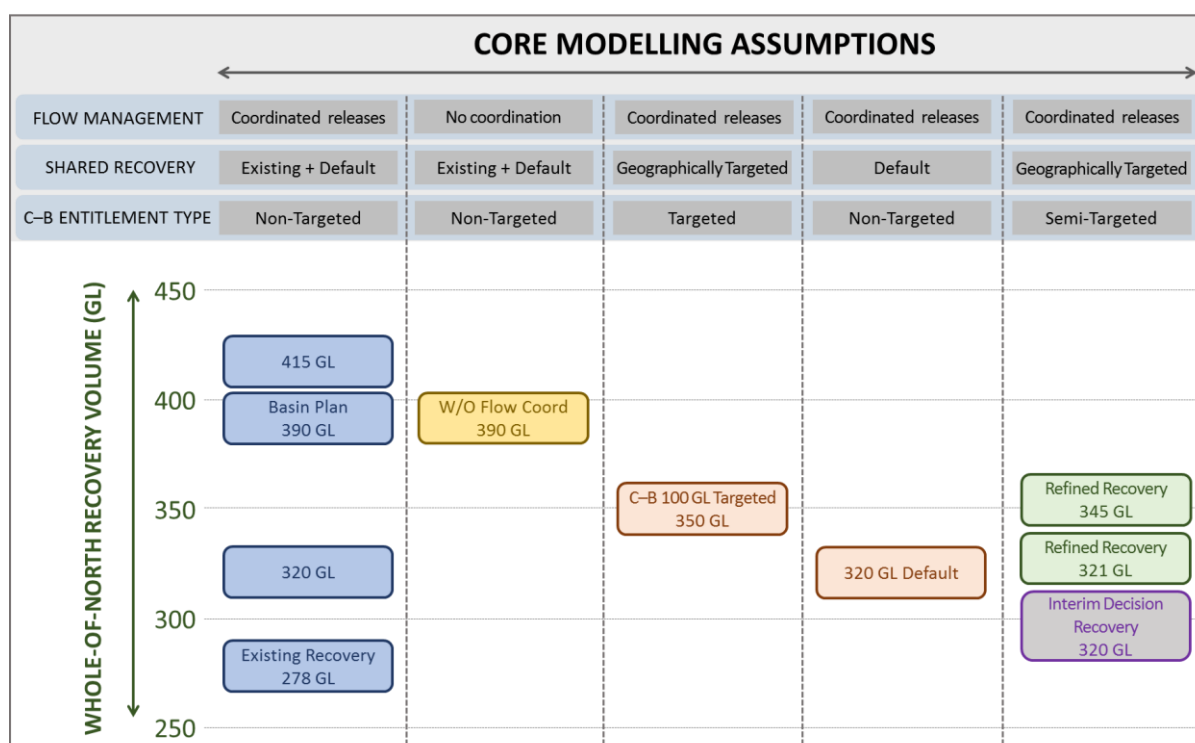


Figure 1: Schematic map of the whole-of-north model scenarios completed for the Northern Basin Review.

Table 1: SDL resource unit apportionment

Catchment		Proposed Local Reduction (GL)	Assumed Shared Reduction (GL)	Total Reduction (GL)
QUEENSLAND	Paroo	0	0	0
	Warrego	8	0	8
	Nebine	1	0	1
	Moonie	0	2	2
	Condamine-Balonne	100	0	100
	Queensland Border Rivers	14	15	29
	Queensland Total	123	17	140
NEW SOUTH WALES	Intersecting Streams	0	8	8
	Gwydir	42	0	42
	NSW Border Rivers	7	0	7
	Namoi	20	0	20
	Macquarie-Castlereagh	55	16	71
	Barwon-Darling	32	0	32
	NSW Total	156	24	180
Whole of North Total		279	41	320

Table 1 details the modelled recovery apportionment settings across the northern Basin while Table 2 shows the modelled recovery in the Condamine–Balonne catchment. In the Condamine–Balonne the modelled recovery was targeted both spatially and by entitlement types (in line with one of the toolkit measures recommended by the Authority). The learnings

from previous model scenarios had shown that this approach was able to largely maintain site specific flow indicator (SFI) achievement while increasing the original Basin Plan sustainable diversion limit. See section 6 of the hydrologic modelling report for a detailed explanation of modelling undertaken in the Condamine-Balonne for the NBR (MDBA 2016a).

