

Victoria's North and Murray Surface Water BDL re-estimates

Prepared by Victoria April 2019

Summary

	Basin Plan BDL	Revised BDL
Victorian Murray water resource plan area	1731.6 GL/year	1,746.0 GL/year
Northern Victoria water resource plan area	2,161.0 GL/year	2,066.6 GL/year

	Basin Plan BDL	Revised BDL
Combined Victorian Murray SDL resource unit	1,814.6 GL/year	1,831.8 GL/year
Combined Northern Victoria SDL resource unit	2,078.0 GL/year	1,980.8 GL/year

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Victorian Murray Water Resource Plan Area: Victorian Murray SS2

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Watercourses (excluding basic rights) – modelled component		1668.0	<p>The Basin Plan did not include a BDL for regulated rivers (excluding basic rights). The modelled BDL for watercourses (excluding basic rights) includes all take from regulated rivers and a portion of unregulated take. Changes in estimates are based on the Source Murray Model computer simulation model that was developed for the Murray system covering all take from a regulated river (excluding basic rights). The method for the BDL is outlined in Revised BDL Estimates for NSW, Victoria and South Australian Murray and Lower Darling SDL Units Technical Report No. 2019/02 (MDBA, 2019).</p> <p>The remaining unregulated take is estimated separately outside of the model (see below).</p>
Watercourses (excluding basic rights) – out of model component	1662	5.5*	<p>Early discussions with the MDBA identified a revised method of total entitlement volume as the method for determining the BDL. This would have resulted in a BDL of 14.9 GL/yr (907 ML of bulk entitlements¹ and 14,003 ML of take and use licences on unregulated watercourses, excluding the amount determined to be associated with runoff dams). In late 2018 the MDBA advised that this would not be an acceptable method.</p> <p>* Victoria proposes to use the Basin Plan BDL for the out of model component for this form of take as an interim method. The BDL in the Basin Plan was determined by using average actual take data from 1997-98 to 2009-10. Recognising there are flaws in the data and method used, Victoria is proposing to revise the estimate within the next two years to determine a more accurate means of representing levels of take as at 30 June 2009 for this form of take. This is explained in the methods report in Part 3.1.3.2 and Table 6 of Appendix C of Victoria's North and Murray Water Resource Plan.</p> <p>¹ <i>the bulk entitlements covered in this estimate include:</i></p> <ul style="list-style-type: none"> • <i>Bulk Entitlement (Corryong) Conversion Order 2000</i> • <i>Bulk Entitlement (Cudgewa) Conversion Order 2000</i> • <i>Bulk Entitlement (Dartmouth) Conversion Order 2000</i> • <i>Bulk Entitlement (Omeo) Conversion Order 2008</i> • <i>Bulk Entitlement (Walwa) Conversion Order 2000</i> <p><i>These have a combined upper limit take of 907 ML per year.</i></p>
Regulated rivers under basic rights	-	8.2	<p>There was no estimate provided in the Basin Plan for this form of take. Victoria's BDL estimate is based on the sum of:</p> <ul style="list-style-type: none"> • a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. This model is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011). The model uses the best

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Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Watercourses under basic rights	-		<p>available information to represent conditions present as at June 2009. Due to the uncertainty in domestic and stock estimates, the modelled estimate uses the upper limits. The modelled estimate is a total volume for all SDL resource units in the Victorian Murray water resource plan area (Victorian Murray SDL resource unit and Kiewa SDL resource unit). As the Victorian Murray SDL resource unit is 89% of the total water resource plan area, the estimate was multiplied by 0.89 to determine a volume for the Victorian Murray SDL resource unit.</p> <ul style="list-style-type: none"> • an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the <i>Traditional Owner Settlement Act 2010</i>
Runoff dams (excluding basic rights)	23	4.8	<p>The volume estimate is based on entitlements extracted from Victorian Water Register as of July 2016.</p> <p>As given in Section 11.4.17 of Victoria's North and Murray Water Resource Plan Comprehensive Report, <i>"Data from the Victorian Water Register has been extracted as of July 2016. Due to ongoing improvements and data management within the Water Register, obtaining historical data from 2009 is currently not practical. However, Victoria's adherence to the Murray-Darling Basin Cap means that the total entitlements volume in 2016 has remained unchanged since before 2009. As a result, licence information from July 2016 is considered a suitable source of information for this situation"</i></p> <p>Data extracted from the Water Register for this form of take includes all registered farm dams. It also includes all take and use licences with licence type of "extraction from an on-waterway dam" or "harvesting using an off-waterway dam".</p> <p>Refer to Victoria's North and Murray Water Resource Plan Comprehensive Report, Section 11.4.1 and Appendix C for detailed description of the method for this form of take.</p>
Runoff dams under basic rights		7.6	<p>The volume estimate is based on modelling defined by Morden (2017) that is used to calculate take from runoff dams in Victoria's North and Murray water resource plan area as described in the Chapter 11 of Victoria's North and Murray Water Resource Plan Comprehensive Report (see Table 11-7).</p> <p>The determination of the BDL for runoff dams under basic rights uses the MDBA waterbodies data prepared by Geoscience Australia in 2010 (Geoscience Australia, 2010) based on Geoscience Australia waterbodies data using aerial imagery from 2005, with some updates in the Campaspe and Goulburn basins using imagery from 2010.</p> <p>While projections for growth in the number of dams are made in the report, these have not been used in estimating the BDL. The best available information on which to base estimates of take is the spatial data from approximately 2005. While this data could be adjusted to represent growth up to 2009, this is not appropriate as it would introduce additional uncertainty with little practical benefit.</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.2 and Appendix C for detailed description of the method for this form of take.</p>
Net take by commercial plantations	22	24.2	<p>This estimate is based on modelling recently undertaken by Victoria. Refer to the Victoria's North and Murray Comprehensive report Section 11.4.3.1 and Table 6 of Appendix C for a more detailed description of the method for this form of take.</p> <p>In summary, the BDL is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present in 2009 and from the vegetation type that was thought to be present before the commercial plantation was established. The long-term average rate of evapotranspiration was estimated using the SoilFlux model (HARC,2016),(Jacobs, 2016). The inputs used are considered the best available information to reflect the level of development of commercial plantations in the Victorian Murray as at June 2009 and the land use types present before the establishment of commercial plantations present in 2009.</p>
Total BDL	1,707	1,718.3	

