

Supplementary Information

Table S1 Percentage changes in mean annual precipitation (mm per year) under control and future climate scenarios across locations in the Western Cape (GCM Ensemble; Downscaling Method: QDM).

Site	Control (m ³ /s)	RCP 4.5	RCP 4.5	RCP 8.5	RCP 8.5
		2040-2060	2080-2100	2040-2060	2080-2100
		(%)	(%)	(%)	(%)
Vredendal	144.44	-14.53	-21.30	-20.50	-34.44
Jonkershoek	990.95	-22.03	-23.64	-24.38	-35.47
Vogel Vallij	531.51	-16.59	-21.01	-21.76	-34.88
Grabouw	1028.96	-5.62	-6.92	-8.42	-20.81
Eenzaamheid	699.10	-15.71	-15.62	-16.26	-27.33
Kammanassie	309.20	0.54	-0.42	2.14	-5.25
Stompdrift Dam	210.11	10.88	11.21	10.78	1.21

Table S2 Percentage changes in mean annual precipitation (mm per year) under control and future climate scenarios across locations in the Western Cape (GCM Ensemble; Downscaling Method: LS).

Site	Control (m ³ /s)	RCP 4.5	RCP 4.5	RCP 8.5	RCP 8.5
		2040-2060	2080-2100	2040-2060	2080-2100
		(%)	(%)	(%)	(%)
Vredendal	144.44	-11.17	-17.78	-15.01	-32.06
Jonkershoek	990.95	-22.81	-24.52	-25.11	-35.69
Vogel Vallij	531.51	-25.26	-28.16	-29.01	-40.63
Grabouw	1028.96	93.95	91.40	88.70	61.78
Eenzaamheid	699.10	-10.33	-10.24	-10.65	-22.68
Kammanassie	309.20	64.08	61.21	65.12	50.99
Stompdrift Dam	210.11	305.44	304.73	307.70	261.68

Table S3 Percentage changes in mean annual precipitation (mm per year) under control and future climate scenarios across locations in the Western Cape (GCM Ensemble; Downscaling Method: DC).

Site	Control (m ³ /s)	RCP 4.5	RCP 4.5	RCP 8.5	RCP 8.5
		2040-2060	2080-2100	2040-2060	2080-2100
		(%)	(%)	(%)	(%)
Vredendal	144.44	-3.60	-9.80	-8.71	-18.57
Jonkershoek	990.95	-5.05	-6.97	-6.64	-17.96
Vogel Vallij	531.51	-4.49	-7.81	-7.50	-18.40
Grabouw	1028.96	-5.07	-6.45	-6.48	-17.66
Eenzaamheid	699.10	-4.36	-3.87	-3.76	-15.25
Kammanassie	309.20	-4.17	-5.80	-3.32	-10.50
Stompdrift Dam	210.11	-6.27	-5.98	-5.17	-14.63

Table S4 Kolmogrov-Smirnov significance testing results for the Little Berg River for several statistical distributions (Downscaling method: DC; IPF Method: Fuller).¹

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060		$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100		$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060		$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100			

Table S5 Kolmogrov-Smirnov significance testing results for the Jonkershoek for several statistical distributions (Downscaling method: DC; IPF Method: Fuller).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$

¹ Grey shaded areas are indicate of non-significance ($p < 0.05$).

RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
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Table S6 Kolmogrov-Smirnov significance testing results for the Little Berg River for several statistical distributions (Downscaling method: DC; IPF Method: Sangal).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060		$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100		$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060		$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100		$p > 0.05$	$p > 0.05$

Table S7 Kolmogrov-Smirnov significance testing results for the Jonkershoek for several statistical distributions (Downscaling method: DC; IPF Method: Sangal).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	

Table S8 Kolmogrov-Smirnov significance testing results for the Little Berg River for several statistical distributions (Downscaling method: LS; IPF Method: Fuller).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S9 Kolmogrov-Smirnov significance testing results for the Jonkershoek for several statistical distributions (Downscaling method: LS; IPF Method: Fuller).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S10 Kolmogrov-Smirnov significance testing results for the Little Berg River for several statistical distributions (Downscaling method: LS; IPF Method: Sangal).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S11 Kolmogrov-Smirnov significance testing results for the Jonkershoek for several statistical distributions (Downscaling method: LS; IPF Method: Sangal).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S12 Kolmogrov-Smirnov significance testing results for the Little Berg River for several statistical distributions (Downscaling method: QDM; IPF Method: Fuller).

