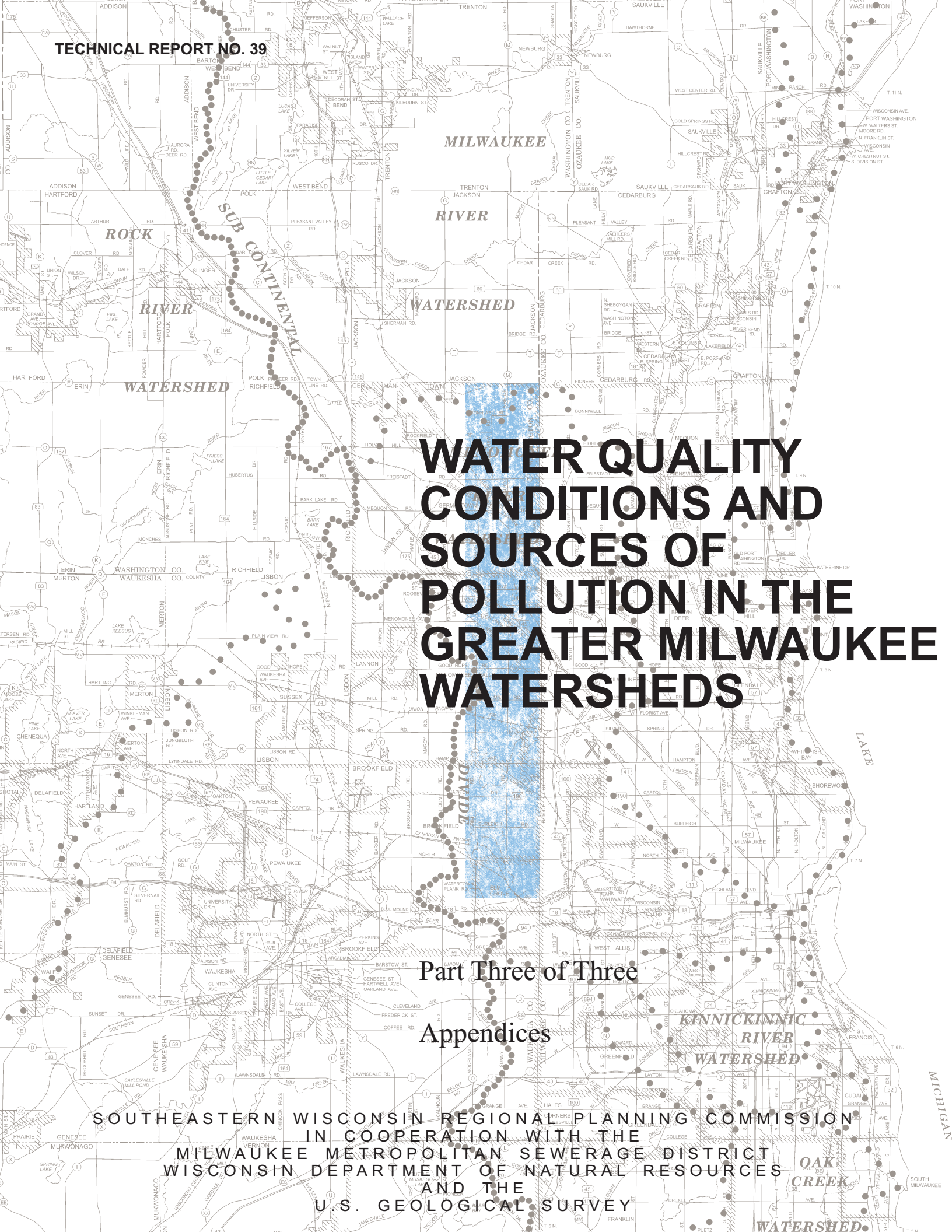
TECHNICAL REPORT NO. 39



WATER QUALITY CONDITIONS AND SOURCES OF POLLUTION IN THE GREATER MILWAUKEE WATERSHEDS

Part Three of Three

Appendices

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION
IN COOPERATION WITH THE
MILWAUKEE METROPOLITAN SEWERAGE DISTRICT
WISCONSIN DEPARTMENT OF NATURAL RESOURCES
AND THE
U.S. GEOLOGICAL SURVEY

