A REVIEW OF WATER QUALITY RESPONSES TO AIR TEMPERATURE AND PRECIPITATION CHANGES II: NUTRIENTS, ALGAL BLOOMS, SEDIMENT, PATHOGENS

Online Supporting Information

Glossary

AVGWLF = ArcView Generalized Watershed Loading Function;

BGC = Terrestrial ecosystem/biogeochemical cycling model;

CARA = Consortium for Atlantic Regional Assessment

CMIP3/CMIP5 = Coupled Model Intercomparison Project Phase 3 or Phase 5 Archive;

GCM = General Circulation Model

GEV = Generalized Extreme Value;

GWLF-VSA = The Generalized Watershed Loading Functions – Variable Source Area model;

HSPF = Hydrologic Simulation Program – Fortran;

ICLUS = Integrated Climate and Land-Use Scenarios;

INCA-P = Integrated Catchment Model

LHS = Latin Hypercube Sampling and calculation of 95% confidence interval;

NARCCAP = North American Regional Climate Change Assessment Program;

PnET- PDLU = Percentage of developed land use;

RCP = Representative Concentration Pathway (2.6, 4.5, 6.0, 8.5);

SRES = Special Report on Emissions Scenarios (B1, A1B, A2, A1FI);

SWAT = Soil and Water Assessment Tool

SWAT-WB = Soil and Water Assessment Tool – Water Balance;

SPARROW = Spatially-Referenced Regression On Watershed attributes;

VIC = Variable Infiltration Capacity Model;

VSA = Variable Source Area;

WEPP-CO2 = Water Erosion Prediction Project – CO2

WEPP-WQ = Water Erosion Prediction Project - Water Quality

Table S-1. Projected nitrogen load responses to future climate changes scenarios. Information is adapted from published scientific literature identified in this review.

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Sleepers River, VT (0.405 km^2)	Late Century	Empirical Regression Models	**Climate** *Number:* 9 *Emissions:* A1FI, B1 *GCM:* CMIP3	**Nitrate:** -2%	**Nitrate:** *Growing:* +57% *Dormant*: -21%	Sebestyen *et al.*, 2009
Susquehanna River (71,236 km^2)	Late Century		**Climate** *Number:* 2 *Emissions:* 1% per year CO_2 increase *GCM:* Hadley Center, Canadian Climate Center	+65% (+26% to +200%)	-	Howarth *et al.*, 2008
7 unnamed, Eastern Massachusetts (12-105 km^2)	Early Century	AVGWLF	**Climate** *Number:* 7 *Emissions:* A1B, B1, A2 *GCM:* CMIP3 **Land use** PDLU extrapolation	**A1B** Climate: +30% Climate & Land use: +30%	*Winter:* +25% to +50% *Spring:* +5% to +10% *Summer*: -25% to -40% *Fall:* -50% to +200%	Tu 2009 [a/]
				B1 Climate: +20%	*Winter:* +30% to +75% *Spring:* -10% to +30% *Summer:* -20% to -50% *Fall:* -75% to +120%	
				A2 Climate: +30%	*Winter:* +0% to +80% *Spring:* +25% to +40% *Summer:* -25% to -50% *Fall:* -50% to +160%	

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
WE-38 experimental watershed, Mahantango Creek, PA (73 km^2)	Mid Century	SWAT	**Climate** *Number:* 7 *Emissions:* A2 *GCM:* CMIP3 *Downscaled:* NARCAAP	+7% (0% to +19%)	Winter/spring: +17% Summer/fall: -29%	Wagena *et al.*, 2018
Hubbard Brook Experimental Forest, NH (0.132 km^2)	Late Century	PnET-BGC	**Climate** *Number:* 3 *Emissions:* A1, B1 *GCM:* GFDL, HADCM3, and PCM	Increases in nitrate concentrations Increases in nitrate export	-	Pourmokhtarian *et al.*, 2012
Merrimack, NH/NE (12,965 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	+18% (+1% to +28%)	*Winter:* +34% (+17% to +42%) *Spring:* +15% (-16% to +21%) *Summer:* +14% (+4% to +28%) *Fall:* +6% (-4% to +30%)	Johnson *et al.*, 2015; USEPA 2013
Susquehanna River, PA (71,236 km^2)				+51% (+34% to +65%)	*Winter:* +102% (+85% to +141%) *Spring:* +27% (+8% to +40%) *Summer:* +15% (-3% to +28%) *Fall:* +70% (+36% to +120%)	
Susquehanna River, PA (71,236 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* RCP 8.5, RCP 2.6 *GCM:* CMIP5 *Downscaled:* WCRP	+9% (+4% to +14%)	-	Wagena & Easton 2018
	Late Century			+12% (+5% to +20%)		
Tuckahoe Creek, MD (221 km^2)	Late Century	SWAT	**Climate** *Number:* 5 *Emissions:* RCP 8.5	**Nitrate:** +66% (+58% to +76%)	*Winter:* increase *Spring*: increase *Summer*: increase *Fall:* increase	Lee *et al.*, 2018