Scenario	Log-Normal	GEV	Log Pearson Type III
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Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S13 Kolmogrov-Smirnov significance testing results for the Jonkershoek for several statistical distributions (Downscaling method: QDM; IPF Method: Fuller).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S14 Kolmogrov-Smirnov significance testing results for the Little Berg River for several statistical distributions (Downscaling method: QDM; IPF Method: Sangal).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S15 Kolmogrov-Smirnov significance testing results for the Jonkershoek for several statistical distributions (Downscaling method: QDM; IPF Method: Sangal).

Scenario	Log-Normal	GEV	Log Pearson Type III
Current	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 4.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

RCP 8.5 2030 – 2060	$p > 0.05$	$p > 0.05$	$p > 0.05$
RCP 8.5 2070 – 2100	$p > 0.05$	$p > 0.05$	$p > 0.05$

Table S16 Descriptions of calibration parameters used within the WRSM/Pitman model with suggested values and ranges (Bailey and Pitman 2016).

Calibration		Suggested
Parameter	Description	Value/Range
Pow	Power in the soil moisture/subsurface flow equation	2
Sl	Soil moisture state where no subsurface flow occurs (mm)	0
St	Soil moisture storage capacity (mm)	160
Ft	Subsurface flow at full soil moisture capacity (mm/day)	0.3
AI	Impervious area as a proportion of total area (AI = 0.2 if 20% of area is urbanized).	0 - 1
Zmin	Minimum catchment absorption rate (mm/hour)	0 – 3
Zmax	Maximum catchment absorption rate (mm/hour)	6 – 15
PI	Interception storage (mm)	1.5
Tl	Lag of flow (excluding groundwater flow) (days)	5
GL	Lag of groundwater flow (days)	10
R	Coefficient in the evaporation/soil moisture equation	0.5

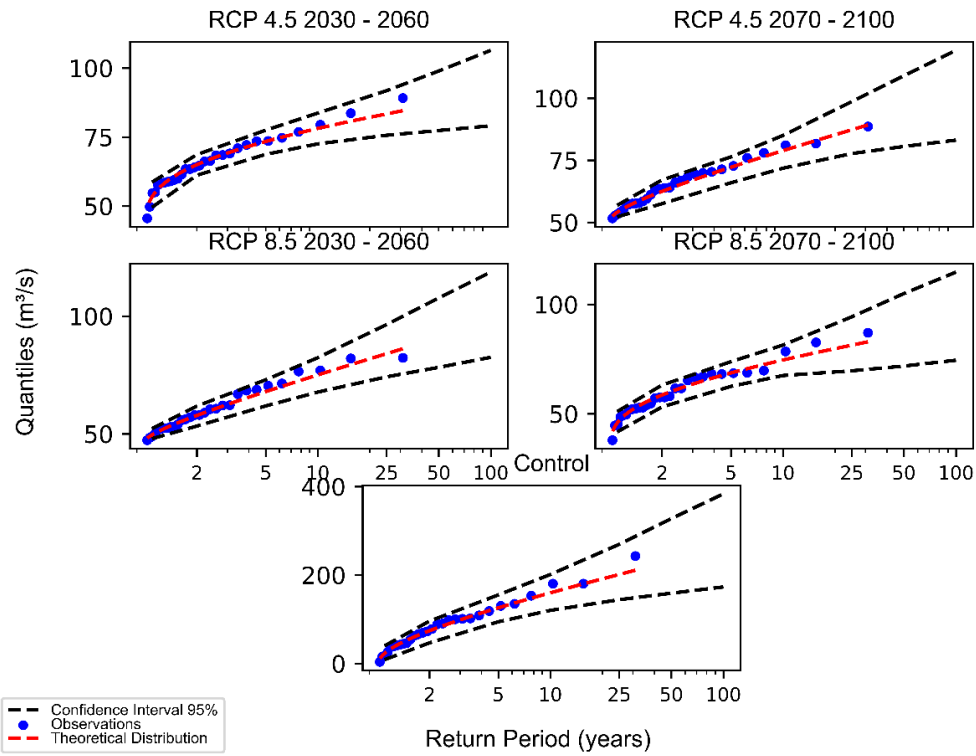


Figure S1 Fitting LP3 distributions to IPFs for the control and future scenarios for Little Berg River (GCM ensemble mean; Downscaling Method: QDM; IPF Estimation Method: Sangal).