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TECHNICAL REPORT NUMBER 39

WATER QUALITY CONDITIONS AND SOURCES OF POLLUTION IN THE GREATER MILWAUKEE WATERSHEDS

Part Three of Three
Appendices

Prepared by the

Southeastern Wisconsin Regional Planning Commission
In Cooperation with the
Milwaukee Metropolitan Sewerage District,
Wisconsin Department of Natural Resources,
and the
U.S. Geological Survey

The preparation of this report was financed in part by the Milwaukee Metropolitan Sewerage District and by the Wisconsin Department of Natural Resources and the U.S. Environmental Protection Agency under the continuing water quality management planning program conducted cooperatively by the Department and the Regional Planning Commission.

November 2007

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Appendix A

SCIENTIFIC NAMES OF ORGANISMS REFERENCED IN THIS REPORT

Common Name	Scientific Name[a]
Fish[b]	
Alewife	*Alosa pseudoharengus*
American Brook Lamprey	*Lampetra appendix*
American Eel[c]	*Anguilla rostrata*
Banded Darter	*Etheostoma zonale*
Banded Killifish[c]	*Fundulus diaphanus*
Bighead Carp	*Hypophthalmichthys nobilis*
Bigmouth Shiner	*Notropis dorsalis*
Black Bullhead	*Ictalurus melas*
Black Carp	*Mylopharygodon piceus*
Black Crappie	*Pomoxis nigromaculatus*
Blackchin Shiner	*Notropis heterodon*
Blackfin Cisco	*Coregonus nigripinnis*
Blacknose Dace	*Rhinichthys atratulus*
Blacknose Shiner	*Notropis heterolepis*
Blackside Darter	*Percina maculata*
Blackstripe Topminnow	*Fundulus notatus*
Bloater[c]	*Coregonus hoyi*
Bluegill	*Lepomis macrochirus*
Bluntnose Minnow	*Pimephales notatus*
Bowfin	*Amia calva*
Brassy Minnow	*Hybognathus hankinsoni*
Brook Silverside	*Labidesthes sicculus*
Brook Stickleback	*Culaea inconstans*
Brook Trout	*Salvelinus fontinalis*
Brown Bullhead	*Ictalurus nebulosus*
Brown Trout	*Salmo trutta*
Bullhead Minnow	*Pimephales vigilax*
Burbot	*Lota lota*
Central Mudminnow	*Umbra limi*
Central Stoneroller	*Campostoma anomalum*
Channel Catfish	*Ictalurus punctatus*
Chinook Salmon	*Oncorhynchus tshawytscha*
Cisco (Lake Herring)[c]	*Coregonus artedii*
Coho Salmon	*Oncorhynchus kisutch*
Common Carp	*Cyprinus carpio*
Common Shiner	*Notropis cornutus*
Creek Chub	*Semotilus atromaculatus*
Deepwater Cisco	*Coregonus johannae*
Emerald Shiner	*Notropis atherinoides*
Fantail Darter	*Etheostoma flabellare*
Fathead Minnow	*Pimephales promelas*
Freshwater Drum	*Aplodinotus grunniens*