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Greenboro Watershed, MD, DE (290 km^2)			(Future CO_2 effects on ET also simulated) *GCM:* CMIP5 *Downscaled:* WCRP	+56% (+47% to 68%)	*Winter:* increase *Spring*: increase *Summer*: increase *Fall:* increase	
Neuse, NC (25,828 km^2)	Mid Century		**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	+31% (-1% to +88%)	*Winter:* +28% (+20% to +34%) *Spring*: +26% (+11% to +31%) *Summer*: +8% (-40% to +130%) *Fall:* +40% (-22% to +193%)	Johnson *et al.*, 2015; USEPA 2013
Suwannee, FL/GA (25,765 km^2)				+31% (-15% to +66%)	*Winter:* +39% (-14% to +98%) *Spring*: +31% (-7% to +44%) *Summer*: +27% (-27% to +75%) *Fall:* +28% (-19% to +86%)	
Apalachicola, GA/FL/AL (49,943 km^2)				+16% (-5% to +25%)	*Winter:* +16% (-8% to +31%) *Spring*: +21% (+7% to +30%) *Summer*: +13% (-8% to +23%) *Fall:* +12% (-14% to +26%)	
Amite, LA/MS (15,157 km^2)				+21% (-12% to +51%)	*Winter:* +9% (-8% to +53%) *Spring:* +45% (-22% to +98%) *Summer:* -16% (-30% to +40%) *Fall:* +24% (-16% to +99%)	
Little Miami, OH (5,840 km^2)	Mid Century	HSPF	**Climate** (Synthetic Scenarios) *Temperature:* +2ºC, +4ºC	***Wettest*** *Climate*: +8% *Climate & Land use*: +12%	-	Tong *et al.*, 2012

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
			Precipitation: ±20% **Land use** CA-Markov Model	***Wet*** *Climate*: +5% *Climate & Land use*: +7% ***Dry*** *Climate*: +1% *Climate & Land use*: +3% ***Driest*** *Climate*: +2% *Climate & Land use*: +4%		
Little River, NC (203 km^2) Nahunta, NC (207 km^2)	Late Century	SWAT	**Climate** *Number:* 2 *Emissions:* A2 *GCM:* CMIP3 **Land use** ICLUS	**Nitrate:** +30% (approx.)	-	Gabriel *et al.*, 2018
Upper Mississippi River Basin (492,000 km^2)	Mid Century	SWAT SPARROW	**Climate** *Number:* 10 *Emissions:* A1B *GCM:* CMIP3	**Nitrate:** +1 kg/ha basin average (-3 kg/ha to +8 kg/ha across sub watersheds)	-	Jha *et al.*, 2015
Saginaw Bay (4 watersheds), MI (22,533 km^2)	Late Century	SWAT	**Climate** Synthetic Scenarios *Number:* 16 *Emissions:* A2 *GCM:* CMIP3	Dry-Dry: -34% to +4% Wet-Dry: -5% to +29% Wet-Wet: +13% to +41%	-	Hall *et al.*, 2017

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Maumee, OH/MI/IL (17,207 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	+43% (-6% to +91%)	*Winter:* +82% (+32% to +125%) *Spring*: +17% (-12% to +79%) *Summer*: +4% (-58% to +42%) *Fall*: +69% (-5% to +174%)	Johnson *et al.*, 2015; USEPA, 2013
Illinois, IL/WI/IN (44,040 km^2)				+7% (-7% to +18%)	*Winter:* +9% (-2% to +18%) *Spring*: +2% (-4% to +9%) *Summer*: +4% (-13% to +22%) *Fall*: +16% (-10% to +38%)	
Minnesota, MN (44,002 km^2)				+44% (+5% to +71%)	*Winter:* +158% (+95% to +249%) *Spring*: +26% (-7% to +42%) *Summer*: +35% (-46% to +87%) *Fall*: +71% (-15% to +160%)	
Maumee, OH/MI/IL (17,207 km^2)	Mid Century	SWAT	**Climate:** *Number:* 3 *Emissions:* A1B *GCM:* CMIP3 *Downscaled:* WCRP	Nitrate: -10%	Nov. to Apr.: Increase May to Oct.: Decrease	Verma *et al.*, 2015
	Late Century			Nitrate: +7%	Oct. to Apr.: Increase May to Sep.: Decrease	
Green Lake, WI (1 km^2)	Early Century	WEPP-WQ	**Climate** *Number:* 2 *Emissions:* A2, A1B, B1 *GCM:* CMIP3	**A2:** +5% **A1B:** +4% **B1:** +5%	*Winter:* increase *Spring*: increase *Summer*: decrease *Fall:* increase	Wang *et al.*, 2018
	Mid Century			**A2:** +27% **A1B:** +38% **B1:** +30%		

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
	Late Century			**A2:** +18% **A1B:** +1% **B1:** +28%		
Walworth Watershed, WI (1 km^2)	Early Century			**A2:** +41% **A1B:** +96% **B1:** +71%	*Winter:* increase *Spring*: increase *Summer*: decrease *Fall:* increase	
	Mid Century			**A2:** +12% **A1B:** +45% **B1:** +8%		
	Late Century			**A2:** +41% **A1B:** +53% **B1:** +68%		
Assiniboine River, Lake Winnipeg Watershed, Saskatchewan (13,500 km^2)	Mid Century	SWAT	**Climate** *Number:* 3 *Emissions:* A2 *GCM:* CMIP3 *Downscaled:* GCDC/NARR	+33% (+10% to +50%)	-	Shrestha *et al.*, 2012
James River, ND/SD (53,490 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* B1, A1B, A2 *GCM:* CMIP3	**B1** Nitrate load: -49% conc.: +55%	-	Wu *et al.*, 2012
				A1B Nitrate load: -54%		
				A2 Nitrate load: -55% conc.: +70%		