Table 2: Condamine-Balonne recovery apportionment

Sub-Region	Entitlement Type Recovered in Model	320 GL (Scenario K)
Upstream Beardmore Dam (off main stem)	—	0
Upstream Beardmore Dam (on main stem)	Unregulated	10
St George	Supplemented Medium Priority	4
JTW to B1	Water harvester (i.e. unsupplemented)	15
	Overland flow (i.e. floodplain harvester)	5
Narran system	Water harvester (i.e. unsupplemented)	21
	Overland flow (i.e. floodplain harvester)	2
Lower Balonne	Water harvester (i.e. unsupplemented)	21
	Overland flow (i.e. floodplain harvester)	22
TOTAL		100

2. Results and Discussion

2.1 Flow and SFI Results

Figure 2 shows the change from baseline in the frequencies of the flow regime up to 80,000 ML/d at Bourke for both the proposed amendment scenario (320 GL recovery) and the Northern Standard scenario (390 GL recovery as recommended by the Authority in 2012). The flow frequency change is in the range of 1-2% and spread across the flow regime. A detailed description of the Northern Standard scenario can be found in the NBR hydrologic modelling report (MDBA 2016a). In essence, this scenario represents the 2012 recovery decision, but with an environmental water release pattern updated to reflect the NBR environmental science.