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Victorian Murray Water Resource Plan Area: Kiewa SS3

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Regulated rivers (excluding basic rights)	n/a	n/a	n/a
Watercourses (excluding basic rights)	11	11.2	The revised BDL estimate is based on the Source Murray Model computer simulation model that was developed for the Murray system. The details are outlined in Revised BDL Estimates for NSW, Victoria and South Australian Murray and Lower Darling SDL Units Technical Report No. 2019/02 (MDBA 2019). The updated model gives the best available of conditions as at 30 June 2009 and uses a regression equation of diversions and climatic variables. This equates to a BDL volume of 11.2 GL/yr for the Kiewa SDL resource unit.
Regulated rivers under basic rights	-	1.0	<p>The volume estimate is based on the sum of:</p> <ul style="list-style-type: none"> a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. This model is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011). The model uses the best available information to represent conditions present as at June 2009. Due to the uncertainty in domestic and stock estimates, the modelled estimate uses the upper limits. The modelled estimate is a total volume for all SDL resource units in the Victorian Murray water resource plan area (Victorian Murray SDL resource unit and Kiewa SDL resource unit). As the Kiewa SDL resource unit is 11% of the total water resource plan area, the estimate was multiplied by 0.11 to determine a volume for the Kiewa SDL resource unit. an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the <i>Traditional Owner Settlement Act 2010</i>
Watercourses under basic rights	-		

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Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Runoff dams (excluding basic rights)	6.6	4.5	<p>The volume estimate is based on entitlements extracted from Victorian Water Register as of July 2016.</p> <p>As given in Section 11.4.17 of Victoria's North and Murray Comprehensive Report:</p> <p><i>"Data from the Victorian Water Register has been extracted as of July 2016. Due to ongoing improvements and data management within the Water Register, obtaining historical data from 2009 is currently not practical. However, Victoria's adherence to the Murray-Darling Basin Cap means that the total entitlements volume in 2016 has remained unchanged since before 2009. As a result, licence information from July 2016 is considered a suitable source of information for this situation"</i></p> <p>Data extracted from the Water Register for this form of take includes all registered farm dams. It also includes all take and use licences with licence type of "extraction from an on-waterway dam" or "harvesting using an off-waterway dam".</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.1 and Appendix C for detailed description of the method for this form of take.</p>
Runoff dams under basic rights		3.7	<p>The volume estimate is based on modelling defined by Morden (2017) that is used to calculate take from runoff dams in Victoria's North and Murray water resource plan area as described in the Chapter 11 of Victoria's North and Murray Water Resource Plan Comprehensive Report (see Table 11-7).</p> <p>The determination of the BDL for runoff dams under basic rights uses the MDBA waterbodies data prepared by Geoscience Australia in 2010 (Geoscience Australia, 2010) based on Geoscience Australia waterbodies data using aerial imagery from 2005, with some updates in the Campaspe and Goulburn basins using imagery from 2010.</p> <p>While projections for growth in the number of dams are made in the report, these have not been used in estimating the BDL. The best available information on which to base estimates of take is the spatial data from approximately 2005. While this data could be adjusted to represent growth up to 2009, this is not appropriate as it would introduce additional uncertainty with little practical benefit.</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.2 and Appendix C for detailed description of the method for this form of take.</p>
Net take by Commercial plantations	7.0	7.3	<p>This estimate is based on modelling recently undertaken by Victoria. Refer to the Victoria's North and Murray Comprehensive report Section 11.4.3.1 and Table 6 of Appendix C for a more detailed description of the method for this form of take.</p> <p>In summary, the BDL is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present in 2009 and from the vegetation type that was thought to be present before the commercial plantation was established. The long-term average rate of evapotranspiration was estimated using the SoilFlux model (HARC,2016), (Jacobs, 2016). The inputs used are considered the best available information to reflect the level of development of commercial plantations in the Kiewa SDL resource unit as at June 2009 and the land use types present before the establishment of commercial plantations present in 2009.</p>
Total BDL	24.6	27.7	