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	**Seasonal Median (Range)**	
Tongue, MT/WY (14,004 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCAAP **Land use** EPA ICLUS	+28% (-29% to +220%)	*Winter:* +157% (+115% to +408%) *Spring*: +33% (-1% to +183%) *Summer*: +21% (-49% to +213%) *Fall*: +45% (-56% to +537%)	Johnson *et al.*, 2015; USEPA, 2013
Elkhorn, NE (18,133 km^2)				+1% (-12% to +45%)	*Winter:* +14% (+9% to +110%) *Spring*: +2% (-16% to +34%) *Summer*: -10% (-52% to +9%) *Fall*: +25% (-15% to +126%)	
Trinity, TX (46,488 km^2)				+30% (-20% to +65%)	*Winter:* +33% (-19% to +46%) *Spring*: +31% (-15% to +96%) *Summer*: +5% (-12% to +134%) *Fall*: +19% (-41% to +91%)	
South Platte, CO (37,991 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCAAP **Land use** EPA ICLUS	-12% (-38% to +16%)	*Winter:* +3% (-6% to +23%) *Spring*: +12% (-9% to +59%) *Summer*: -32% (-64% to -6%) *Fall*: -15% (-36% to +20%)	Johnson *et al.*, 2015; USEPA, 2013
Upper Colorado, CO (46,271 km^2)				-20% (-27% to +10%)	*Winter:* -25% (-34% to +11%) *Spring*: +14% (+11% to +34%) *Summer*: -36% (-40% to -3%) *Fall*: -29% (-41% to +15%)	

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Rio Grande, CO/NM (49,104 km²)				-52% (-63% to +26%)	*Winter:* -26% (-38% to +19%) *Spring*: -66% (-81% to +36%) *Summer*: -44% (-61% to +15%) *Fall*: -27% (-32% to +2%)	
Salt, AZ (15,025 km²)				-10% (-16% to +42%)	*Winter:* -6% (-31% to +15%) *Spring*: -2% (-27% to +6%) *Summer*: +1% (-22% to +54%) *Fall*: -10% (-38% to +130%)	
Los Angeles, CA (2,172 km²)				0% (-10% to +39%)	*Winter:* +6% (-3% to +57%) *Spring*: -9% (-29% to +64%) *Summer*: 0% (-1% to +27%) *Fall*: -1% (-6% to +11%)	
Sacramento, CA (21,537 km²)				-1% (-12% to +9%)	*Winter:* -16% (-23% to -8%) *Spring*: +11% (0% to +19%) *Summer*: -7% (-19% to +26%) *Fall*: +14% (-1% to +33%)	
Sacramento River, CA (23,300 km²)	Late Century	SWAT & LHS	**Climate** (Synthetic Scenarios) *Temp.:* +6.4ºC *Precip.:* ±20%	**95%CI:** -13% to +13%	**95%CI:** *Winter:* -21% to +32% *Spring*: -16% to +16% *Summer*: -43% to +13% *Fall*: -12% to +16%	Ficklin *et al.*, 2013

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
San Joaquin River, CA (14,983 km^2)				**95%CI:** -26% to +28%	**95%CI:** *Winter:* -34% to +37% *Spring*: -42% to +26% *Summer*: -35% to +61% *Fall*: -16 to +71%	
Sycamore Creek, AZ (505 km^2)	Early Century	SWAT	**Climate** *Number:* 1 *Emissions:* B2 *GCM:* CMIP3 CGCM2 *Downscaled:* SDSM	-33%	Greatest decreases in late autumn and early spring	Ye and Grim, 2013 [/c]
	Mid Century			-50%		
	Late Century			-60%		
Northern San Joaquin Valley watershed, CA (14,976 km^2)	Late Century	SWAT	**Climate** (Synthetic Scenarios) *Temp.*: +1.1ºC to +6.4ºC *Precip.:* 0%, ±10%, ±20%	-37% to +40%	-	Ficklin *et al.*, 2010
			CO_2 : 970 ppm	+4 % to +37%		
Willamette River, OR (29,031 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	-4% (-11% to +4%)	*Winter:* -1% (-8% to +8%) *Spring*: -10% (-19% to +4%) *Summer*: -7% (-13% to +9%) *Fall*: +8% (-14% to +11%)	Johnson *et al.*, 2015; USEPA, 2013

*Early Century: 2020–2040, Mid-Century: 2041–2070, and Late Century: 2071–2100.
a/ Approximate values from graph are presented
b/ Study assessed nutrient concentrations
c/ Study assessment: average daily export (kg) per day

Table S-2. Projected phosphorus load responses to future climate changes scenarios. Information is adapted from published scientific literature identified in this review.

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%) Annual Median (Range)	Projected Changes in Load (%) Seasonal Median (Range)	Citation
Merrimack, NH ($12,965\ km^2$)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	+11% (-6% to +18%)	*Winter:* +24% (+3% to +28%) *Spring:* 0% (-27% to +8%) *Summer*: +10% (+0% to +23%) *Fall:* +10% (-3% to +29%)	Johnson *et al.*, 2015; USEPA, 2013
Susquehanna River, PA ($71,236\ km^2$)				+15% (+6% to +28%)	*Winter:* +30% (+22% to +40%) *Spring:* +16% (-8% to +30%) *Summer:* +11% (-7% to +26%) *Fall:* +11% (+3% to +28%)	
WE-38 experimental watershed, Mahantango Creek, PA ($73\ km^2$)	Mid Century	SWAT	**Climate** *Number:* 7 *Emissions:* A2 *GCM:* CMIP3 *Downscaled:* NARCAAP	+1% (0% to +43%)	Winter/spring: +17% Summer/fall: -29%	Wagena *et al.*, 2018
Susquehanna River, PA ($71,236\ km^2$)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* RCP 8.5, RCP 2.6 *GCM:* CMIP5 *Downscaled:* WCRP	-5% (-15% to +5%)	-	Wagena & Easton, 2018
	Late Century			-2% (-11% to +7%)		
Neuse, NC ($25,828\ km^2$)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) GCM: CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	+43% (-6% to +129%)	*Winter:* +32% (+24% to +47%) *Spring:* +30% (+11% to +39%) *Summer:* +7% (-48% to +172%) *Fall*: +46% (-28% to +262%)	Johnson *et al.*, 2015; USEPA, 2013
Suwannee, FL/GA ($25,765\ km^2$)				+25% (-24% to +73%)	*Winter:* +44% (-26% to +142%)	

