U.S. EPA
National Rivers and Streams Assessment: A Collaborative Survey
Appendix B
Ecoregion-Specific Benchmarks Used in NRSA 2013–14

Ecoregion	Benthic Macroinvertebrate MMI		Fish MMI		Total Nitrogen (µg/L)		Total Phosphorus (µg/L)		Salinity as Conductivity (µS/cm)	
	Good (≥)	Poor (≤)	Good (≥)	Poor (≤)	Good (≤)	Poor (≥)	Good (≤)	Poor (≥)	Good (≤)	Poor (≥)
CPL	54.9	40.7	57.3	46.8	624	1081	55.9	103.0	500	1000
NAP	55.0	40.9	57.6	47.1	345	482	17.1	32.6	500	1000
SAP	45.0	30.8	60.3	49.8	240	456	14.8	24.4	500	1000
UMW	36.9	22.7	39.8	29.3	583	1024	36.3	49.9	500	1000
TPL	40.3	26.2	58.0	47.5	700	1274	88.6	143.0	1000	2000
NPL	56.8	42.6	46.3	35.8	575	937	64.0	107.0	1000	2000
SPL	35.5	21.3	50.2	39.7	581	1069	55.8	127.0	1000	2000
WMT	50.1	35.9	75.9	65.4	139	249	17.7	41.0	500	1000
XER	57.0	42.8	76.8	63.7	285	529	52.0	95.9	500	1000

See the NRSA 2013–14 Technical Support Document for ecoregional category assignments for in-stream fish habitat, riparian vegetation cover, and stream- bed sediment.
See Appendix A for indicators that are assessed with nationally consistent benchmarks.

Percentage of Stream Miles in Each Category: 2008–09 Estimates (Original and Recalculated), 2013–14 Estimates, and Difference Between 2008–09 Recalculated and 2013–14 Estimates

Indicator	Category	Original estimate from 2008–09 report (percent)	2008–09 estimate recalculated for consistency with 2013–14 report (percent)	2013–14 estimate (percent)	Difference (with confidence intervals) between recalculated 2008–09 estimate and 2013–14 estimate (percentage points)	Reason for difference between original 2008–09 estimate and 2008–09 recalculated estimate used in difference analysis
Benthic MMI	**Good**	28	29.6	30.2	0.6 (-3.1 to 4.3)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Benthic MMI	**Fair**	25	24.5	26.1	1.6 (-2.6 to 5.8)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Benthic MMI	**Poor**	46	44.9	43.5	-1.4 (-5.5 to 2.8)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Benthic MMI	**Not Assessed**	1	1	0.2	-0.8 (-1.3 to -0.4)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Fish MMI	**Good**	36	34.8	26.4	-8 (-12 to -4)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Analytical approach for developing the fish MMI changed from a random-forest model to a more traditional approach similar to the one used for the benthic MMI. 3) A larger set of reference sites was used in 2013-14 to establish benchmarks than in 2008-09.

Fish MMI	**Fair**	19	23.9	22.4	-1.5 (-6 to 3)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Analytical approach for developing the fish MMI changed from a random-forest model to a more traditional approach similar to the one used for the benthic MMI. 3) A larger set of reference sites was used in 2013-14 to establish benchmarks than in 2008-09.
Fish MMI	**Poor**	32	26.5	36.8	10 (6 to 14)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Analytical approach for developing the fish MMI changed from a random-forest model to a more traditional approach similar to the one used for the benthic MMI. 3) A larger set of reference sites was used in 2013-14 to establish benchmarks than in 2008-09.
Fish MMI	**Not Assessed**	13	14.8	14.3	-0.5 (-3 to 3)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Analytical approach for developing the fish MMI changed from a random-forest model to a more traditional approach similar to the one used for the benthic MMI. 3) A larger set of reference sites was used in 2013-14 to establish benchmarks than in 2008-09.
Phosphorus	**Good**	35	34.4	17.5	-17 (-21 to -13)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Phosphorus	**Fair**	19	18.1	24.1	6 (2 to 10)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.