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Northern Victoria Water Resource Plan Area: Ovens (SS4)

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Regulated rivers (excluding basic rights)	n/a	25.4	<p>The revised BDL estimate is based on the Source Murray Model computer simulation model that was developed for the Murray system. The details are outlined in Revised BDL Estimates for NSW, Victoria and South Australian Murray and Lower Darling SDL Units Technical Report No. 2019/02 (MDBA,2019). The updated model gives the best available of conditions as at 30 June 2009. This equates to a BDL volume of 25.4 GL/yr for the Ovens SDL resource unit.</p> <p>The Basin Plan did not include a BDL for regulated rivers (excluding basic rights). It is assumed that the BDL for watercourses (excluding basic rights) was the BDL for both regulated rivers (excluding basic rights) and watercourses (excluding basic rights).</p>
Watercourses (excluding basic rights)	25		
Regulated rivers under basic rights	-	2.9	<p>The BDL estimate is based on the sum of:</p> <ul style="list-style-type: none"> a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. This model is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011). The model uses the best available information to represent conditions present as at June 2009. Due to the uncertainty in domestic and stock estimates, the modelled estimate uses the upper limits. The modelled estimate is a total volume for all SDL resource units in the Northern Victoria water resource plan area (Goulburn SDL resource unit, Broken SDL resource unit, Campaspe SDL resource unit, Loddon SDL resource unit and Ovens SDL resource unit). As the Ovens SDL resource unit is 17% of the total water resource plan area, the estimate was multiplied by 0.17 to determine a volume for the Ovens SDL resource unit. an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the <i>Traditional Owner Settlement Act 2010</i>
Watercourses under basic rights	-		

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Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Runoff dams (excluding basic rights)	26	12.5	<p>The volume estimate is based on entitlements extracted from Victorian Water Register as of July 2016.</p> <p>As given in Section 11.4.17 of Victoria's North and Murray Comprehensive Report:</p> <p><i>"Data from the Victorian Water Register has been extracted as of July 2016. Due to ongoing improvements and data management within the Water Register, obtaining historical data from 2009 is currently not practical. However, Victoria's adherence to the Murray-Darling Basin Cap means that the total entitlements volume in 2016 has remained unchanged since before 2009. As a result, licence information from July 2016 is considered a suitable source of information for this situation"</i></p> <p>Data extracted from the Water Register for this form of take includes all registered farm dams. It also includes all take and use licences with licence type of "extraction from an on-waterway dam" or "harvesting using an off-waterway dam".</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.1 and Appendix C for detailed description of the method for this form of take.</p>
Runoff dams under basic rights		12.5	<p>The volume estimate is based on modelling defined by Morden (2017) that is used to calculate take from runoff dams in Victoria's North and Murray water resource plan area as described in the Chapter 11 of Victoria's North and Murray Water Resource Plan Comprehensive Report (see Table 11-7).</p> <p>The determination of the BDL for runoff dams under basic rights uses the MDBA waterbodies data prepared by Geoscience Australia in 2010 (Geoscience Australia, 2010) based on Geoscience Australia waterbodies data using aerial imagery from 2005, with some updates in the Campaspe and Goulburn basins using imagery from 2010.</p> <p>While projections for growth in the number of dams are made in the report, these have not been used in estimating the BDL. The best available information on which to base estimates of take is the spatial data from approximately 2005. While this data could be adjusted to represent growth up to 2009, this is not appropriate as it would introduce additional uncertainty with little practical benefit.</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.2 and Appendix C for detailed description of the method for this form of take.</p>
Net take by commercial plantations	32	32.5	<p>This estimate is based on modelling recently undertaken by Victoria. Refer to the Victoria's North and Murray Comprehensive report Section 11.4.3.1 and Table 6 of Appendix C for a more detailed description of the method for this form of take.</p> <p>In summary, the BDL is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present in 2009 and from the vegetation type that was thought to be present before the commercial plantation was established. The long-term average rate of evapotranspiration was estimated using the SoilFlux model (HARC,2016), (Jacobs, 2016). The inputs used are considered the best available information to reflect the level of development of commercial plantations in the Ovens SDL resource unit as at June 2009 and the land use types present before the establishment of commercial plantations present in 2009.</p>
Total BDL	83	85.8	

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Northern Victoria Water Resource Plan Area: Goulburn (SS6)