Common Name	Scientific Name[a]
Fish[b]	
Gizzard Shad	*Dorosoma cepedianum*
Golden Redhorse	*Moxostoma erythrurum*
Golden Shiner	*Notemigonus crysoleucas*
Goldfish	*Carassius auratus*
Grass Carp	*Ctenopharyngodon idella*
Grass Pickerel	*Esox americanus vermiculatus*
Greater Redhorse[d]	*Moxostoma valenciennesi*
Green Sunfish	*Lepomis cyanellus*
Hornyhead Chub	*Nocomis biguttatus*
Iowa Darter	*Etheostoma exile*
Johnny Darter	*Etheostoma nigrum*
Kiyi	*Coregonus kiyi*
Lake Chub	*Couesius plumbeus*
Lake Chubsucker[c]	*Erimyzon sucetta*
Lake Trout	*Salvelinus namaycush*
Lake Whitefish	*Coregonus clupeaformis*
Largemouth Bass	*Micropterus salmoides*
Largescale Stoneroller	*Campostoma oligolepis*
Least Darter[c]	*Etheostoma microperca*
Logperch	*Percina caprodes*
Longear Sunfish[d]	*Lepomis megalotis*
Longnose Dace	*Rhinichthys cataractae*
Longnose Gar	*Lepisosteus osseus*
Mimic Shiner	*Notropis volucellus*
Mottled Sculpin	*Cottus bairdi*
Ninespine Stickleback	*Pungitius pungitius*
Northern Brook Lamprey	*Ichthyomyzon fossor*
Northern Hog Sucker	*Hypentelium nigricans*
Northern Pike	*Esox lucius*
Northern Redbelly Dace	*Phoxinus eos*
Orangespotted Sunfish	*Lepomis humilis*
Pallid Shiner	*Notropis amnis*
Pearl Dace	*Semotilus margarita*
Pirate Perch	*Aphredoderus sayanus*
Pugnose Minnow	*Notropis emiliae*
Pugnose Shiner[d]	*Notropis anogenus*
Pumkinseed	*Lepomis gibbosus*
Quillback	*Carpoides cyprinus*
Rainbow Darter	*Etheostoma caeruleum*
Rainbow Smelt	*Osmerus mordax*
Rainbow Trout	*Salmo gairdneri*
Redfin Shiner[d]	*Notropis umbratilis*

Appendix A (continued)

Common Name	Scientific Name[a]
Fish[b]	
Redside Dace[c]	*Clinostomus elongatus*
River Carpsucker	*Carpoides carpio*
River Redhorse	*Moxostoma carinatum*
River Shiner	*Notropis blennius*
Rock Bass	*Ambloplites rupetris*
Rosyface Shiner	*Notropis rubellus*
Round Goby	*Neogobius melanostomus*
Ruffe	*Gymnocephalus cernuus*
Sand Shiner	*Notropis stramineus*
Sea Lamprey	*Petromyzon marinus*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Silver Carp	*Hypophthalmichthys molitrix*
Silver Lamprey	*Ichthyomyzon unicuspis*
Silver Redhorse	*Moxostoma anisurum*
Slender Madtom	*Noturus exilis*
Slenderhead Darter	*Percina phoxocephala*
Slimy Sculpin	*Cottus cognatus*
Smallmouth Bass	*Micropterus dolomieui*
Smallmouth Buffalo	*Ictiobus bubalus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Crustacea	
Fishhook Waterflea	*Cercopagis pengoi*
Rusty Crayfish	*Orconectes rusticus*
Spiny Waterflea	*Bythotrephes longimanus*[f]
Waterfleas	Genus *Daphnia*
Insects	
Caddisflies	Order Trichoptera
Mayflies	Order Ephemeroptera
Midges	Family Chironomidae
Stoneflies	Order Plecoptera
True Flies	Order Diptera

Common Name	Scientific Name[a]
Fish[b]	
Spotfin Shiner	*Notropis spilopterus*
Spottail Shiner	*Notropis hudsonius*
Starhead Topminnow	*Fundulus notatus*
Stonecat	*Noturus flavus*
Striped Shiner[e]	*Notropis chrysocephalus*
Suckermouth Minnow	*Phenacobius mirabilis*
Tadpole Madtom	*Noturus gyrinus*
Threespine Stickleback	*Gasterosteus aculeatus*
Tubenose Goby	*Proterorhinus marmoratus*
Walleyed Pike	*Stizostedion vitreum vitreum*
Warmouth	*Lepomis gulosus*
Weed Shiner[c]	*Notropis texanus*
White Bass	*Morone chrysops*
White Crappie	*Pomoxis annularis*
White Perch	*Morone americana*
White Sucker	*Catostomus catostomus*
Yellow Bass	*Morone mississippiensis*
Yellow Bullhead	*Ictalurus natalis*
Yellow Perch	*Perca plavescens*
Plants	
Curly-Leaf Pondweed	*Potamogeton crispus*
Eurasian Water Milfoil	*Myriophyllum spicatum*
Flowering Rush	*Butomus umbellatus*
Purple Loosestrife	*Lythrum salicaria*
Mollusks	
Quagga Mussel	*Dreissena bugensis*
Zebra Mussel	*Dreissena polymorpha*