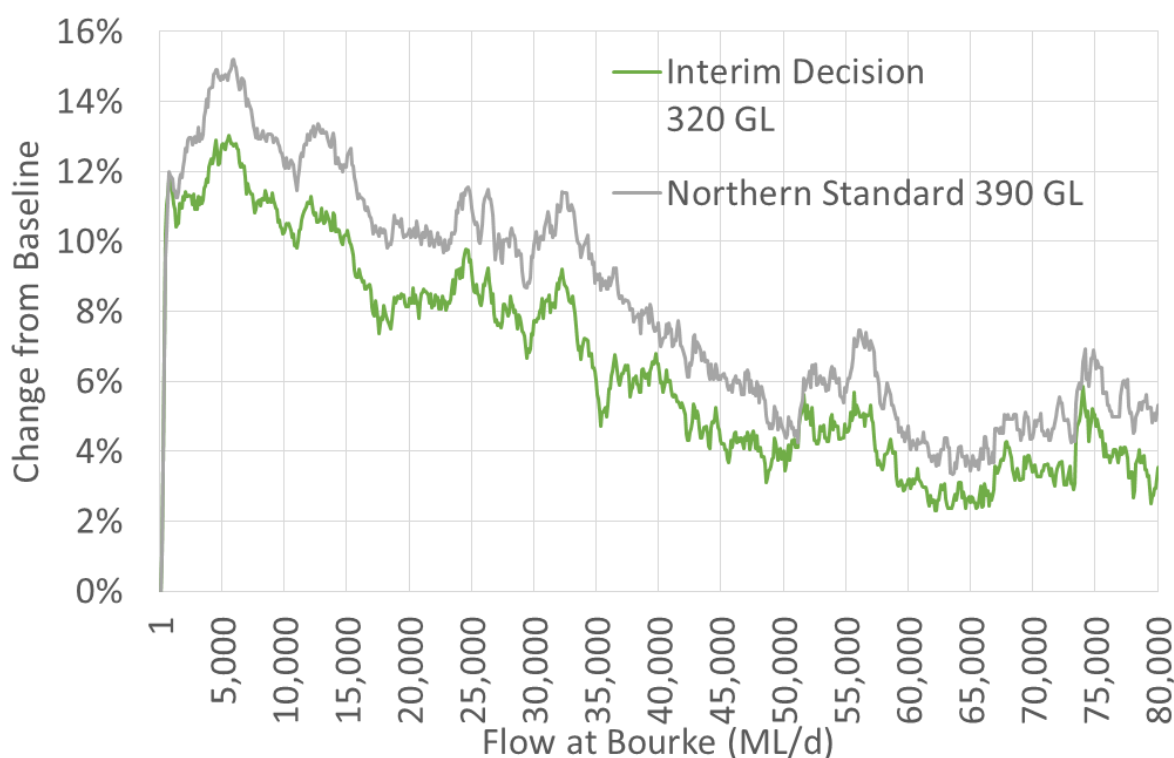


Figure 2: Differential flow duration curves at Bourke

The SFI results for the proposed amendment scenario and all other whole of north scenarios are presented in Appendix A. The SFI results for the Barwon–Darling have remained largely unchanged between the 390 to 320 GL scenarios. This indicates that the reduced recovery volume has largely been offset by the targeted recovery pattern (toolkit measure 2; MDBA 2016c), hence environmental outcomes in this catchment are expected to remain near-unchanged.

The SFI results in the Condamine–Balonne have decreased slightly between the two scenarios. In this case, the SFI changes resulting from a reduction in recovery volume (from 142 to 100 GL) have been only partially offset by the targeted recovery pattern. An analysis of the model results indicates that the 142 GL SFI results can largely be reproduced by supplementing the targeted 100 GL recovery pattern with event-based mechanisms to enhance specific flow events (MDBA 2016a).

2.2 Inflow to Menindee Lakes

Table 3 shows the change in long term average inflows at Menindee compared to the baseline (pre-Basin Plan) scenario and the benchmark (390 GL — original Basin Plan settings) scenario. The SDL adjustment benchmark scenario was chosen for this comparison because this is the extant (as of late-2016) MDBA-State-Commonwealth agreed scenario representing Basin Plan 2012 settings.

Examining all years, the 70 GL reduction in whole of north water recovery has resulted in a long term average decrease in Menindee inflows of 7 GL/y (i.e. a reduction from 1,877 to 1,870 GL/y). The primary driver of this relatively small decrease is the targeted recovery pattern. The 390 GL scenario followed the semi-targeted recovery method specified in 2012, but the 320 GL scenario follows a more refined method designed to best enhance flows through the Barwon–Darling.

The remaining rows in Table 3 show the same parameter, but divided into dry, median and wet years (based on the lower, middle and upper thirds of a ranked Menindee Lakes annual series). This indicates that there is negligible change in median and wet years, and a small decrease in dry years (i.e. an average change from 278 to 269 GL/y).

Table 3: Long term average flows to Menindee Lakes

Type of Year	Menindee Inflows (GL/y)			Change from Baseline	
	Baseline (pre-Basin Plan)	Benchmark (390 GL)	Proposed amendment (320 GL)	Benchmark (390 GL)	Proposed amendment (320 GL)
Dry	188	278	269	+90 (+48%)	+81 (+43%)
Median	850	1,003	1,007	+153 (+18%)	+157 (+18%)
Wet	4,131	4,349	4,334	+218 (+5%)	+203 (+5%)
All Years	1,723	1,877	1,870	+154 (+9%)	+147 (+9%)

Further exploring the climate-dependency of the inflow changes, Figure 3 shows the annual change in Menindee Lakes inflows over the historical climate sequence, where the water years have been ranked from driest to wettest based in baseline inflow volume. Both scenarios provided increased inflows to Menindee Lakes compared to baseline conditions, but the far-left columns in Figure 3 indicates that the 320 GL option is expected to provide slightly less inflow in dry years compared to the 390 GL option.