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Regulated rivers (excluding basic rights)	1552.0	1552.7	<p>Changes in estimates are based on the updated Resource Allocation Model (REALM) computer simulation model the "Goulburn Simulation Model" that was developed for the Goulburn, Broken, Campaspe, Coliban and Loddon systems covering all take from a regulated river (excluding basic rights).</p> <p>The method for the BDL is outlined in the report titled: Hydrologic Models for Basin Plan Compliance in the Northern Victoria Water Resource Plan Area - Baseline and Sustainable Diversion Limits, and Permitted Take Method – April 2019 (DELWP, 2019).</p>
Watercourses (excluding basic rights)	29	18.3*	<p>Early discussions with the MDBA identified a revised method of total entitlement volume as the method for determining the BDL. This would have increased the BDL to 46.5 GL (29,798 ML of bulk entitlements and 16,716 ML of take and use licences on unregulated watercourses, excluding the amount determined to be associated with runoff dams).</p> <p>In late 2018 the MDBA advised that this would not be an acceptable method. Victoria is proposing to revise the estimate within the next two years to determine a more accurate means of representing levels of take as at 30 June 2009 for this form of take. This is explained in the methods report in Part 3.1.3.2 and Table 6 of Appendix C of Victoria's North and Murray Water Resource Plan.</p> <p>* The BDLs in the Basin Plan were determined using actual take data from the period between 1997-98 to 2009-10. In the interim, the total volume of the Basin Plan BDLs for Goulburn, Broken, Loddon and Campaspe SDL resource units (31 GL/yr) has been reapportioned between SDL resource units to better align with recent actual take data for accounting purposes. The reapportionment volumes use the average actual take reported under the Commonwealth Water Act, section 71 reporting for 2017-18, 2016-17 and 2015-16 water accounting years. This equates to a volume of 18.3 GL/yr for the Goulburn SDL resource unit.</p> <p>The adoption of the interim method does not:</p> <ul style="list-style-type: none"> • limit the ability of a holder of a take and use licence to utilise their entitlement during the two-year review process; • prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year, • prejudice Victoria from adopting a method in 2 years which may result in an increased BDL • prevent a revised SDL compliance assessment to be undertaken of the period since 1 July 2019, once a revised BDL and permitted take method is agreed (consistent with the MDBA's SDL reporting and compliance framework).
Regulated rivers under basic rights	-	6.3	<p>The BDL estimate is based on the sum of:</p> <ul style="list-style-type: none"> • a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. This model is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011). The model uses the best

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Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Watercourses under basic rights	-		<p>available information to represent conditions present as at June 2009. Due to the uncertainty in domestic and stock estimates, the modelled estimate uses the upper limits. The modelled estimate is a total volume for all SDL resource units in the Northern Victoria water resource plan area (Goulburn SDL resource unit, Broken SDL resource unit, Campaspe SDL resource unit, Loddon SDL resource unit and Ovens SDL resource unit). As the Goulburn SDL resource unit is 37% of the total water resource plan area, the estimate was multiplied by 0.37 to determine a volume for the Goulburn SDL resource unit.</p> <ul style="list-style-type: none"> • an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the <i>Traditional Owner Settlement Act 2010</i>
Runoff dams (excluding basic rights)	86.0	27.1	<p>The volume estimate is based on entitlements extracted from Victorian Water Register as of July 2016.</p> <p>As given in Section 11.4.17 of Victoria's North and Murray Comprehensive Report:</p> <p><i>"Data from the Victorian Water Register has been extracted as of July 2016. Due to ongoing improvements and data management within the Water Register, obtaining historical data from 2009 is currently not practical. However, Victoria's adherence to the Murray-Darling Basin Cap means that the total entitlements volume in 2016 has remained unchanged since before 2009. As a result, licence information from July 2016 is considered a suitable source of information for this situation"</i></p> <p>Data extracted from the Water Register for this form of take includes all registered farm dams. It also includes all take and use licences with licence type of "extraction from an on-waterway dam" or "harvesting using an off-waterway dam".</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.1 and Appendix C for detailed description of the method for this form of take.</p>
Runoff dams under basic rights		24.4	<p>The volume estimate is based on modelling defined by Morden (2017) that is used to calculate take from runoff dams in Victoria's North and Murray water resource plan area as described in the Chapter 11 of Victoria's North and Murray Water Resource Plan Comprehensive Report (see Table 11-7).</p> <p>The determination of the BDL for runoff dams under basic rights uses the MDBA waterbodies data prepared by Geoscience Australia in 2010 (Geoscience Australia, 2010) based on Geoscience Australia waterbodies data using aerial imagery from 2005, with some updates in the Campaspe and Goulburn basins using imagery from 2010.</p> <p>While projections for growth in the number of dams are made in the report, these have not been used in estimating the BDL. The best available information on which to base estimates of take is the spatial data from approximately 2005. While this data could be adjusted to represent growth up to 2009, this is not appropriate as it would introduce additional uncertainty with little practical benefit.</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.2 and Appendix C for detailed description of the method for this form of take.</p>
Net take by commercial plantations	23.0	22.4	<p>This estimate is based on modelling recently undertaken by Victoria. Refer to the Victoria's North and Murray Comprehensive report Section 11.4.3.1 and Table 6 of Appendix C for a more detailed description of the method for this form of take.</p> <p>In summary, the BDL is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present in 2009 and from the vegetation type that was thought to be present before the commercial plantation was established. The long-term average rate of evapotranspiration was estimated using the SoilFlux model (HARC,2016),(Jacobs, 2016). The inputs used are considered the best available information to reflect the level of development of commercial plantations in the Goulburn SDL resource unit as at June 2009 and the land use types present before the establishment of commercial plantations present in 2009.</p>
Total BDL	1,690	1,651.2	