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%) Annual Median (Range)	Projected Changes in Load (%) Seasonal Median (Range)	Citation
					Spring: +27% (-22% to +49%) *Summer:* +14% (-35% to +93%) *Fall*: +18% (-40% to +115%)	
Apalachicola, GA/FL/AL (49,943 km^2)				+36% (+6% to +51%)	*Winter:* +37% (-8% to +71%) *Spring:* +42% (+24% to +56%) *Summer*: +29% (-7% to +45%) *Fall*: +29% (-14% to +63%)	
Amite, LA/MS (15,157 km^2)				+15% (-12% to +42%)	*Winter:* +5% (-11% to +51%) *Spring*: +37% (-21% to +83%) *Summer*: -16% (-31% to +30%) *Fall*: +17% (-17% to +82%)	
Little Miami, OH (5,840 km^2)	Mid Century	HSPF	**Climate** (Synthetic Scenarios) *Temperature:* +2ºC, +4ºC *Precipitation:* ±20% **Land use** CA-Markov Model	***Wettest*** *Climate*: +14% *Climate & Land use*: +21% ***Wet*** *Climate*: +6% *Climate & Land use*: +8% ***Dry*** *Climate*: +8% *Climate & Land use*: +12% ***Driest*** *Climate*: +3% *Climate & Land use*: +7%	-	Tong *et al.*, 2012 [b/]
Black River Watershed, Ontario (322 km^2)	Mid Century	INCA-P	**Climate** *Number:* 7 *GCM:* CGCM3 *Downscaled:* SDSM4.2 *Emissions:* A1B, A2	**A1B:** +22% **A2:** +19%	**A1B** *Summer*: +25% *Winter:* +25% **A2** *Summer*: +15% *Winter:* +40%	Cross-man *et al.*, 2013 [b/]
	Late Century			**A1B:** +32% **A2:** +33%	**A1B** *Summer*: +25% *Winter:* +35% **A2** *Summer*: +25%	

Watershed (Drainage Area)	**Future Period***	**Water Model(s)**	**Scenarios Used to Drive Water Model**	**Projected Changes in Load (%)**		**Citation**
				Annual Median (Range)	**Seasonal Median (Range)**	
					Winter: +40%	
Maumee, OH/MI/IL (17,207 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	+25% (-12% to +50%)	*Winter:* +23% (+1% to +38%) *Spring:* +9% (-13% to +54%) *Summer*: +21% (-53% to +91%) *Fall*: +80% (+29% to +136%)	Johnson *et al.*, 2015; USEPA, 2013
Illinois, IL/WI/IN (44,040 km^2)				+8% (-1% to +13%)	*Winter:* +14% (+4% to +19%) *Spring:* +9% (+7% to +19%) *Summer*: -1% (-14% to +12%) *Fall*: +9% (-5% to +29%)	
Minnesota, MN (44,002 km^2)				+26% (-3% to +60%)	*Winter:* +108% (+82% to +167%) *Spring*: -6% (-31% to +20%) *Summer*: +49% (-50% to +138%) *Fall:* +38% (-44% to +163%)	
Saginaw Bay (4 watersheds), MI (22,533 km^2)	Late Century	SWAT	**Climate** Synthetic Scenarios *Number:* 16 *Emissions:* A2 *GCM:* CMIP3	Dry-Dry: -45% to -21%	-	Hall *et al.*, 2017
				Wet-Dry: -16% to +11%		
				Wet-Wet: +2% to +15%		
Maumee, OH/MI/IL (17,207 km^2)	Mid Century	SWAT	**Climate** *Number:* 3 *Emissions:* A1B *GCM:* CMIP3 *Downscaled:* BCSD	-9%	*Nov. to Apr.:* Increase *May to Oct.:* Decrease	Verma *et al.*, 2015
	Late Century			+4%	*Oct. to Apr.:* Increase *May to Sep.:* Decrease	
Green Lake, WI (1 km^2)	Early Century	WEPP-WQ	**Climate** *Number:* 2	**A2:** +42% **A1B:** +28% **B1:** +38%	*Winter:* increase *Spring*: increase	Wang *et al.*, 2018

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	**Seasonal Median (Range)**	
	Mid Century		*Emissions:* A2, A1B, B1 *GCM:* CMIP3	**A2:** +54% **A1B:** +44% **B1:** +41%	*Summer*: decrease *Fall:* increase	
	Late Century			**A2:** +89% **A1B:** +75% **B1:** +72%		
Walworth Watershed, WI (1 km^2)	Early Century			**A2:** +31% **A1B:** +27% **B1:** +25%	*Winter:* increase *Spring*: increase *Summer*: decrease *Fall:* increase	
	Mid Century			**A2:** +81% **A1B:** +88% **B1:** +72%		
	Late Century			**A2:** +109% **A1B:** +96% **B1:** +106%		
Tongue, MT/WY (14,004 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	+28% (-33% to +224%)	*Winter:* +151% (+88% to +428%) *Spring*: +29% (-11% to +173%) *Summer*: +21% (-50% to +224%) *Fall*: +50% (-59% to +576%)	Johnson *et al.*, 2015; USEPA, 2013
Elkhorn, NE (18,133 km^2)				+31% (-35% to +47%)	*Winter:* +46% (+6% to +69%) *Spring*: +39% (-18% to +58%) *Summer*: +6% (-62% to +32%) *Fall*: +61% (-34% to +91%)	
Trinity, TX (46,488 km^2)				+32% (-17% to +63%)	*Winter:* +31% (-22% to +43%) *Spring*: +30% (-11% to +88%) *Summer*: +13% (+2% to +132%) *Fall:* +21% (-42% to +85%)	
Lake Winnipeg Watershed, Saskatchewan (13,500 km^2)	Mid Century	SWAT	**Climate** *Number:* 3 *Emissions:* A2 *GCM:* NARCCAP *Downscaled:* GCDC/NARR	+5% (-18% to +19%)	-	Shrestha *et al.*, 2012