This relatively small change in flows at the Menindee Lakes shows that the proposed amended water recovery settings will have a small and relatively insignificant change to flows downstream of the confluence of the Murray and Darling Rivers. Analysis of modelled flows at the South Australian border show a long term average reduction of 4 GL/y (8,720 GL/y reduced to 8,716 GL/y) associated with a 70 GL reduction in water recovery in the Northern Basin, with no change in the River Murray SFI or Coorong Lower Lakes & Murray Mouth indicator results.

Furthermore, although dry years at Menindee Lakes experienced slightly less inflows due to the reduced recovery, there was no matching trend in the River Murray at the SA border and at the barrages. Dry years in the Murray did not experience a decrease in flows, and indeed some dry

years showed an increase (notably the 2006 – 2009 period) as result of the more targeted Northern Basin recovery pattern. Overall, the change in Northern Basin recovery is not expected to significantly impact River Murray flows.

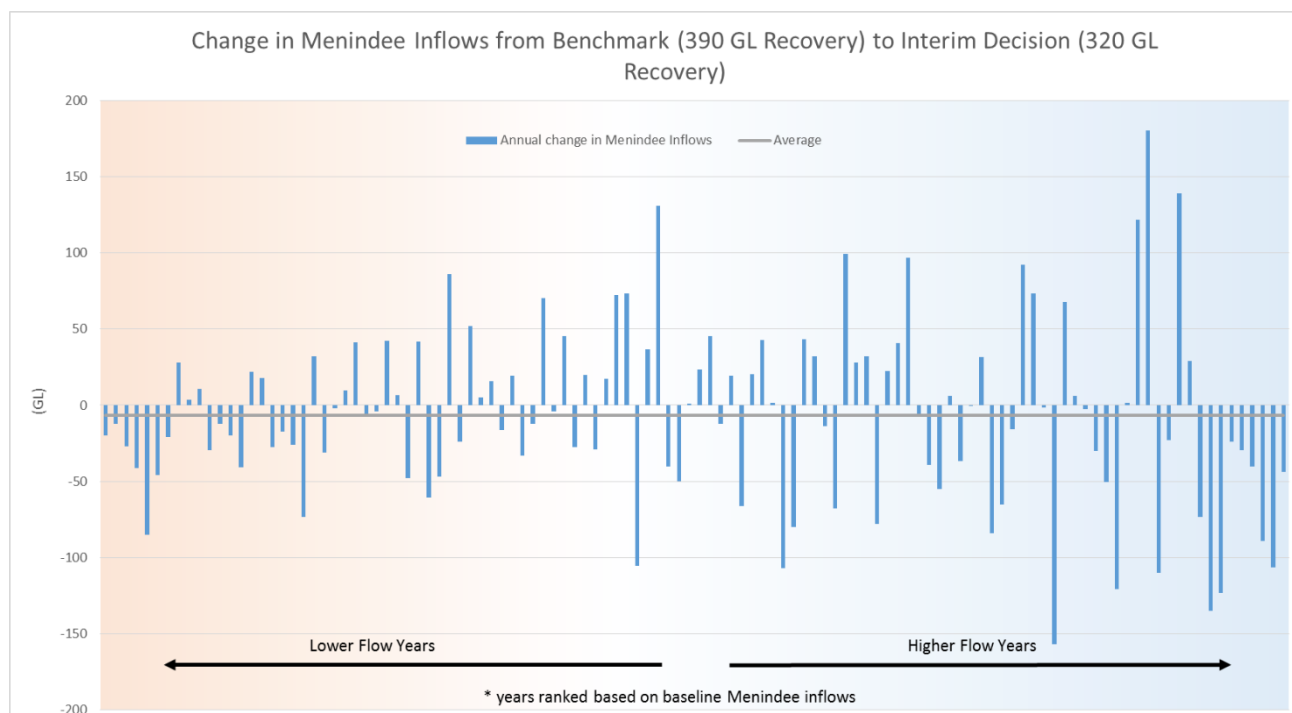


Figure 3 Annual change in Menindee Lakes inflows between the benchmark (390 GL) and interim decision (320 GL) scenarios

3. Conclusion

The model outputs of whole of north scenario K reflecting the Authority's proposed amendment were largely as expected as the settings of this scenario had been guided by analysis of previous model scenario outputs. This scenario was designed to minimise economic impacts while attempting to maintain many of the environmental outcomes associated with the original Basin plan recovery settings. Of all the recommended toolkit measures only two are explicitly modelled in this scenario, targeted recovery and an improved ability to coordinate delivery of environmental water.