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Northern Victoria Water Resource Plan Area: Broken (SS5)

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Regulated rivers (excluding basic rights)	13	13.2	<p>Changes in estimates are based on the updated Resource Allocation Model (REALM) computer simulation model the "Goulburn Simulation Model" that was developed for the Goulburn, Broken, Campaspe, Coliban and Loddon systems covering all take from a regulated river (excluding basic rights).</p> <p>The method for the BDL is outlined in the report titled: Hydrologic Models for Basin Plan Compliance in the Northern Victoria Water Resource Plan Area - Baseline and Sustainable Diversion Limits, and Permitted Take Method – April 2019 (DELWP, 2019)</p>
Watercourses (excluding basic rights)	0	2.9*	<p>Early discussions with the MDBA identified a revised method of total entitlement volume as the method for determining the BDL. This would have increased the BDL to 3.86 GL/yr (2,324 ML/yr of bulk entitlement, <i>Bulk Entitlement (Loombah McCall-Say) Conversion Order 2001</i> and 1,538 ML/yr of take and use licences on unregulated watercourses, excluding the amount determined to be associated with runoff dams).</p> <p>In late 2018 the MDBA advised that this would not be an acceptable method. Victoria is proposing to revise the estimate within the next two years to determine a more accurate means of representing levels of take as at 30 June 2009 for this form of take. This is explained in the methods report in Part 3.1.3.2 and Table 6 of Appendix C of Victoria's North and Murray Water Resource Plan.</p> <p>* The BDLs in the Basin Plan were determined using actual take data from the period between 1997-98 to 2009-10. In the interim, the total volume of the Basin Plan BDLs for Goulburn, Broken, Loddon and Campaspe SDL resource units (31 GL/yr) has been reapportioned between SDL resource units to better align with recent actual take data for accounting purposes. The reapportionment volumes use the average actual take reported under the Commonwealth Water Act, section 71 reporting for 2017-18, 2016-17 and 2015-16 water accounting years. This equates to a volume of 2.9 GL/yr for the Broken SDL resource unit.</p> <p><i>Note: the volume of 2.848 GL/yr has been rounded up to 2.9 GL/year to result in no net change from the 31 GL/yr combined total BDL in the Basin Plan for the interim method.</i></p> <p>The adoption of the interim method does not:</p> <ul style="list-style-type: none"> • limit the ability of a holder of a take and use licence to utilise their entitlement during the two-year review process; • prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year, • prejudice Victoria from adopting a method in 2 years which may result in an increased BDL • prevent a revised SDL compliance assessment to be undertaken of the period since 1 July 2019, once a revised BDL and permitted take method is agreed (consistent with the MDBA's SDL reporting and compliance framework).
Regulated rivers under basic rights	-	1.6	<p>The BDL estimate is based on the sum of:</p> <ul style="list-style-type: none"> • a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. This model is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011). The model uses the best available information to represent conditions present as at June 2009. Due to the uncertainty in domestic and stock estimates, the modelled estimate uses the upper limits. The modelled estimate is a total volume for all SDL resource units in the Northern Victoria water resource plan area (Goulburn SDL resource unit, Broken SDL resource unit, Campaspe SDL resource unit, Loddon SDL resource unit and Ovens SDL resource unit). As the Broken SDL resource unit is 9% of the total water resource plan area, the estimate was multiplied by 0.09 to determine a volume for the Broken SDL resource unit. • an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the <i>Traditional Owner Settlement Act 2010</i>
Watercourses under basic rights	-		