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
South Platte, CO (37,991 km²)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCAAP **Land use** EPA ICLUS	-6% (-28% to +10%)	*Winter:* +4% (0% to +18%) *Spring*: +7% (-11% to +43%) *Summer*: -19% (-51% to 0%) *Fall*: -9% (-17% to +15%)	Johnson *et al.*, 2015; USEPA, 2013
Upper Colorado, CO (46,271 km²)				-16% (-21% to +19%)	*Winter:* -13% (-18% to +25%) *Spring*: -5% (-9% to +28%) *Summer*: -26% (-30% to +8%) *Fall*: -18% (-24% to +22%)	
Rio Grande, CO/NM (49,104 km²)				-47% (-59% to +27%)	*Winter:* -20% (-24% to +13%) *Spring*: -64% (-78% to +38%) *Summer*: -37% (-55% to +16%) *Fall:* -5% (-10% to +4%)	
Salt, AZ (15,025 km²)				-15% (-30% to +54%)	*Winter:* -18% (-64% to +32%) *Spring*: -38% (-66% to -8%) *Summer*: +50% (-75% to +449%) *Fall*: -14% (-44% to +193%)	
Los Angeles, CA (2,172 km²)				-39% (-48% to -13%)	*Winter:* -42% (-53% to -23%) *Spring*: -45% (-59% to -11%) *Summer*: +1% (-12% to +32%) *Fall*: -2% (-8% to +33%)	
Sacramento, CA (21,537 km²)				+1% (-15% to +14%)	*Winter:* -17% (-27% to -9%) *Spring*: +4% (-7% to +29%) *Summer*: 0% (-7% to +56%) *Fall*: +19% (-3% to +42%)	

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Model	Projected Changes in Load (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Northern San Joaquin Valley watershed, CA (14,976 km^2)	Late Century	SWAT	**Climate** (Synthetic Scenarios) *Temp.:* +1.1 ºC to +6.4 ºC *Precip.:* 0%, ±10%, ±20%	-37% to 40%	-	Ficklin *et al.*, 2010
Willamette River, OR (29,031 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* A2 (Future CO_2 effects on ET also simulated) *GCM:* CMIP3 *Downscaled:* NARCCAP **Land use** EPA ICLUS	-3% (-6% to 0%)	*Winter:* -6% (-8% to -2%) *Spring*: -2% (-9% to +6%) *Summer*: -1% (-5% to +3%) *Fall*: 0% (-10% to +2%)	Johnson *et al.*, 2015; USEPA, 2013
Tualatin, OR (4781 km^2)	Mid century	HSPF	**Climate** *Number:* 8 *Emissions:* A1B, B1 *GCM:* CMIP3	+12%	Winter: +16% Spring: -2% Summer: -8% Fall: +43%	Praskievicz and Chang, 2011
	Late Century			+21%	Winter: +26% Spring: +4% Summer: -9% Fall: +62%	

*Early Century: 2020–2040, Mid-Century: 2041–2070, and Late Century: 2071–2100.

Table S-3. Projected sediment load responses to future climate changes scenarios. Information is adapted from published scientific literature identified in this review.

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Merrimack River, NE (12,965 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled*: NARCCAP **Land use** EPA ICLUS	+18% (-15% to +28%)	*Winter*: +90% (+52% to +123%) *Spring*: -5% (-41% to +9%) *Summer*: +6% (-9% to +57%) *Fall*: -2% (-20% to +54%)	USEPA, 2013
Susquehanna River, PA (71,236 km^2)				+12% (-16% to +18%)	*Winter*: +67% (+40% to 93%) *Spring*: 0% (-32% to +13%) *Summer*: -15% (-33% to +28%) *Fall*: -1% (-28% to +34%)	
Susquehanna River, PA (71,236 km^2)	Mid Century	SWAT	**Climate** *Number:* 6 *Emissions:* RCP 8.5, RCP 2.6 *GCM:* CMIP5 *Downscaled:* WCRP	+26% (+9% to +60%)	-	Wagena & Easton, 2018
	Late Century			+31% (+14% to +72%)		
St. Lawrence River, Canada (19 watersheds)	Early Century	Statistical	**Climate** *Emissions*: B1, A1B, A2 *GCM*: CGCM3 *Downscaled*: CCCma	*B1*: +1.7% [a/] *A1B*: +1.6% [a/] *A2*: +1.8% [a/]	*Winter*: 1% to +3% [a/] *Spring*: 1% to +4% [a/] *Summer:* -2% to +3% [a/] *Fall*: 0.25% to +1% [a/]	Delpla and Rodriguez, 2014
WE-38 experimental watershed, Mahantango Creek, PA (73 km^2)	Mid Century	SWAT	**Climate** *Number:* 7 *Emissions:* A2 *GCM:* CMIP3 *Downscaled:* NARCAAP	+8% (-10% to +32%)	Winter/spring: +25% (+7% to +44%) Summer/fall: -9% (-30% to +5%)	Wagena *et al.*, 2018

