Supplemental Material for: Benchmarking High-Resolution, Hydrologic Performance of Long-Term Retrospectives in the United States

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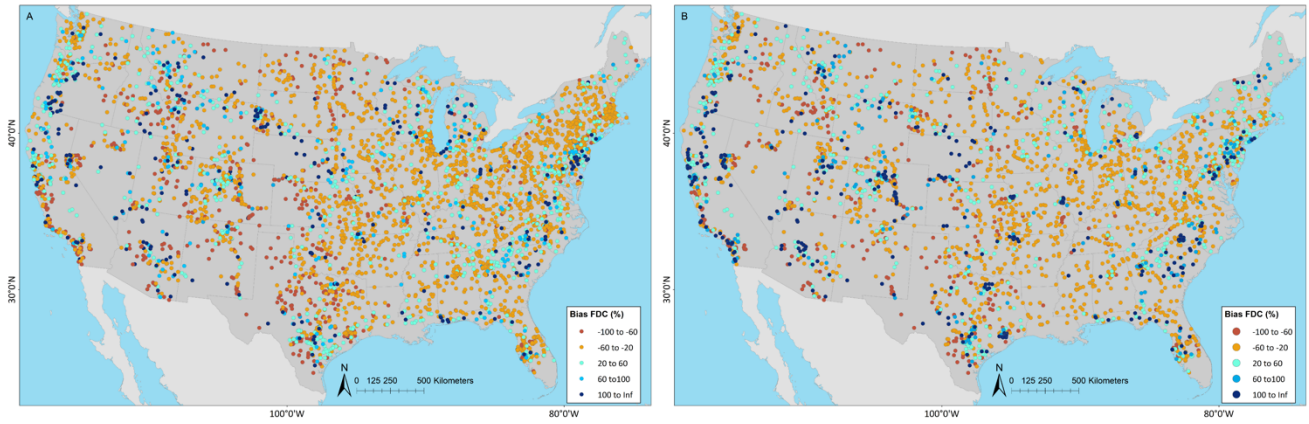
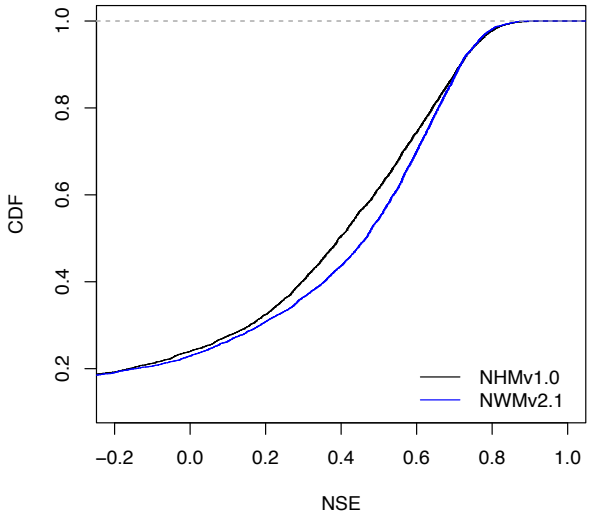
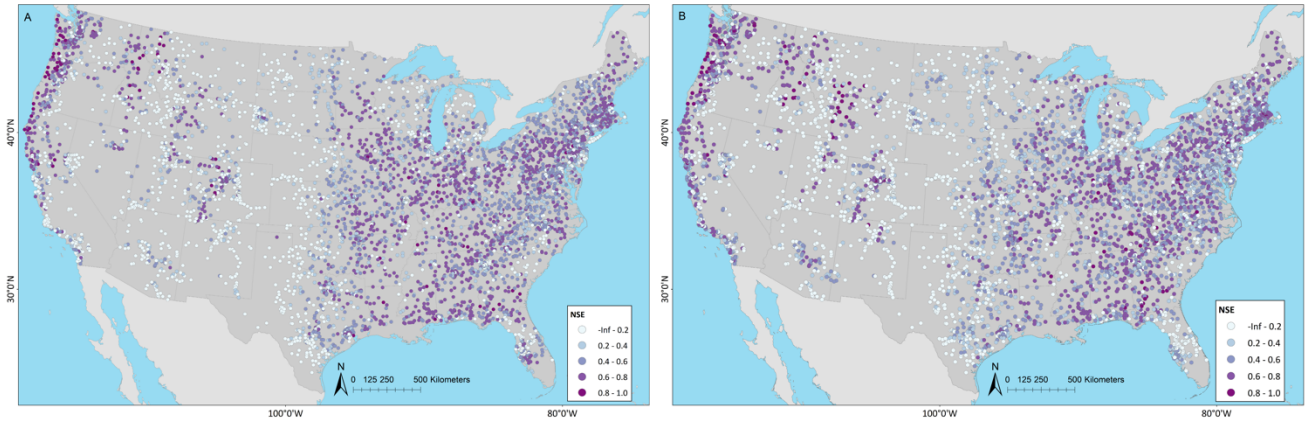