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Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Runoff dams (excluding basic rights)	30.0	10.4	<p>The volume estimate is based on entitlements extracted from Victorian Water Register as of July 2016.</p> <p>As given in Section 11.4.17 of Victoria's North and Murray Comprehensive Report:</p> <p><i>"Data from the Victorian Water Register has been extracted as of July 2016. Due to ongoing improvements and data management within the Water Register, obtaining historical data from 2009 is currently not practical. However, Victoria's adherence to the Murray-Darling Basin Cap means that the total entitlements volume in 2016 has remained unchanged since before 2009. As a result, licence information from July 2016 is considered a suitable source of information for this situation"</i></p> <p>Data extracted from the Water Register for this form of take includes all registered farm dams. It also includes all take and use licences with licence type of "extraction from an on-waterway dam" or "harvesting using an off-waterway dam".</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.1 and Appendix C for detailed description of the method for this form of take.</p>
Runoff dams under basic rights		6.3	<p>The volume estimate is based on modelling defined by Morden (2017) that is used to calculate take from runoff dams in Victoria's North and Murray water resource plan area as described in the Chapter 11 of Victoria's North and Murray Water Resource Plan Comprehensive Report (see Table 11-7).</p> <p>The determination of the BDL for runoff dams under basic rights uses the MDBA waterbodies data prepared by Geoscience Australia in 2010 (Geoscience Australia, 2010 based on Geoscience Australia waterbodies data using aerial imagery from 2005, with some updates in the Campaspe and Goulburn basins using imagery from 2010).</p> <p>While projections for growth in the number of dams are made in the report, these have not been used in estimating the BDL. The best available information on which to base estimates of take is the spatial data from approximately 2005. While this data could be adjusted to represent growth up to 2009, this is not appropriate as it would introduce additional uncertainty with little practical benefit.</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.2 and Appendix C for detailed description of the method for this form of take.</p>
Net take by commercial plantations	13.0	14.9	<p>This estimate is based on modelling recently undertaken by Victoria. Refer to the Victoria's North and Murray Comprehensive report Section 11.4.3.1 and Table 6 of Appendix C for a more detailed description of the method for this form of take.</p> <p>In summary, the BDL is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present in 2009 and from the vegetation type that was thought to be present before the commercial plantation was established. The long-term average rate of evapotranspiration was estimated using the SoilFlux model (HARC,2016), (Jacobs, 2016). The inputs used are considered the best available information to reflect the level of development of commercial plantations in the Broken SDL resource unit as at June 2009 and the land use types present before the establishment of commercial plantations present in 2009.</p>
Total BDL	56	49.3	

Victoria's North and Murray Surface Water BDL re-estimates

Northern Victoria Water Resource Plan Area: Campaspe (SS7)

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Regulated rivers (excluding basic rights)	111	115.8	<p>Changes in estimates are based on the updated Resource Allocation Model (REALM) computer simulation model the "Goulburn Simulation Model" that was developed for the Goulburn, Broken, Campaspe, Coliban and Loddon systems covering all take from a regulated river (excluding basic rights).</p> <p>The method for the BDL is outlined in the report titled: Hydrologic Models for Basin Plan Compliance in the Northern Victoria Water Resource Plan Area - Baseline and Sustainable Diversion Limits, and Permitted Take Method – April 2019 (DELWP, 2019)</p>
Watercourses (excluding basic rights)	1	0.9*	<p>Early discussions with the MDBA identified a revised method of total entitlement volume as the method for determining the BDL. This would have increased the BDL to 1.15 GL/yr (120 ML/yr of bulk entitlement, <i>Bulk Entitlement (Trentham) Conversion Order 2012</i>, and 1,028 ML/yr of take and use licences on unregulated watercourses, excluding the amount determined to be associated with farm dams).</p> <p>In late 2018 the MDBA advised that this would not be an acceptable method. Victoria is proposing to revise the estimate within the next two years to determine a more accurate means of representing levels of take as at 30 June 2009 for this form of take. This is explained in the methods report in Part 3.1.3.2 and Table 6 of Appendix C of Victoria's North and Murray Water Resource Plan.</p> <p>* The BDLs in the Basin Plan were determined using actual take data from the period between 1997-98 to 2009-10. In the interim, the total volume of the Basin Plan BDLs for Goulburn, Broken, Loddon and Campaspe SDL resource units (31 GL/yr) has been reapportioned between SDL resource units to better align with recent actual take data for accounting purposes. The reapportionment volumes use the average actual take reported under the Commonwealth Water Act, section 71 reporting for 2017-18, 2016-17 and 2015-16 water accounting years. This equates to a volume of 0.9 GL/yr for the Campaspe SDL resource unit.</p> <p>The adoption of the interim method does not:</p> <ul style="list-style-type: none"> • limit the ability of a holder of a take and use licence to utilise their entitlement during the two-year review process; • prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year, • prejudice Victoria from adopting a method in 2 years which may result in an increased BDL • prevent a revised SDL compliance assessment to be undertaken of the period since 1 July 2019, once a revised BDL and permitted take method is agreed (consistent with the MDBA's SDL reporting and compliance framework).
Regulated rivers under basic rights	-	1.6	<p>The BDL estimate is based on the sum of:</p> <ul style="list-style-type: none"> • a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. This model is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011). The model uses the best available information to represent conditions present as at June 2009. Due to the uncertainty in domestic and stock estimates, the modelled estimate uses the upper limits. The modelled estimate is a total volume for all SDL resource units in the Northern Victoria water resource plan area (Goulburn SDL resource unit, Broken SDL resource unit, Campaspe SDL resource unit, Loddon SDL resource unit and Ovens SDL resource unit). As the Campaspe SDL resource unit is 9% of the total water resource plan area, the estimate was multiplied by 0.09 to determine a volume for the Campaspe SDL resource unit. • an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the <i>Traditional Owner Settlement Act 2010</i>
Watercourses under basic rights	-		