4. References

MDBA (2016a) Hydrologic Modelling for the Northern Basin Review

MDBA (2016b) Environmental Outcomes of the Northern Basin Review

MDBA (2016c) The triple-bottom line framework: A method for assessing the, economic, social and environmental outcomes of sustainable diversion limits for the northern basin

Appendix A: SFI results

Table A1 lists the SFI results for the nine whole-of-north scenarios described in Section 7 of the NBR modelling report (MDBA 2016a), along with those for the without development and baseline scenarios. The ‘HU’ and ‘LU’ targets relate to a high and low uncertainty regarding the achievement of the desired environmental outcomes.

Also shown in this table is the ‘score’ of each scenario. This scoring approach, in which each SFI was given a value of between 0 and 4 depending on their progress from baseline towards the HU target value, was developed to collate SFI results. The method underlying this score can be found in the ecological outcomes report (MDBA 2016b).

Table A1 Flow indicator frequency results and score used for aggregated results — Whole-of-north Scenarios — the interim decision scenario (scenario K) results are in bold

SFI ID	Flow indicator			Frequency											Score													
	Flow event	LU target	HU target	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)	
CB 1	2 ML/d for 1 day any time of the year at Weilmoringle on the Culgoa River (refuges) (frequency results shown as average number of days of top 10% of dry spells)	350	430	247	451	447	445	447	448	445	448	447	447	447	448	4	0	0	0	0	0	0	0	0	0	0	0	0
CB 2	2 ML/d for 1 day any time of the year at Narran Park on the Narran River (refuges) (frequency results shown as average number of days of top 10% of dry spells)	350	470	349	542	550	534	533	539	540	540	539	539	539	540	4	0	0	0	0	0	0	0	0	0	0	0	0
CB 3	1,000 ML/d for 7 days any time of the year at Brenda on the Culgoa River (small fresh) (frequency results shown as percent of years with at least one event)	90	80	98	74	75	75	75	75	75	75	75	75	75	75	4	0	0	0	0	0	0	0	0	0	0	0	0
CB 4	1,700 ML/d for 14 days between Aug and May at Wilby Wilby on the Narran River (large fresh) (frequency results shown as percent of years with at least one event)	60	40	61	25	31	37	40	40	39	40	39	39	40	39	4	0	1	2	3	3	3	3	3	2	2	3	2
CB 5	3,500 ML/d for 14 days between Aug and May at Brenda on the Culgoa River (large fresh) (frequency results shown as percent of years with at least one event)	60	40	68	30	42	43	46	44	45	41	46	46	46	44	4	0	3	3	3	3	3	3	3	3	3	3	3
CB 6	9,200 ML/d for 12 days any time of the year at Brenda on the Culgoa River (riparian zone) (frequency results shown as the average period in years between events)	2	3	1.3	5.6	4.0	4.0	3.7	3.9	3.9	3.6	3.5	3.5	3.4	4.0	4	0	1	1	2	1	2	2	2	2	2	2	1