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	**Seasonal Median (Range)**	
Cannonsville Reservoir Watershed, NY (891 km^2)	Late Century	SWAT-WB	**Climate** *Number*: 9 *Emissions*: A1B *GCM*: CGCM3	+4% (-7% to +26%)	*Winter/Spring*: increase *Summer/Fall*: decrease	Mukundan *et al.*, 2013a
Esopus Creek, NY (493 km^2)	Mid Century	GWLF-VSA	**Climate** *Number*: 5 *Emissions*: B1, A1B, A2	+3% [a/]	*Winter*: +45% [a/]	Mukundan *et al.*, 2013b
	Late Century			+5% [a/]	*Winter*: +68% [a/]	
Neuse River, NC (25,828 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled*: NARCCAP **Land use** EPA ICLUS	+29% (-18% to +99%)	*Winter*: +24% (-5% to +36%) *Spring*: +15% (+5% to +29%) *Summer*: +24% (-57% to +161%) *Fall*: +43% (-34% to +216%)	USEPA, 2013
Suwannee River, FL (25,765 km^2)				+30% (-26% to +81%)	*Winter*: +43% (-34% to +159%) *Spring*: +30% (-28% to +53%) *Summer*: +23% (-26% to +66%) *Fall*: +27% (-35% to +155%)	
Apalachicola River, FL (49,943 km^2)				+27% (-47% to +46%)	*Winter*: +29% (-50% to +78%) *Spring*: +31% (-26% to +42%) *Summer*: +14% (-69% to +27%) *Fall*: +27% (-66% to +97%)	
Amite River, LA (8,606 km^2)				+8% (-30% to +31%)	*Winter*: +7% (-24% to +51%) *Spring*: +14% (-32% to +56%) *Summer*: -50% (-69% to +10%) *Fall*: +7% (-13% to +68%)	

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Apalachicola River, FL (49,943 km^2)	Late Century	SWAT	**Climate** *Emissions*: A2, A1B, B1 *GCM*: HadCM3, IPCM4, MPEH5		**HASCM3** [b/] *Winter*: increase *Spring*: increase *Summer*: decrease *Fall*: increase **IPCM4** [b/] *Winter*: decrease *Spring*: decrease *Summer*: decrease *Fall*: increase **MPEH5** [b/] *Winter*: increase *Spring*: little change *Summer*: increase *Fall*: increase	Hovenga *et al.*, 2016
Big Sunflower River Watershed, MS (7,660 km^2)	Mid Century	SWAT	**Climate** *Emissions*: A1B, A2, and B1 *GCM*: CCSM3	+6.3% to +6.4%	-	Parajuli *et al.*, 2016
	Late Century			+12.7% to +15.6%		
Apalachicola River, FL (3,589 km^2)	Mid Century	SWAT	**Climate** *GCM*: CMIP3 *Downscaled*: NARCCAP	-	*Min*: -15% in October *Max*: +30% in July	Chen *et al.*, 2014
Maumee, OH/MI/IN (17,207 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled*: NARCCAP	+28% (-14% to +69%)	*Winter*: +46% (+14% to +84%) *Spring*: +21% (-17% to +52%) *Summer*: +10% (-60% to +85%) *Fall*: +59% (-7% to +163%)	USEPA, 2013

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	**Seasonal Median (Range)**	
Illinois, IL/WI/IN (44,040 km^2)			**Land use** EPA ICLUS	+18% (-10% to +42%)	*Winter*: +24% (-11% to +56%) *Spring*: +23% (+6% to +41%) *Summer*: +14% (-13% to +41%) *Fall:* +12% (-32% to+55%)	
Minnesota, MN (44,002 km^2)				+53% (-23% to +125%)	*Winter*: +262% (+153% to +460%) *Spring*: +21% (-27% to +69%) *Summer*: +45% (-66% to +164%) *Fall*: +103% (-47% to +406%)	
Maumee, OH/MI/IN (17,207 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: RCP 2.6, 4.5, 6.0, 8.5 *GCM*: CMIP5 (19) *Downscaled*: NARCCAP	*RCP 2.6*: -26% *RCP 4.5*: -24% *RCP 6*: -25% *RCP 8.5*: -3%	*Winter*: -33% to +10% *Spring*: -18% to +1% *Summer*: -40% to -26% *Fall*: -30% to -20%	Cousino *et al.*, 2015
	Late Century			*RCP 2.6*: -26% *RCP 4.5*: -12% *RCP 6*: -10% *RCP 8.5*: +11%	*Winter*: -37% to +58% *Spring:* -20% to +12% *Summer:* -51% to -18% *Fall:* -29% to -17%	
Cedar Creek (3 watersheds), IN (679 km^2)	Late Century	SWAT	**Climate** *Number:* 17 *Emissions:* RCP 6.0 *GCM:* CMIP5	+1% to +139%	-	Wallace at al., 2017
Saginaw Bay (4 watersheds), MI (22,533 km^2)	Late Century	SWAT	**Climate** Synthetic Scenarios *Number:* 16 *Emissions:* A2 *GCM:* CMIP3	Dry-Dry: -58% to -16%	-	Hall *et al.*, 2017
				Wet-Dry: -31% to +28%		
				Wet-Wet: -7% to +27%		

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Little Miami River, OH (5,840 km^2)	Mid Century	SWAT	**Climate** (Synthetic Scenarios) *Air temp*: +2 to +4ºC *Precipitation*: ±20%	*Wettest*: +47% *Wet*: +46% *Dry*: -41% *Driest*: -41%	-	Tong *et al.*, 2007
Eagle Creek watershed, Indiana (248 km^2)	Early Century	SWAT	**Climate** *Number*: 16 *Emissions*: A2, A1B, B1 *GCM*: CMIP3	Increases	-	Ahmadi *et al.*, 2014
	Mid Century			Increases		
	Late Century			Increases*		
Central WI	Mid Century	WEPP-CO2	**Climate** *Emissions*: IS95a *GCM*: HadCM3	+150%	-	O'Neal *et al.*, 2005
East central IN /West central OH				+34%		
Eastern IL				+32%		
Eastern WI				+129%		
MI Thumb				+105%		
North western OH /South eastern MI				+273%		
South central MI /Northern IN				-3%		
Southern IL				+37%		
South western IN				+18%		
South western WI				+147%		
Western IL				+18%		
Maumee, OH/MI/IN (16,395 km^2)	Mid Century	SWAT	**Climate** *Number*: 3 *Emissions*: A1B *GCM*: CMIP3 *Downscaled*: BCSD	-10% (-82% to +90%)	*Summer*: decreases	Verma *et al.*, 2015
	Late Century			+10% (-84% to +138%)		