Victoria's North and Murray Surface Water BDL re-estimates

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Runoff dams (excluding basic rights)	39.0	6.1	<p>The volume estimate is based on entitlements extracted from Victorian Water Register as of July 2016.</p> <p>As given in section 10.4.1 of the WRP Comprehensive Report:</p> <p><i>"Data from the Victorian Water Register has been extracted as of July 2016. Due to ongoing improvements and data management within the Water Register, obtaining historical data from 2009 is currently not practical. However, current management of Section 51 licences ensures that the overall entitlement pool for section 51 licences cannot increase over time. This means that the total entitlements volume in 2016 has remained unchanged since prior to 2009. As a result, licence information from July 2016 is considered a suitable source of information for this situation."</i></p> <p>Data extracted from the Water Register for this form of take includes all registered farm dams. It also includes all take and use licences with licence type of "extraction from an on-waterway dam" or "harvesting using an off-waterway dam". A small number of these licenses exist in the West Wimmera zone.</p> <p>Refer to the WRP Comprehensive Report section 10.4.1 for detailed description of the method for this form of take.</p>
Runoff dams under basic rights		14.4	<p>The volume estimate is based on modelling defined by Morden (2017) that is used to calculate take from runoff dams in Victoria's North and Murray water resource plan area as described in the Chapter 11 of Victoria's North and Murray Water Resource Plan Comprehensive Report (see Table 11-7).</p> <p>The determination of the BDL for runoff dams under basic rights uses the MDBA waterbodies data prepared by Geoscience Australia in 2010 (Geoscience Australia, 2010) based on Geoscience Australia waterbodies data using aerial imagery from 2005, with some updates in the Campaspe and Goulburn basins using imagery from 2010.</p> <p>While projections for growth in the number of dams are made in the report, these have not been used in estimating the BDL. The best available information on which to base estimates of take is the spatial data from approximately 2005. While this data could be adjusted to represent growth up to 2009, this is not appropriate as it would introduce additional uncertainty with little practical benefit.</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.2 and Appendix C for detailed description of the method for this form of take.</p>
Net take by commercial plantations	1.0	1.8	<p>This estimate is based on modelling recently undertaken by Victoria. Refer to the Victoria's North and Murray Comprehensive report Section 11.4.3.1 and Table 6 of Appendix C for a more detailed description of the method for this form of take.</p> <p>In summary, the BDL is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present in 2009 and from the vegetation type that was thought to be present before the commercial plantation was established. The long-term average rate of evapotranspiration was estimated using the SoilFlux model (HARC,2016), (Jacobs, 2016). The inputs used are considered the best available information to reflect the level of development of commercial plantations in the Campaspe SDL resource unit as at June 2009 and the land use types present before the establishment of commercial plantations present in 2009.</p>
Total BDL	152.0	140.6	

Victoria's North and Murray Surface Water BDL re-estimates

Northern Victoria Water Resource Plan Area: Loddon (SS8)

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Regulated rivers (excluding basic rights)	89.0	85.8	<p>Changes in estimates are based on the updated Resource Allocation Model (REALM) computer simulation model the "Goulburn Simulation Model" that was developed for the Goulburn, Broken, Campaspe, Coliban and Loddon systems covering all take from a regulated river (excluding basic rights).</p> <p>The method for the BDL is outlined in the report titled: Hydrologic Models for Basin Plan Compliance in the Northern Victoria Water Resource Plan Area - Baseline and Sustainable Diversion Limits, and Permitted Take Method – April 2019 (DELWP, 2019)</p>
Watercourses (excluding basic rights)	1.0	8.9*	<p>Early discussions with the MDBA identified a revised method of total entitlement volume as the method for determining the BDL. This would have increased the BDL to 21.2 GL/yr (4,461 ML/yr of bulk entitlements¹ and 16,756 ML/yr of take and use licences on unregulated watercourses, excluding the amount determined to be associated with runoff dams).</p> <p>In late 2018 the MDBA advised that this would not be an acceptable method. Victoria is proposing to revise the estimate within the next two years to determine a more accurate means of representing levels of take as at 30 June 2009 for this form of take. This is explained in the methods report in Part 3.1.3.2 and Table 6 of Appendix C of Victoria's North and Murray Water Resource Plan.</p> <p>* The BDLs in the Basin Plan were determined using actual take data from the period between 1997-98 to 2009-10. In the interim, the total volume of the Basin Plan BDLs for Goulburn, Broken, Loddon and Campaspe SDL resource units (31 GL/yr) has been reapportioned between SDL resource units to better align with recent actual take data for accounting purposes. The reapportionment volumes use the average actual take reported under the Commonwealth Water Act, section 71 reporting for 2017-18, 2016-17 and 2015-16 water accounting years. This equates to a volume of 8.9 GL/yr for the Loddon SDL resource unit.</p> <p>The adoption of the interim method does not:</p> <ul style="list-style-type: none"> • limit the ability of a holder of a take and use licence to utilise their entitlement during the two-year review process; • prejudice Victoria from identifying a method on review that would enable the accumulation of credits if actual take is below what would be permitted in a given year, • prejudice Victoria from adopting a method in 2 years which may result in an increased BDL • prevent a revised SDL compliance assessment to be undertaken of the period since 1 July 2019, once a revised BDL and permitted take method is agreed (consistent with the MDBA's SDL reporting and compliance framework). <p>¹The bulk entitlements covered in this estimate include:</p> <ul style="list-style-type: none"> • Bulk Entitlement (Creswick) Conversion Order 2004 • Bulk Entitlement (Daylesford - Hepburn Springs) Conversion Order 2004 • Bulk Entitlement (Evansford-Talbot System-Part Maryborough-Central Highlands Water) Conversion Order 2006 • Bulk Entitlement (Lexton) Conversion Order 2004
Regulated rivers under basic rights	-	4.8	<p>The BDL estimate is based on the sum of:</p> <ul style="list-style-type: none"> • a modelled estimate of the volume of water taken from freehold land and Crown frontage based on estimated domestic demand of 0.3 ML/house/year and stock drinking water of 0.03ML/year/per ha of land grazed. This model is explained in Stock and Domestic Water Use Modelling Resource Manager's Handbook (RMCG, 2011). The model uses the best