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SFI ID	Flow indicator			Frequency												Score											
	Flow event	LU target	HU target	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)
CB 7	15,000 ML/d for 10 days any time of the year at Brenda on the Culgoa River (inner floodplain) (frequency results shown as the average period in years between events)	3	4	1.9	7.1	6.3	6.3	6.3	6.3	6.3	6.0	5.4	5.4	5.4	6.3	4	0	0	0	0	0	1	1	1	1	1	0
CB 8	24,500 ML/d for 7 days any time of the year at Brenda on the Culgoa River (middle floodplain) (frequency results shown as the average period in years between events)	6	8	3.5	8.7	7.6	7.6	8.1	7.1	7.6	8.1	7.6	7.6	7.6	8.1	4	0	3	3	2	3	3	2	3	3	3	2
CB 9	38,000 ML/d for 6 days any time of the year at Brenda on the Culgoa River (outer floodplain) (frequency results shown as the average period in years between events)	10	20	9.5	28.5	38.0	38.0	22.8	22.8	28.5	22.8	19.0	19.0	16.3	28.5	4	0	0	0	2	2	2	2	3	3	3	2
NL 1	25 GL inflow over 60 days any time of the year at Wilby Wilby on the Narran River (waterbird breeding habitat) (frequency results shown as the average period in years between events)	1	1.3	0.6	1.3	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	4	3	3	4	4	4	4	4	4	4	4	4
NL 2	50 GL inflow over 90 days any time of the year at Wilby Wilby on the Narran River (waterbird breeding and foraging habitat) (frequency results shown as the average period in years between events)	1.3	1.7	0.8	2.0	1.7	1.5	1.4	1.4	1.5	1.4	1.4	1.4	1.4	1.4	4	0	3	4	4	4	4	4	4	4	4	4
NL 3	250 GL inflow over 180 days any time of the year at Wilby Wilby on the Narran River (outer floodplain) (frequency results shown as the average period in years between events)	8	10	5.3	13.8	12.2	11.0	9.1	9.1	11.0	10.0	11.0	11.0	9.9	9.1	4	0	1	2	3	3	2	3	2	2	3	3
NL 4	154 GL inflow over 90 days any time of the year at Wilby Wilby on the Narran River (waterbird breeding) (frequency results shown as the average period in years between events)	4	5	2.6	8.3	7.2	6.7	6.3	6.3	7.2	6.3	6.7	6.7	6.3	6.3	4	0	0	1	1	1	0	1	1	1	1	1
BD 01	6,000 ML/d for 14 days any time of the year at Bourke on the Darling River (small fresh) (frequency results shown as percent of years with at least one event)	90	80	96	66	78	80	80	80	82	82	82	75	82	81	4	0	2	3	3	3	3	3	3	1	3	3
BD 04	10,000 ML/d for 14 days between Aug and May at Bourke on the Darling River (large fresh – fish movement) (frequency results shown as percent of years with at least one event)	80	60	89	54	59	59	59	58	59	59	59	57	60	59	4	0	2	2	2	2	2	2	2	1	3	2
BD05	Two events of 10,000 ML/d for 20 days between Aug and May at Bourke on the Darling River (large fresh – fish breeding) (frequency results shown as percent of years with at least one event)	35	25	42	20	23	22	23	22	22	23	22	22	22	22	4	0	1	1	1	1	1	1	1	1	1	1