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Tongue River, WY/MT (14,004 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled:* NARCAAP **Land use** EPA ICLUS	+31% (-34% to +251%)	*Winter*: +143% (+79% to +318%) *Spring*: +33% (-18% to +170%) *Summer*: +25% (-50% to +273%) *Fall:* +36% (-61% to +554%)	USEPA, 2013
Elkhorn River, NE (18,133 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled:* NARCAAP **Land use** EPA ICLUS	+39% (-40% to +62%)	*Winter*: +121% (+39% to +204%) *Spring*: +47% (-13% to +77%) *Summer*: +6% (-74% to +39%) *Fall*: +92% (-46% to +148%)	USEPA, 2013
Trinity River, TX (46,488 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled:* NARCAAP **Land use** EPA ICLUS	-27% (-73% to +25%)	*Winter*: -23% (-70% to +3%) *Spring*: -21% (-71% to +55%) *Summer*: -52% (-75% to +93%) *Fall*: -43% (-82% to +52%)	USEPA, 2013
South Platte, CO (37,991 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled*: NARCAAP **Land use** EPA ICLUS	-7% (-20% to +4%)	*Winter:* +5% (-4% to +11%) *Spring*: -2% (-9% to +19%) *Summer*: -17% (-33% to -6%) *Fall:* -9% (-24% to -1%)	USEPA, 2013
Upper Colorado River, CO/UT (46,271 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled*: NARCAAP **Land use** EPA ICLUS	-13% (-20% to +24%)	*Winter*: -6% (-16% to +38%) *Spring:* +28% (+26% to +55%) *Summer*: -36% (-39% to +4%) *Fall:* -21% (-35% to +35%)	USEPA, 2013
Rio Grande Valley, NM, CO (49,104 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled*: NARCAAP **Land use** EPA ICLUS	-41% (-51% to +14%)	*Winter*: -45% (-49% to +14%) *Spring*: -24% (-48% to +19%) *Summer*: -33% (-51% to +14%) *Fall*: -49% (-55% to +12%)	USEPA, 2013

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	**Seasonal Median (Range)**	
Salt River, AZ ($15,025\ km^2$)				-17% (-34% to +83%)	*Winter*: -9% (-67% to +41%) *Spring*: -37% (-74% to +5%) *Summer*: +95% (-93% to +591%) *Fall*: -26% (-57% to +248%)	
Los Angeles River, CA ($2,172\ km^2$)				-19% (-35% to +10%)	*Winter*: -11% (-23% to +24%) *Spring*: -38% (-57% to -15%) *Summer*: -2% (-14% to +38%) *Fall:* -15% (-28% to +41%)	
Sacramento River, CA ($21,537\ km^2$)				+14% (-7% to +38%)	*Winter*: +26% (-8% to +39%) *Spring*: -6% (-43% to +51%) *Summer*: +52% (+28% to +438%) *Fall*: -6% (-38% to +52%)	
Sacramento River, CA ($23,300\ km^2$)	Late Century	SWAT	**Climate** (Synthetic Scenarios) *Temp.*: +6.4ºC *Precip.*: ±20%	*95% CI:* -26% to +20%	***95%CI*** *Winter*: -33% to +36% *Spring*: -26% to +43% *Summer*: -27% to +12% *Fall*: -32% to +13%	Ficklin *et al.*, 2013
San Joaquin River, CA ($14,983\ km^2$)				*95% CI:* -50% to +73%	***95%CI*** *Winter*: -52% to +66% *Spring*: -49% to +94% *Summer*: -56% to +165% *Fall*: -57% to +48%	
Sierra Nevada, CA (703 to $15,789\ km^2$)	Mid Century	SWAT	**Climate** *Number*: 16 *Emissions*: A2 *GCM*: CMIP3 *Downscaled*: WCRP	-	*Spring: -46* [c/] (-60 to -12) *Summer*: -50 [c/] (-57 to +30)	Ficklin *et al.*, 2013
	Late Century				*Spring*: -54 [c/] (-65 to -20) *Summer*: -50 [c/] (-60 to -23)	