[a]*Except where otherwise noted, the scientific name listed is the generic name and specific epithet.*

[b]*Hybrids of fish species are not included in this table.*

[c]*This species is designated as being of special concern by the Wisconsin Department of Natural Resources.*

[d]*This species is designated as being threatened by the Wisconsin Department of Natural Resources.*

[e]*This species is designated as being endangered by the Wisconsin Department of Natural Resources.*

[f]*Some literature refers to this species by the taxonomically invalid name,* Bythotrephes cederstroemi.

Source: George C. Becker, Fishes of Wisconsin, *University of Wisconsin Press, 1983; U.S. Department of Agriculture Integrated Taxonomic Information System; Wisconsin Department of Natural Resources; and SEWRPC.*

Appendix B

CITIZEN MONITORING DATA FROM THE GREATER MILWAUKEE WATERSHEDS WITHIN SOUTHEASTERN WISCONSIN

Table B-1

CITIZEN MONITORING DATA FROM THE KINNICKINNIC RIVER WATERSHED: 1998-2004

Kinnickinnic River	Biochemical Oxygen Demand (mg/l)	Dissolved Oxygen (mg/l)	Nitrate (mg/l)	pH (stu)	Temperature (Celsius)	Total Phosphorus (mg/l)	Total Solids (mg/l)	Water Clarity (feet)
Samples	1	1	1	1	1	1	1	1
Mean	6.0	9.5	0.7	7.7	6.0	4.6	2,100	1.7
Minimum	6.0	9.5	0.7	7.7	6.0	4.6	2,100	1.7
Maximum	6.0	9.5	0.7	7.7	6.0	4.6	2,100	1.7
Standard Deviation	- -	- -	- -	- -	- -	- -	- -	- -
Range of Number of Samples per Station per Year	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1

Source: Riveredge Nature Center.