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SFI ID	Flow indicator			Frequency												Score											
	Flow event	LU target	HU target	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)
BD 08	30,000 ML/d for 24 days any time of the year at Bourke on the Darling River (riparian zone)	2	3	1.8	4.1	3.9	3.8	3.9	3.9	3.9	3.8	3.8	3.9	3.8	3.8	4	0	0	0	0	0	0	0	0	0	0	0
BD09	45,000 ML/d for 22 days any time of the year at Bourke on the Darling River (inner floodplain)	3.5	4	3.4	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	4.9	4	0	0	0	0	0	0	0	0	0	0	0
BD 10	65,000 ML/d for 24 days any time of the year at Bourke on the Darling River (middle floodplain)	6	8	5.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	4	0	0	0	0	0	0	0	0	0	0	0
BD 02	6,000 ML/d for 20 days between Aug and May at Louth on the Darling River (small fresh – long duration) (frequency results shown as percent of years with at least one event)	70	70	91	58	61	61	63	62	63	63	63	63	63	62	4	0	0	0	1	0	1	1	1	1	1	0
BD 06	21,000 ML/d for 20 days between Aug and May at Louth on the Darling River (large fresh – long duration) (frequency results shown as percent of years with at least one event)	40	40	54	32	32	32	32	32	32	32	32	32	32	32	4	0	0	0	0	0	0	0	0	0	0	0
BD03	6,000 ML/d for 8 days any time of the year at Wilcannia on the Darling River (small fresh - short duration) (frequency results shown as percent of years with at least one event)	60	45	77	42	46	46	46	48	49	46	48	49	50	48	4	0	3	3	3	3	3	3	3	3	3	3
BD 07	20,000 ML/d for 5 days any time of the year at Wilcannia on the Darling River (large fresh – short duration) (frequency results shown as percent of years with at least one event)	60	45	70	39	42	45	45	45	45	45	45	44	45	44	4	0	1	3	3	3	3	3	3	2	3	2
BD 11	Annual flow volume of 2,350 GL measured when flow is above 30,000 ML/d at Wilcannia on the Darling River (outer floodplain) (frequency results shown as percent of years with at least one event)	10	7	11	7	7	7	7	7	7	7	7	7	7	7	4	3	3	3	3	3	3	3	3	3	3	3
BR 1	4,000 ML/d for 5 days between Oct and Dec at Mungindi on the Barwon River (fresh – fish breeding) (frequency results shown as percent of years with at least one event)	31	23	39	17	18	22	20	20	22	22	22	22	22	20	4	0	0	2	1	1	2	2	2	2	2	1
BR 2	4,000 ML/d for 5 days between Oct and March at Mungindi on the Barwon River (fresh – fish breeding longer season) (frequency results shown as percent of years with at least one event)	59	44	74	33	35	37	37	37	39	38	38	36	39	38	4	0	0	1	1	1	1	1	1	0	1	1
BR 3	Two 4,000 ML/d for 11 days events any time of the year at Mungindi on the Barwon River (fresh – productivity) (frequency results shown as percent of years with at least one event)	34	25	42	14	14	17	15	15	16	16	18	18	18	16	4	0	0	0	0	0	0	0	1	1	1	0

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G1	150 ML/d for 45 days between Oct and Jan at Yarraman Bridge on the Gwydir River (baseflow – fish movement and breeding) (frequency results shown as percent of years with at least one event)	85	85	38	81	79	79	80	79	79	80	80	77	80	78	0	0	0	0	0	0	0	0	0	0	0	0
G2	1,000 ML/d for 2 days between Oct and Jan at Yarraman Bridge on the Gwydir River (fresh – cue for fish movement and breeding) (frequency results shown as percent of years with at least one event)	85	85	89	85	84	84	84	84	84	84	84	85	84	84	4	0	0	0	0	0	0	0	0	4	0	0
	Average of G1 and G2 used to generate the score used in the report	85	85	64	83	82	82	82	82	82	82	82	81	82	80	0	1	0	0	0	0	0	0	0	0	0	0
G3	45 GL inflow over 60 days between Oct and Mar at Yarraman Bridge on the Gwydir River (wetlands) (frequency results shown as percent of years with at least one event)	90	80	67	70	75	75	75	75	75	75	75	74	75	75	0	0	1	1	1	1	1	1	1	1	1	1
G4	60 GL inflow over 60 days between Oct and Mar at Yarraman Bridge on the Gwydir River (wetlands) (frequency results shown as percent of years with at least one event)	70	60	57	63	62	62	62	61	61	61	61	62	60	61	0	3	3	3	3	3	3	3	3	3	3	3
G5	80 GL inflow over 60 days between Oct and Mar at Yarraman Bridge on the Gwydir River (wetlands) (frequency results shown as percent of years with at least one event)	50	40	50	46	46	46	47	47	47	47	47	46	46	48	4	4	4	4	4	4	4	4	4	4	4	4
G6	150 GL inflow over 60 days between Oct and Mar at Yarraman Bridge on the Gwydir River (wetlands) (frequency results shown as percent of years with at least one event)	30	20	29	20	25	25	25	25	25	25	25	25	25	25	4	3	4	4	4	4	4	4	4	4	4	4
G7	250 GL inflow over 60 days between Oct and Mar at Yarraman Bridge on the Gwydir River (wetlands) (frequency results shown as percent of years with at least one event)	12	12	14	11	14	14	14	14	14	15	15	14	15	14	4	0	4	4	4	4	4	4	4	4	4	4
G8	5.4 GL inflow over 120 days between Feb and Mar and between Aug and Sep at the Mallowa Creek regulator – targeting 50 ML/d during these periods (riparian veg) (frequency results shown as percent of years with at least one event)	91	91	17	83	84	84	84	87	87	86	86	84	85	87	0	0	0	0	0	1	1	1	1	0	0	1
G9	4.5 GL inflow over 92 days between Nov and Jan at the Mallowa Creek regulator – targeting 50 ML/d during this periods (riparian vegetation) (frequency results shown as percent of years with at least one event)	50	40	15	1	50	50	50	49	49	50	50	51	49	49	0	0	4	4	4	4	4	4	4	4	4	4