Supplemental Figure 1. Percent bias of midsegment of flow duration curve (PBIAS_FDC) maps for National Water Model v2.1 (NWMv2.1) (left; A) and National Hydrologic Model v1.0 (NHMv1.0) (right; B), where PBIAS_FDC >20% or <-20%. Cooler colors are where model is overestimating midsegment slope, and warmer colors are where model is underestimating midsegment slope.



Supplement Figure 2. Cumulative density functions (CDFs) for model Nash-Sutcliffe efficiency (NSE) based on daily streamflow at U.S. Geological Survey (USGS) gages for National Water Model v2.1 (NWMv2.1) and National Hydrologic Model v1.0 (NHMv1.0).



Supplemental Figure 3. Nash-Sutcliffe efficiency (NSE) based on National Water Model v2.1 (NWMv2.1) (left, A) and National Hydrologic Model v1.0 (NHMv1.0) (right, B) daily streamflow at U.S. Geological Survey (USGS) gages.

Supplemental Table 1. For each hydrologic model application, number (percent) of sites in PBIAS_HF category by region; bold italic indicates maximum number (percent) of sites by CONUS, bold indicates maximum number (percent) of sites in each category across regions. PBIAS_HF = percent bias high flow; CONUS = conterminous United States; NHMv1.0=National Hydrologic Model v1.0; NWMv2.1 = National Water Model v2.1.

		CONUS	Region			
	PBIAS_HF		West	Central	Southeast	Northeast
NHMv1.0	(-100,-60]	1046 (19%)	217 (21%)	**415 (40%)**	307 (29%)	107 (10%)
	(-60,-20]	***2640 (49%)***	562 (21%)	676 (26%)	675 (26%)	**727 (28%)**
	(-20,20]	1126 (21%)	**379 (34%)**	234 (21%)	184 (16%)	329 (29%)
	(20,60]	251 (5%)	**133 (53%)**	57 (23%)	25 (10%)	36 (14%)
	(60,100]	117 (2%)	**78 (67%)**	21 (18%)	9 (8%)	9 (8%)
	(100, Inf]	210 (4%)	**141 (67%)**	47 (22%)	12 (6%)	10 (5%)
NWMv2.1	(-100,-60]	573 (11%)	102 (18%)	**209 (36%)**	142 (25%)	120 (21%)
	(-60,-20]	***2630 (49%)***	420 (16%)	716 (27%)	654 (25%)	**840 (32%)**
	(-20,20]	1408 (26%)	**548 (39%)**	325 (23%)	312 (22%)	223 (16%)
	(20,60]	384 (7%)	**202 (53%)**	87 (23%)	68 (18%)	27 (7%)
	(60,100]	146 (3%)	**90 (62%)**	34 (23%)	17 (12%)	5 (3%)
	(100, Inf]	249 (5%)	**148 (59%)**	79 (32%)	19 (8%)	3 (1%)

Supplemental Table 2. For each hydrologic model application, number (percent) of sites in PBIAS_LF category by region; bold italic indicates maximum number (percent) of sites by CONUS, bold indicates maximum number (percent) of sites in each category across regions. PBIAS_LF = percent bias low flow; CONUS = conterminous United States; NHMv1.0=National Hydrologic Model v1.0; NWMv2.1 = National Water Model v2.1.