Table B-2

CITIZEN MONITORING DATA FROM THE MENOMONEE RIVER WATERSHED: 1998-2004

Subwatershed	Biochemical Oxygen Demand (mg/l)	Dissolved Oxygen (mg/l)	Fecal Coliform Bacteria (#/100 ml)	Nitrate (mg/l)	pH (stu)	Temperature (Celsius)	Total Phosphorus (mg/l)	Total Solids (mg/l)	Turbidity (ntu)	Water Clarity (feet)
Upper Menomonee River										
Samples	38	10	38	38	38	13	38	36	- -	38
Mean	4.5	12.2	1,592	0.9	7.8	12.0	2.2	1,035	- -	3.1
Minimum	1.0	10.0	5	0.0	7.0	7.2	0.0	0	- -	0.3
Maximum	12.0	14.0	17,000	22.0	8.5	16.5	45.0	12,800	- -	6.0
Standard Deviation	3.0	1.6	3,210	3.8	0.3	3.5	7.8	2,151	- -	1.5
Range of Number of Samples per Station per Year	0-4	0-2	0-4	0-4	0-4	0-2	0-4	0-4	- -	0-4
Lower Menomonee River										
Samples	43	6	46	44	46	8	46	44	- -	46
Mean	2.8	12.6	2,327	3.0	7.9	8.1	0.4	634	- -	3.2
Minimum	0.3	8.0	33	0.5	6.1	0.0	0.0	3	- -	0.5
Maximum	8.2	18.0	25,000	6.0	8.5	14.0	2.5	1,800	- -	6.0
Standard Deviation	1.8	3.5	4,783	1.5	0.4	4.6	0.5	329	- -	1.5
Range of Number of Samples per Station per Year	0-4	0-1	0-4	0-4	0-4	0-3	0-4	0-4	- -	0-4
Honey Creek										
Samples	2	3	2	1	3	3	1	1	1	- -
Mean	3.5	10.3	2,256	5.0	7.8	10.7	1.0	548	77	- -
Minimum	3.0	8.0	31	5.0	7.5	9.0	1.0	548	77	- -
Maximum	4.0	14.0	4,480	5.0	8.0	13.0	1.0	548	77	- -
Standard Deviation	0.7	3.2	3,146	- -	0.3	2.1	- -	- -	- -	- -
Range of Number of Samples per Station per Year	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	- -
Little Menomonee River										
Samples	1	- -	1	1	1	- -	1	1	- -	- -
Mean	8.6	- -	100	5.0	7.0	- -	0.4	70	- -	- -
Minimum	8.6	- -	100	5.0	7.0	- -	0.4	70	- -	- -
Maximum	8.6	- -	100	5.0	7.0	- -	0.4	70	- -	- -
Standard Deviation	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Range of Number of Samples per Station per Year	0-1	- -	0-1	0-1	0-1	- -	0-1	0-1	- -	- -
Underwood Creek										
Samples	1	1	1	1	1	1	1	1	- -	1
Mean	1.0	12.0	380	0.1	8.8	15.5	0.2	3,500	- -	3.3
Minimum	1.0	12.0	380	0.1	8.8	15.5	0.2	3,500	- -	3.3
Maximum	1.0	12.0	380	0.1	8.8	15.5	0.2	3,500	- -	3.3
Standard Deviation	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Range of Number of Samples per Station per Year	0-1	0-1	0-1	0-1	0-1	0-1	0-1	0-1	- -	0-1
Willow Creek										
Samples	- -	6	- -	- -	14	7	- -	- -	1	- -
Mean	- -	9.8	- -	- -	7.7	10.9	- -	- -	30	- -
Minimum	- -	8.0	- -	- -	7.2	0.0	- -	- -	30	- -
Maximum	- -	12.5	- -	- -	8.5	20.0	- -	- -	30	- -
Standard Deviation	- -	0.2	- -	- -	0.4	7.4	- -	- -	- -	- -
Range of Number of Samples per Station per Year	- -	0-3	- -	- -	0-3	0-2	- -	- -	0-1	- -

Source: Riveredge Nature Center and the University of Wisconsin-Extension.