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SFI ID	Flow indicator			Frequency												Score											
	Flow event	LU target	HU target	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)	Without Development (844)	Baseline (845)	278 GL (1113; Scen D)	320 GL (1112; Scen E)	320 GL (1111; Scen G)	321 GL (1115; Scen J)	345 GL (1103; Scen I)	350 GL (1114; Scen C)	390 GL (1089; Scen B)	390 GL (1110; Scen H)	415 GL (1108; Scen A)	320 GL (1117; Scen K)
N1	500 ML/d for 75 days (events with min duration of 25 days included) any time of the year at Bugilbone on the Namoi River (baseflow) (frequency results shown as percent of years with at least one event)	55	41	69	33	40	45	45	45	46	46	46	43	45	45	4	0	2	3	3	3	3	3	3	3	3	3
N2	1,800 ML/d for 60 days (events with min duration of 6 days included) any time of the year at Bugilbone on the Namoi River (freshe) (frequency results shown as percent of years with at least one event)	39	29	49	30	32	32	32	32	32	32	32	31	32	32	4	3	3	3	3	3	3	3	3	3	3	3
N3	4,000 ML/d for 45 days (events with min duration of 7 days included) any time of the year at Bugilbone on the Namoi River (riparian veg) (frequency results shown as percent of years with at least one event)	25	22	32	16	19	22	22	22	22	22	22	23	22	22	4	0	1	3	3	3	3	3	3	3	3	3
M1	100 GL inflow over 5 months between Jun and Apr at Marebone Break on the Macquarie River River (wetlands) (frequency results shown as percent of years with at least one event)	85	80	91	80	85	85	84	82	85	85	85	85	86	86	4	3	4	4	4	3	4	4	4	4	4	4
M2	250 GL inflow over 5 months between June and Apr at Marebone Break on the Macquarie River (wetlands) (frequency results shown as percent of years with at least one event)	50	40	66	35	48	48	51	46	46	48	48	49	50	48	4	0	4	4	4	4	4	4	4	4	4	4
M3	400 GL inflow over 7 months between June and Apr at Marebone Break on the Macquarie River (wetlands) (frequency results shown as percent of years with at least one event)	40	30	48	27	37	37	38	34	37	37	37	40	39	34	4	0	4	4	4	3	4	4	4	4	4	3
M4	700 GL inflow over 8 months between Jun and May at Marebone Break on the Macquarie River (wetlands) (frequency results shown as percent of years with at least one event)	17	17	18	17	18	18	18	18	18	18	18	18	18	18	4	4	4	4	4	4	4	4	4	4	4	4