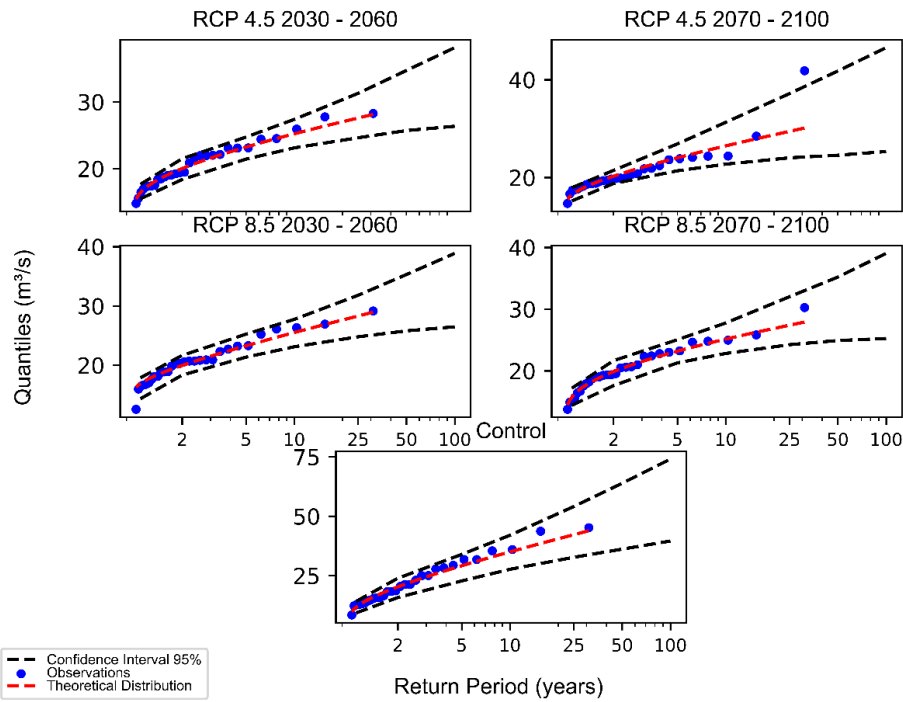


Figure S2 Fitting LP3 distributions to IPFs for the control and future scenarios for Jonkershoek (GCM ensemble mean; Downscaling Method: QDM; IPF Estimation Method: Sangal).

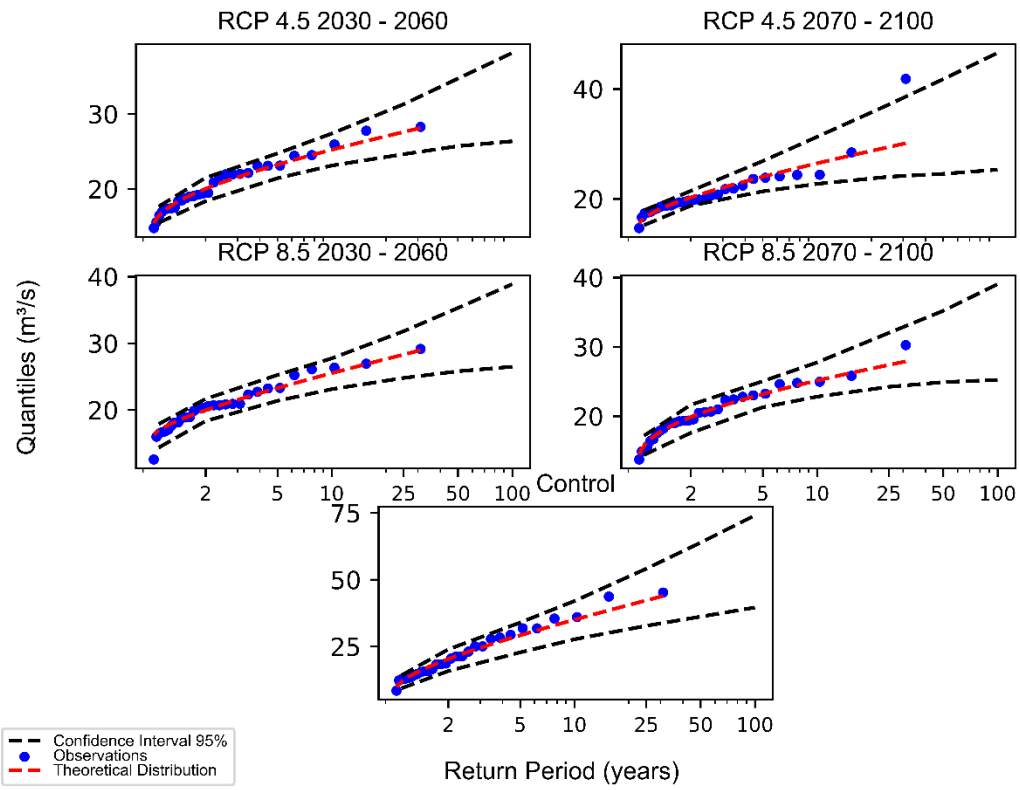


Figure S3 Fitting LP3 distributions to IPFs for the control and future scenarios for Jonkershoek (GCM ensemble mean; Downscaling Method: QDM; IPF Estimation Method: Fuller).