Table B-3

CITIZEN MONITORING DATA FROM THE MILWAUKEE RIVER WATERSHED: 1998-2004

Subwatershed	Biochemical Oxygen Demand (mg/l)	Dissolved Oxygen (mg/l)	Fecal Coliform Bacteria (#/100 ml)	Nitrate (mg/l)	pH (stu)	Temperature (Celsius)	Total Phosphorus (mg/l)	Total Solids (mg/l)	Water Clarity (feet)
Middle Milwaukee River									
Samples	6	10	6	6	13	10	6	6	6
Mean	4.3	9.5	238	0.84	7.9	16.2	3.70	422.0	2.90
Minimum	1.0	5.0	20	0.05	6.7	4.0	0.00	300.0	2.00
Maximum	10.0	13.5	790	5.00	8.3	26.7	12.00	660.0	4.00
Standard Deviation	3.3	2.7	293	2.04	0.4	7.5	5.10	123.0	0.70
Range of Number of Samples per Station per Year	0-2	0-4	0-2	0-2	0-4	0-4	0-2	0.2	0-2
Upper Lower Milwaukee River									
Samples	7	- -	6	9	9	5	9	9	7
Mean	2.7	- -	929	0.20	8.0	11.3	1.25	248.0	2.90
Minimum	1.1	- -	33	0.00	7.5	7.0	0.01	45.0	2.00
Maximum	4.1	- -	2,700	1.79	8.5	13.0	4.00	490.0	5.00
Standard Deviation	1.1	- -	1,012	0.60	0.3	2.5	1.45	170.0	1.00
Range of Number of Samples per Station per Year	0-2	- -	0-2	0-2	0-2	0-2	0-2	0-2	0-2
Lower Milwaukee River									
Samples	57	10	57	57	57	16	57	56.0	57
Mean	4.3	13.2	6,520	2.60	8.1	9.9	2.50	2.5	428.00
Minimum	0.0	4.4	0	0.00	6.3	5.0	0.00	1.2	0.05
Maximum	26.0	20.0	217,746	99.60	10.0	15.4	30.00	5.7	1,400.00
Standard Deviation	3.8	4.7	31,276	13.20	0.8	2.7	6.40	1.1	220.00
Range of Number of Samples per Station per Year	0-3	0-3	0-3	0-3	0-3	0-2	0-3	0-3	0-3
Cedar Creek									
Samples	24	11	25	25	26	10	25	24	22
Mean	4.0	10.4	103	2.00	7.9	8.9	0.90	269.0	4.60
Minimum	0.9	2.6	0	0.00	6.0	2.0	0.00	6.0	2.10
Maximum	9.9	17.0	520	9.80	10.1	12.0	7.00	514.0	6.50
Standard Deviation	2.4	4.3	129	2.50	0.8	2.8	1.90	167.0	1.30
Range of Number of Samples per Station per Year	0-3	0-2	0-5	0-3	0-3	0-2	0-3	0-3	0-3
Lower Cedar Creek									
Samples	3	1	3	3	3	- -	3	3	3
Mean	4.7	11.0	423	10.80	7.8	- -	0.20	263.0	4.10
Minimum	2.0	11.0	60	0.40	7.5	- -	0.20	38.0	3.30
Maximum	9.0	11.0	1,150	26.00	8.0	- -	0.20	440.0	5.00
Standard Deviation	3.8	- -	629	13.40	0.3	- -	0.00	205.0	0.90
Range of Number of Samples per Station per Year	0-1	0-1	0-1	0-1	0-1	- -	0-1	0-1	0-1
North Branch Milwaukee River									
Samples	6	2	5	6	6	2	5	5	4
Mean	6.1	11.8	65	0.08	8.5	10.0	0.23	364.0	4.60
Minimum	2.5	10.0	8	0.00	8.5	9.0	0.10	50.0	3.00
Maximum	8.5	13.5	175	0.20	8.5	11.0	0.50	800.0	5.60
Standard Deviation	2.3	2.5	64	0.07	0.0	1.4	0.16	357.0	1.10
Range of Number of Samples per Station per Year	0-2	0-1	0-2	0-2	0-2	0-1	0-2	0-2	0-2
Quaas Creek									
Samples	2	12	3	3	15	16	3	3	2
Mean	4.5	10.9	73	0.07	7.7	12.6	3.40	450.0	3.20
Minimum	2.0	8.0	20	0.00	7.3	0.0	0.00	280.0	1.60
Maximum	7.0	14.0	160	0.20	8.2	21.1	10.00	620.0	4.80
Standard Deviation	3.5	1.8	76	0.12	0.3	6.5	5.80	170.0	2.30
Range of Number of Samples per Station per Year	0-2	0-6	0-2	0-2	0-5	0-6	0-2	0-2	0-2

Table B-3 (continued)

Subwatershed	Biochemical Oxygen Demand (mg/l)	Dissolved Oxygen (mg/l)	Fecal Coliform Bacteria (#/100 ml)	Nitrate (mg/l)	pH (stu)	Temperature (Celsius)	Total Phosphorus (mg/l)	Total Solids (mg/l)	Water Clarity (feet)
Stony Creek									
Samples	- -	2	- -	- -	2	2	- -	- -	- -
Mean	- -	10.3	- -	- -	7.5	11.5	- -	- -	- -
Minimum	- -	9.0	- -	- -	7.5	9.9	- -	- -	- -
Maximum	- -	11.5	- -	- -	7.5	13.0	- -	- -	- -
Standard Deviation	- -	1.8	- -	- -	0.0	2.2	- -	- -	- -
Range of Number of Samples per Station per Year	- -	0-2	- -	- -	0-2	0-2	- -	- -	- -

Source: Riveredge Nature Center and the University of Wisconsin-Extension.