Phosphorus	**Poor**	46	47.3	58.4	11 (7 to 15)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Phosphorus	**Not Assessed**	0.2	0.3	0	- 0.3 (-0.5 to -0.1)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Nitrogen	**Good**	38	38.7	32.3	-6.4 (-10.3 to -2.4)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Nitrogen	**Fair**	20	20.3	24.5	4.2 (0.32 to 8.1)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Nitrogen	**Poor**	41	40.8	43.2	2.4 (-1.6 to 6.5)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Nitrogen	**Not Assessed**	0.2	0.3	0	-0.3 (-0.5 to -0.04)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Salinity	**Good**	85	84	86.4	2.4 (-0.01 to 4.9)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Salinity	**Fair**	12	11.7	9.7	-2.0(-4.3 to 0.4)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Salinity	**Poor**	3	3.9	3.8	-0.12 (-1.3 to 1.1)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.

Salinity	**Not Assessed**	0.3	0.5	0.1	-0.4 (-0.7 to -0.1)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Acidification	**None**	99	98.5	98.4	0.0 (-1 to 0.9)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Acid mine drainage, episodic acidification, and acid deposition were reported as separate categories in 2008-09 but are grouped together as "poor" in 2013-14.
Acidification	**ACID-organic**	0.4	0.5	0.2	-0.3 (-0.6 to 0.0)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Acid mine drainage, episodic acidification, and acid deposition were reported as separate categories in 2008-09 but are grouped together as "poor" in 2013-14.
Acidification	**Poor (ACID- AMD, Episodic, or ACID-aciddep)**	0.5	0.8	1.1	0.2 (-0.3 to 0.7)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Acid mine drainage, episodic acidification, and acid deposition were reported as separate categories in 2008-09 but are grouped together as "poor" in 2013-14.
Acidification	**Not Assessed**	0.2	0.2	0.3	0.1 (-0.3 to 0.5)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14. 2) Acid mine drainage, episodic acidification, and acid deposition were reported as separate categories in 2008-09 but are grouped together as "poor" in 2013-14.

In-stream Fish Habitat	**Good**	68	67.7	64.3	-3.4 (-7.7 to 0.9)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
In-stream Fish Habitat	**Fair**	20	21.1	20.4	-0.7 (-4.7 to 3.4)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
In-stream Fish Habitat	**Poor**	11	11.2	14.4	3.3 (0.04 to 6.6)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
In-stream Fish Habitat	**Not Assessed**	0	0	0.8	0.8 (0.3 to 1.2)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Riparian Disturbance	**Good**	34	34.7	29	-5.8 (-9.9 to -1.6)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Riparian Disturbance	**Fair**	46	44.2	47	2.8 (-1.8 to 7.3)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Riparian Disturbance	**Poor**	20	21.1	23.3	2.3 (-1.1 to 5.7)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Riparian Disturbance	**Not Assessed**	0	0	0.7	0.7 (0.3 to 1.2)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.
Riparian Vegetation	**Good**	56	55.8	58	2.2 (-2.1 to 6.5)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.

Riparian Vegetation	**Fair**	20	19.1	17.4	-1.7 (-5.5 to 2.2)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.
Riparian Vegetation	**Poor**	24	25.1	23.7	-1.4 (-5.1 to 2.2)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.
Riparian Vegetation	**Not Assessed**	0	0	0.9	0.9 (0.4 to 1.5)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.
Streambed Sediment	**Good**	55	50.8	51.9	1.1 (-3.2 to 5.4)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.
Streambed Sediment	**Fair**	29	28.6	22.3	-6.3 (-10.3 to -2.3)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.
Streambed Sediment	**Poor**	15	19.3	21.8	2.5 (-1.2 to 6.1)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.

Streambed Sediment	**Not Assessed**	1	1.4	4.1	2.8 (1.1 to 4.4)	1) To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14 2) A larger set of reference sites was used in 2013-14 than in 2008-09.
Enterococci	**Above Human Health Benchmark**	23	21.8	29.9	8.0 (3.7 to 12.4)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA
Enterococci	**At or Below Human Health Benchmark**	70	71.3	68.9	-2.5 (-6.9 to 2.0)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA
Enterococci	**Not Assessed**	6	6.8	1.2	-5.6 (-7.1 to -4.1)	To ensure known stream and river lengths were equivalent for difference analysis, the statistical analysis method was updated and applied to data from both NRSA 2008-09 and 2013-14.