		CONUS	Region			
	PBIAS_LF		West	Central	Southeast	Northeast
NHMv1.0	(-Inf,-100]	1169 (22%)	**470 (40%)**	257 (22%)	233 (20%)	209 (18%)
	(-100,-60]	450 (8%)	133 (30%)	67 (15%)	104 (23%)	**146 (32%)**
	(-60,-20]	715 (13%)	173 (24%)	134 (19%)	178 (25%)	**230 (32%)**
	(-20,20]	1041 (19%)	233 (22%)	271 (26%)	220 (21%)	**317 (30%)**
	(20,60]	**1287 (24%)**	289 (22%)	**412 (32%)**	319 (25%)	267 (21%)
	(60,100]	722 (13%)	207 (29%)	**309 (43%)**	158 (22%)	48 (7%)
	NA	6 (0.1%)	5 (83%)	0 (0%)	0 (0%)	1 (17%)
NWMv2.1	(-Inf,-100]	504 (9%)	**252 (50%)**	152 (30%)	55 (11%)	45 (9%)
	(-100,-60]	215 (4%)	**86 (40%)**	40 (19%)	47 (22%)	42 (20%)
	(-60,-20]	479 (9%)	145 (30%)	90 (19%)	74 (15%)	**170 (35%)**
	(-20,20]	988 (18%)	262 (27%)	204 (21%)	180 (18%)	**342 (35%)**
	(20,60]	1489 (28%)	335 (22%)	378 (25%)	379 (25%)	**397 (27%)**
	(60,100]	**1709 (32%)**	425 (25%)	**586 (34%)**	477 (28%)	221 (13%)
	NA	6 (0.1%)	5 (83%)	0 (0%)	0 (0%)	1 (17%)

Supplemental Table 3. For each hydrologic model application, number (percent) of sites in Nash-Sutcliffe efficiency (NSE) category by region; bold italic indicates maximum number (percent) of sites by CONUS, bold indicates maximum number (percent) of sites in each category across regions. CONUS = conterminous United States; NHMv1.0=National Hydrologic Model v1.0; NWMv2.1 = National Water Model v2.1.

		CONUS	Region			
	NSE		West	Central	Southeast	Northeast
NHMv1.0	<0.2	**1750 (32%)**	**741 (42%)**	553 (32%)	267 (15%)	189 (11%)
	0.2-0.4	976 (18%)	162 (17%)	**347 (36%)**	290 (30%)	177 (18%)
	0.4-0.6	1285 (24%)	211 (16%)	332 (26%)	356 (28%)	**386 (30%)**
	0.6-1.0	1379 (26%)	396 (29%)	218 (16%)	299 (22%)	**466 (34%)**
NWMv2.1	<0.2	**1660 (31%)**	**759 (46%)**	553 (33%)	250 (15%)	98 (6%)
	0.2-0.4	698 (13%)	162 (23%)	**227 (33%)**	169 (24%)	140 (20%)
	0.4-0.6	1421 (26%)	221 (16%)	334 (24%)	401 (28%)	**465 (33%)**
	0.6-1.0	1611 (30%)	368 (23%)	336 (21%)	392 (24%)	**515 (32%)**

Supplemental Table 4. For each hydrologic model application, number (percent) of sites in logNSE category by region; bold italic indicates maximum number (percent) of sites by CONUS, bold indicates maximum number (percent) of sites in each category across regions. NSE = Nash-Sutcliffe efficiency; CONUS = conterminous United States; NHMv1.0=National Hydrologic Model v1.0; NWMv2.1 = National Water Model v2.1.

		CONUS	Region			
	logNSE		West	Central	Southeast	Northeast
NHMv1.0	<0.2	***2265 (42%)***	**850 (38%)**	684 (30%)	455 (20%)	276 (12%)
	0.2-0.4	603 (11%)	139 (23%)	**205 (34%)**	139 (23%)	120 (20%)
	0.4-0.6	1009 (19%)	185 (18%)	**312 (31%)**	247 (24%)	265 (26%)
	0.6-1.0	1513 (28%)	336 (22%)	249 (16%)	371 (25%)	**557 (37%)**
NWMv2.1	<0.2	***2078 (39%)***	**850 (41%)**	681 (33%)	410 (20%)	137 (7%)
	0.2-0.4	487 (9%)	122 (25%)	**150 (31%)**	122 (25%)	93 (19%)
	0.4-0.6	893 (17%)	168 (19%)	232 (26%)	**277 (31%)**	216 (24%)
	0.6-1.0	1932 (36%)	370 (19%)	387 (20%)	403 (21%)	**772 (40%)**