Table B-4

CITIZEN MONITORING DATA FROM THE OAK CREEK WATERSHED: 1998-2004

Oak Creek	Biochemical Oxygen Demand (mg/l)	Fecal Coliform Bacteria (cells/100 ml)	Nitrate (mg/l)	pH (stu)	Total Phosphorus (mg/l)	Total Solids (mg/l)	Water Clarity (feet)
Samples	4	4	4	4	4	4	4
Mean	2.1	250	0.1	7.5	1.0	572	2.70
Minimum	0.0	8	0.0	6.0	0.0	287	1.80
Maximum	4.5	312	0.2	8.0	4.0	815	3.58
Standard Deviation	1.0	325	0.1	1.0	2.0	268	0.70
Range of Number of Samples per Station per Year	0-3	0-3	0-3	0-3	0-3	0-3	0-3

Source: Riveredge Nature Center.

Table B-5

CITIZEN MONITORING DATA FROM THE ROOT RIVER WATERSHED: 1997-2004

Lower Root River	Dissolved Oxygen (mg/l)	pH (stu)	Temperature (ºC)	Turbidity (ntu)
Number of Samples	125	100	131	125
Mean	9.6	6.8	14.0	55.6
Minimum	4.5	5.0	1.0	5.0
Maximum	22.0	9.5	26.1	240.0
Standard Deviation	3.1	0.9	5.3	45.5
Range of Number of Samples per Station per Year	0-42	0-36	0-44	0-43

Source: University of Wisconsin-Extension.

Appendix C

SEASONAL AND ANNUAL TRENDS IN WATER QUALITY PARAMETERS AMONG STREAMS OF THE GREATER MILWAUKEE WATERSHEDS WITHIN SOUTHEASTERN WISCONSIN

Table C-1

SEASONAL AND ANNUAL TRENDS IN WATER QUALITY PARAMETERS AMONG STATIONS IN THE KINNICKINNIC RIVER WATERSHED: 1975-2001[a]

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological											
Fecal Coliform[e]	4.9	0	- -	0	- -	0	- -	0	- -	0	- -
	2.8	0	- -	0	- -	0	- -	0	- -	↓	0.01
	1.4	↓	0.08	0	0.01	↓	0.15	↑	0.18	↓	0.06
	0.6	↓	0.10	↓	0.02	↓	0.17	0	- -	↓	0.08
	0.2	↓	0.12	0	- -	↓	0.13	0	- -	↓	0.07
E. coli[e]	4.9	0	- -	0	- -	↑	- -	- -	- -	- -	- -
	2.8	0	- -	0	- -	0	- -	- -	- -	- -	- -
	1.4	- -	- -	0	- -	0	- -	- -	- -	- -	- -
	0.6	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chlorophyll-*a*[e]	4.9	0	- -	0	- -	0	- -	0	- -	0	- -
	2.8	0	- -	0	- -	↑	0.20	↓	0.18	0	- -
	1.4	0	- -	↓	0.13	0	- -	0	- -	↓	0.03
	0.6	↓	0.06	↓	0.08	↓	0.05	0	- -	↓	0.04
	0.2	0	- -	↓	0.16	↓	0.06	0	- -	↓	0.06
Chemical											
Alkalinity	4.9	0	- -	0	- -	0	- -	0	- -	0	- -
	2.8	0	- -	0	- -	0	- -	0	- -	0	- -
	1.4	0	- -	0	- -	0	- -	0	- -	0	- -
	0.6	0	- -	0	- -	0	- -	↑	0.31	0	- -
	0.2	0	- -	↑	0.02	0	- -	↑	0.38	0	- -
Biochemical Oxygen Demand[e]	4.9	0	- -	↓	0.05	↓	0.18	0	- -	↓	0.05
	2.8	↑	0.16	↓	0.03	↓	0.15	0	- -	↓	0.02
	1.4	0	- -	↓	0.06	↓	0.29	0	- -	↓	0.07
	0.6	↓	0.34	↓	0.27	↓	0.38	0	- -	↓	0.32
	0.2	↓	0.40	↓	0.40	↓	0.44	0	- -	↓	0.40
Chloride[e]	4.9	0	- -	↑	0.12	↑	0.12	0	- -	↑	0.07
	2.8	↑	0.09	↑	0.13	↑	0.12	0	- -	↑	0.07
	1.4	0	- -	↑	0.07	↑	0.03	0	- -	↑	0.02
	0.6	↑	0.09	↑	0.36	↑	0.05	0	- -	↑	0.08
	0.2	↑	0.18	↑	0.34	↑	0.09	0	- -	↑	0.12
Dissolved Oxygen	4.9	↓	0.06	0	- -	0	- -	0	- -	0	- -
	2.8	↓	0.04	0	- -	↑	0.02	0	- -	0	- -
	1.4	0	- -	0	- -	↑	0.03	0	- -	0	- -
	0.6	0	- -	0	- -	0	- -	0	- -	↑	0.01
	0.2	0	- -	0	- -	0	- -	0	- -	0	- -
Hardness	4.9	↑	0.05	0	- -	0	- -	↓	0.36	0	- -
	2.8	↑	0.05	0	- -	0	- -	↓	0.28	0	- -
	1.4	0	- -	0	- -	0	- -	0	- -	0	- -
	0.6	0	- -	0	- -	0	- -	0	- -	0	- -
	0.2	↑	0.08	0	- -	0	- -	0	- -	0	- -