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Northern San Joaquin Valley watershed, CA (14,976 km^2)	Late Century	SWAT	**Climate** (Synthetic Scenarios) *Temp*: +1.1 ºC to +6.4 ºC *Precip*: 0%, ±10%, ±20%	-27% to +28%	-	Ficklin *et al.*, 2010
			Climate + CO_2 (970 ppm)	-6 % to +25%		
San Francisco Estuary Watershed (Sacramento-San Joaquin watersheds and Deltas)	Late Century	VIC	**Climate** *Number*: 2 *Emissions*: B1, A2 *GCM*: PCM-B1, GFDL-A2	*B1:* decreases	-	Cloern *et al.*, 2011
				A2: decreases		
Willamette River, OR (29,032 km^2)	Mid Century	SWAT	**Climate** *Number*: 6 *Emissions*: A2 (Future CO_2 effects on ET also simulated) *GCM*: CMIP3 *Downscaled*: NARCCAP **Land use** EPA ICLUS	+10% (-13% to +19%)	*Winter*: +10% (-10% to +24%) *Spring*: +8% (-12% to +40%) *Summer*: +13% (-27% to +50%) *Fall*: +21% (-25% to +34%)	USEPA, 2013
Bull Run watershed, OR (264 km^2)	Early Century	GEV	**Climate** *Emissions*: A2 *GCM*: CMIP3 *Downscaled:* WCRP	+0.30% [b/] (0 to +3%)	-	Towler *et al.*, 2010
	Mid Century			+0.80% [b/] (0 to +7%)		
	Late Century			+1.20% [b/] (0 to +11%)		
Tucannon, OR (1,116 km^2)	Mid Century	SWAT	**Climate** *Number*: 10 *Emission*: A2 *GCM*: CMIP3 *Downscaled*: NARCCAP	-18%	*Winter*: -14% (+24% to +8%) *Summer*: -5% (-60% to +98%)	Praskievicz, 2016
South Fork Coeur d'Alene, ID (743 km^2)				-18%	*Winter*: +88% (+79% to +94%) *Summer*: -72% (-73% to -60%)	

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenario(s) Used to Drive Water Models	Projected Load Changes (%)		Citation
				Annual Median (Range)	Seasonal Median (Range)	
Red River, ID (99 km^2)				-8%	*Winter*: -14% (-24% to -6%) *Summer*: -26% (-43% to -4%)	
Tualatin, OR (4781 km^2)	Mid century	HSPF	**Climate** *Number:* 8 *Emissions:* A1B, B1 *GCM:* CMIP3	+252%	*Winter:* +261% to +451% *Spring:* +129% to +164% *Summer:* -67 to +54% Fall: +430 to +595%	Praskievicz and Chang, 2011
	Late Century			+245%	*Winter:* +259% to +436% *Spring:* +41% to +53% *Summer:* -81% to -52% *Fall:* +503% to +812%	

*Early Century: 2020–2040, Mid-Century: 2041–2070, and Late Century: 2071–2100.
a/ Change in turbidity
b/ Estimated from graph (Figure 3 in Hovenga *et al.,* 2016), values listed for is range of monthly changes (HADCM3, IPCM4, MPEH5).
c/ Study assessed sediment concentrations.

Table S-4. **Projected fecal indicator bacteria (FIB) load responses to future climate changes scenarios. Information is adapted from published scientific literature identified in this review.**

Watershed (Drainage Area)	Future Period*	Water Model(s)	Scenarios Used to Drive Water Models	Projected FIB Changes (%)		Citation
				Annual Median	Seasonal Median	
Pigg River, VA ($1,015\ km^2$)	Mid Century	HSPF	**Climate** *Number:* 7 *Emissions:* B2 *GCM:* CMIP3 **Land use** 1 (many sources)	*Low flow years:* +49% [a/] L	*Winter*: +41% L *Spring*: -33% L *Summer*: +10% L *Fall*: +212%	Coffey *et al.*, 2015b
				Average flow years +4% L	*Winter*: +22% L *Spring*: -26% L *Summer*: -22% L *Fall*: +106% L	
				High flow years: +21% L	*Winter*: +81% L *Spring*: -17% L Summer: -14% L Fall: +50% L	
Upper Pearl River, MS ($7,588\ km^2$)	Mid Century	SWAT	**Climate** *Number:* 1 *Emissions:* A1B *GCM:* CMIP3	+175% [b/] C (< 0% to > +900%)	*Winter/Spring*: decreases *Summer/Fall*: increases	Jayakody *et al.*, 2015
	Late Century			+297% C (< 0% to > +900%)	*Winter/Spring*: decreases *Summer/Fall*: increases	

*Early Century: 2020–2040, Mid-Century: 2041–2070, and Late Century: 2071–2100.
a/ L denotes change in load in response to climate change scenarios only.
b/ C denotes change in concentration.

Table S-5. Occurrence of waterborne disease outbreaks following weather events in the U.S. Adapted from Rizak and Hrudey, 20**08.**

Year	Location	Pathogen	Outbreak Characteristics/ Contributing Factors	Reference
1999	Washington County Fair, New York	*E. coli* O157:H7, *Campylobacter jejuni*	Drought conditions followed by heavy rainfall, sewage contamination	Novello, 2000
1979	Bradford, Pennsylvania	*Giardia lamblia*	Heavy rainfall, inappropriate treatment	Lippy, 1981
1978	Bennington, Vermont	*Campylobacter jejuni*	Heavy rainfall, potential sewage contamination	Vogt *et al.*, 1982
1993	Milwaukee, Wisconsin	*Cryptosporidium parvum*	Severe winter storms and heavy runoff, sewage effluent contamination	MacKenzie *et al.*, 1994; Fox and Lytle, 1996; Peng *et al.*, 1997; Sulaiman *et al.*, 1998
1989/1990	Cabool, Missouri	*E. coli* O157:H7	Extreme cold temperatures, sewage contamination	Swerdlow *et al.*, 1992
1993	Gideon, Missouri	*Salmonella typhimirium*	Extreme cold temperatures, contamination of storage facilities	Clark *et al.*, 1996; Angulo *et*
1998	Brushy Creek, Texas	*Cryptosporidium parvum*	Drought conditions, extreme high temperatures, sewage contamination	TDOH, 1999
1980	Georgetown, Texas	Coxsackievirus B3; hepatitis A	Heavy rainfall, sewage contamination	Hejkal *et al.*, 1982
1998	Alpine, Wyoming	*E. coli* O157:H7	Heavy rainfall, potential contamination from wildlife	Olsen *et al.*, 2002
1980	Red Lodge, Montana	*Giardia lamblia*	Heavy runoff, volcanic ashfall	Weniger *et al.*, 1983

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