Victoria's North and Murray Surface Water BDL re-estimates

Form of Take	BP 2012 Estimate (GL/yr)	Revised Estimate (GL/yr)	Supporting Information
Watercourses under basic rights	-		<p>available information to represent conditions present as at June 2009. Due to the uncertainty in domestic and stock estimates, the modelled estimate uses the upper limits. The modelled estimate is a total volume for all SDL resource units in the Northern Victoria water resource plan area (Goulburn SDL resource unit, Broken SDL resource unit, Campaspe SDL resource unit, Loddon SDL resource unit and Ovens SDL resource unit). As the Loddon SDL resource unit is 28% of the total water resource plan area, the estimate was multiplied by 0.28 to determine a volume for the Loddon SDL resource unit.</p> <ul style="list-style-type: none"> • an estimate of the volume of expected water demand under section 8A of the Victorian Water Act where the Traditional Owners have a natural resource agreement under the <i>Traditional Owner Settlement Act 2010</i>
Runoff dams (excluding basic rights)	85.0	18.1	<p>The volume estimate is based on entitlements extracted from Victorian Water Register as of July 2016.</p> <p>As given in section 10.4.1 of the WRP Comprehensive Report:</p> <p><i>"Data from the Victorian Water Register has been extracted as of July 2016. Due to ongoing improvements and data management within the Water Register, obtaining historical data from 2009 is currently not practical. However, current management of Section 51 licences ensures that the overall entitlement pool for section 51 licences cannot increase over time. This means that the total entitlements volume in 2016 has remained unchanged since prior to 2009. As a result, licence information from July 2016 is considered a suitable source of information for this situation."</i></p> <p>Data extracted from the Water Register for this form of take includes all registered farm dams. It also includes all take and use licences with licence type of "extraction from an on-waterway dam" or "harvesting using an off-waterway dam". A small number of these licenses exist in the West Wimmera zone.</p> <p>Refer to Victoria's North and Murray Water Resource Plan Comprehensive Report, Section 10.4.1 for detailed description of the method for this form of take.</p>
Runoff dams under basic rights		16.6	<p>The volume estimate is based on modelling defined by Morden (2017) that is used to calculate take from runoff dams in Victoria's North and Murray water resource plan area as described in the Chapter 11 of Victoria's North and Murray Water Resource Plan Comprehensive Report (see Table 11-7).</p> <p>The determination of the BDL for runoff dams under basic rights uses the MDBA waterbodies data prepared by Geoscience Australia in 2010 (Geoscience Australia, 2010) based on Geoscience Australia waterbodies data using aerial imagery from 2005, with some updates in the Campaspe and Goulburn basins using imagery from 2010.</p> <p>While projections for growth in the number of dams are made in the report, these have not been used in estimating the BDL. The best available information on which to base estimates of take is the spatial data from approximately 2005. While this data could be adjusted to represent growth up to 2009, this is not appropriate as it would introduce additional uncertainty with little practical benefit.</p> <p>Refer to Victoria's North and Murray Comprehensive Report Section 11.4.2 and Appendix C for detailed description of the method for this form of take.</p>
Net take by commercial plantations	5.0	5.5	<p>This estimate is based on modelling recently undertaken by Victoria. Refer to the Victoria's North and Murray Comprehensive report Section 11.4.3.1 and Table 6 of Appendix C for a more detailed description of the method for this form of take.</p> <p>In summary, the BDL is estimated as the difference between the long-term average rate of evapotranspiration from commercial plantations that were present in 2009 and from the vegetation type that was thought to be present before the commercial plantation was established. The long-term average rate of evapotranspiration was estimated using the SoilFlux model (HARC,2016), (Jacobs, 2016). The inputs used are considered the best available information to reflect the level of development of commercial plantations in the Loddon SDL resource unit as at June 2009 and the land use types present before the establishment of commercial plantations present in 2009.</p>
Total BDL	180.0	139.7	