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*Supplement of*

## **Climate change and wetland loss impacts on a western river's water quality**

**R. M. Records et al.**

*Correspondence to:* R. M. Records (rosemary@lamar.colostate.edu)

Supplementary Material, Table 1. Calibrated model parameters and values for Sprague River tributaries and mainstem (“Main”).

Name	Description	File	Units	North Fork	South Fork	Sycan	Main
ADJ_PKR	Peak rate adjustment factor for sediment routing in tributary channels.	.bsn	-	1.768	0.705	0.500	0.710
AI0	Ratio of chlorophyll-a to algal biomass.	.wwq	µg-chla/mg algae	10.070	0.588	1.000	17.500
AI1	Fraction of algal biomass that is N.	.wwq	mg N/mg algae	0.089	0.070	0.090	0.090
AI2	Fraction of algal biomass that is P.	.wwq	mg P/mg algae	0.011	0.010	0.010	0.010
ALPHA_BF	Base flow alpha factor.	.gw	days	0.001	0.033	0.048	0.011
BC1	Rate constant for biological oxidation of NH <sub>4</sub> to NO <sub>2</sub> in the reach.	.swq	day <sup>-1</sup>	0.954	0.100	0.100	0.100
BC2	Rate constant for biological oxidation of NO <sub>2</sub> to NO <sub>3</sub> in the reach.	.swq	day <sup>-1</sup>	1.775	0.200	0.200	0.200
BC3	Rate constant for hydrolysis of organic N to NH <sub>4</sub> in the reach.	.swq	day <sup>-1</sup>	0.013	0.167	0.012	0.008
BC4	Rate constant for mineralization of organic P to dissolved P in the reach.	.swq	day <sup>-1</sup>	0.406	0.194	0.117	0.010
CANMX	Maximum canopy index.	.hru	mm	0.000	9.468	4.647	1.661
CDN	Denitrification exponential rate coefficient.	.bsn	-	1.103	1.120	1.120	3.000
CH_COV(1)	Channel erodibility factor.	.rte	-	0.108	0.681	0.953	0.673
CH_COV(2)	Channel cover factor.	.rte	-	0.130	0.375	0.024	0.028
CH_KI	Effective hydraulic conductivity in tributary channel alluvium.	.sub	mm hr <sup>-1</sup>	1.651	148.900	58.540	146.600
CH_KII	Effective hydraulic conductivity in main channel alluvium.	.rte	mm hr <sup>-1</sup>	10.540	0.025	3.969	0.938
CH_NI	Manning's <i>n</i> value for tributary channels.	.sub	-	0.014	0.014	0.014	0.098
CH_NII	Manning's <i>n</i> value for the main channel.	.rte	-	0.147	0.111	0.145	0.057
CMN	Rate factor for humus mineralization of active organic nutrients.	.bsn	-	0.001	0.000	0.000	0.002
CN_F	Initial SCS runoff curve number for moisture condition II.	.mgt	%	0.242	-0.237	-0.082	-0.130
DEP_IMP	Depth to impervious layer in soil profile (mm).	.hru	mm	0	0	0	1656
ERORGN	Organic N enrichment ratio.	.hru	-	0.000	5.000	4.087	1.652
ERORGP	Organic P enrichment ratio.	.hru	-	0.000	1.880	3.286	0.000
ESCO	Soil evaporation compensation factor.	.hru	-	0.010	0.978	0.996	0.309
GWQMN	Threshold depth of water in the shallow aquifer required for return flow to occur.	.gw	mm H <sub>2</sub> O	0	50	109	4669
GWSOLP	Soluble P concentration in groundwater flow.	.gw	mg P L <sup>-1</sup>	0.055	0.057	0.057	0.077
HLIFE_NGW	Half-life of nitrate in the shallow aquifer.	.gw	days	365.25	365.25	365.25	291.60

Supplementary Material, Table 1, continued.

Name	Description	File	Units	North Fork	South Fork	Sycan	Main
ICN	Curve number calculation method.	.bsn	-	0	0	1	0
LABP	Initial soluble P concentration in soil layer.	.chm	mg P/kg soil	108.000	7.224	57.940	0.000
NPERCO	Nitrate percolation coefficient.	.bsn	-	0.258	0.085	0.085	0.010
P_N	Algal preference factor for ammonia.	.wwq	-	0.358	0.677	0.890	0.010
PHOSKD	P soil partitioning coefficient.	.bsn	m <sup>3</sup> Mg <sup>-1</sup>	150	165	132	100
PLAPS	Precipitation lapse rate.	.sub	mm H <sub>2</sub> O km <sup>-1</sup>	698.400	708.100	699.500	712.700
PPERCO	P percolation coefficient.	.bsn	10 m <sup>3</sup> Mg <sup>-1</sup>	16.310	12.210	11.120	10.000
PRF	Peak rate adjustment factor for sediment routing in the main channel.	.bsn	-	0.812	1.908	0.690	1.666
RCHRG_DP	Deep aquifer percolation fraction.	.gw	-	0.000	0.246	0.825	0.009
RHOQ	Algal respiration rate.	.wwq	-	0.050	0.050	0.500	0.050
RS1	Local algal settling rate in the reach.	.swq	m day <sup>-1</sup>	0.327	1.820	1.492	0.150
RS2	Sediment source rate for dissolved P in the reach.	.swq	mg P m <sup>-2</sup> day <sup>-1</sup>	3.012	0.578	0.246	0.550
RS3	Benthic source rate for NH <sub>4</sub> -N in the reach.	.swq	mg N m <sup>-2</sup> day <sup>-1</sup>	0.427	0.413	0.346	0.060
RS4	Rate coefficient for organic N settling in the reach.	.swq	day <sup>-1</sup>	0.058	0.050	0.061	0.050
RS5	Organic P settling rate in the reach.	.swq	day <sup>-1</sup>	0.964	0.249	0.202	0.010
RSDCO	Residue decomposition coefficient.	.bsn	-	0.599	0.100	0.319	0.109
RSDIN	Initial residue cover.	.hru	kg · ha <sup>-1</sup>	2661	10000	819	111
SDNCO	Denitrification threshold water content.	.bsn	-	0.100	0.247	0.247	0.142
SFTMP	Snowfall temperature.	.bsn	°C	2.079	2.661	2.429	2.226
SLSUBBSN	Average slope length.	.hru	m	30.680	143.400	148.700	82.980
SMFMN	Melt factor for snow on December 21.	.bsn	mm · °C <sup>-1</sup> · day <sup>-1</sup>	1.838	1.800	2.052	4.022
SMFMX	Melt factor for snow on June 21.	.bsn	mm · °C <sup>-1</sup> · day <sup>-1</sup>	1.838	1.800	3.500	4.022
SMTMP	Snow melt base temperature.	.bsn	°C	4.803	-1.241	-2.710	-3.392
SNO50COV	Fraction of snow volume represented by SNOCOVMX corresponding to 50% snow cover.	.bsn	-	0.307	0.010	0.180	0.412
SNOCOVMX	Minimum snow water content corresponding to 100% snow cover.	.bsn	mm	296.200	1.000	533.300	220.600

Supplementary Material, Table 1, concluded.

Name	Description	File	Units	North Fork	South Fork	Sycan	Main
SOL_AWC	Available water capacity of the soil layer.	.sol	fraction	-0.053	-0.194	-0.239	0.115
SOL_K	Saturated hydraulic conductivity.	.sol	fraction	-0.220	-0.199	0.019	-0.167
SOL_ORGN	Initial organic N concentration in the soil layer.	.chm	mg N/kg soil	1897	1	1717	0
SOL_ORGP	Initial organic P concentration in the soil layer.	.chm	mg P/kg soil	1.00	63.06	99.62	500.00
SOL_Z	Depth from soil surface to bottom of layer.	.sol	fraction	0.034	-0.120	0.084	0.222
SOLN	Initial NO <sub>3</sub> <sup>-</sup> concentration in the soil layer.	.chm	mg N/kg soil	149.300	6.971	174.000	1.000
SPCON	Linear parameter for calculating maximum sediment reentrainment.	.bsn	-	0.000	0.009	0.005	0.002
SPEXP	Exponent parameter for calculating sediment reentrainment.	.bsn	-	1.143	1.808	1.976	1.769
SURLAG	Surface runoff lag coefficient.	.bsn	day	4.462	9.893	10.580	11.960
TIMP	Snow pack temperature lag factor.	.bsn	-	0.289	0.295	0.295	0.953
TLAPS	Temperature lapse rate.	.sub	°C km <sup>-1</sup>	-3.508	-3.561	-3.563	-3.516
USLE_C	USLE equation cropping practices factor.	crop.dat	fraction	0.000	-0.216	-0.078	-0.040
USLE_K	USLE equation soil erodibility (K) factor.	.sol	fraction	-0.026	-0.332	-0.371	0.449