Table C-1 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Chemical (continued)											
pH	4.9	0	- -	0	- -	0	- -	0	- -	0	- -
	2.8	0	- -	0	- -	⬆	0.03	0	- -	0	- -
	1.4	⬇	0.10	⬇	0.03	⬇	0.06	0	- -	⬇	0.05
	0.6	0	- -	0	- -	0	- -	0	- -	0	- -
	0.2	0	- -	0	- -	0	- -	⬆	0.12	0	- -
Specific Conductance	4.9	0	- -	0	- -	0	- -	0	- -	0	- -
	2.8	⬆	0.03	⬆	0.09	⬆	0.07	0	- -	⬆	0.03
	1.4	0	- -	0	- -	0	- -	0	- -	0	- -
	0.6	0	- -	⬆	0.18	0	- -	⬆	0.26	⬆	0.01
	0.2	0	- -	⬆	0.33	0	- -	⬆	0.20	0	- -
Temperature	4.9	⬆	0.03	0	- -	0	- -	0	- -	0	- -
	2.8	⬆	0.03	0	- -	0	- -	0	- -	0	- -
	1.4	⬆	0.04	⬆	0.06	0	- -	0	- -	0	- -
	0.6	0	- -	⬆	0.04	⬆	0.03	0	- -	⬆	0.01
	0.2	0	- -	⬆	0.08	⬆	0.03	0	- -	⬆	0.03
Suspended Material											
Total Suspended Sediment	4.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	2.8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	1.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.6	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Total Suspended Solids	4.9	0	- -	0	- -	0	- -	0	- -	0	- -
	2.8	0	- -	0	- -	0	- -	0	- -	⬇	0.01
	1.4	⬇	0.01	0	- -	⬇	0.06	0	- -	⬇	0.01
	0.6	0	- -	0	- -	⬇	0.03	0	- -	⬇	0.01
	0.2	0	- -	⬆	0.02	0	- -	0	- -	0	- -
Nutrients											
Ammonia[e]	4.9	⬆	0.03	⬇	0.07	0	- -	⬇	0.86	0	- -
	2.8	0	- -	0	- -	0	- -	0	- -	0	- -
	1.4	0	- -	⬇	0.09	⬇	0.09	0	- -	⬇	0.04
	0.6	⬇	0.07	⬇	0.26	⬇	0.29	0		⬇	0.22
	0.2	⬇	0.08	⬇	0.17	⬇	0.21	0	- -	⬇	0.16
Kjeldahl Nitrogen[e]	4.9	⬆	0.06	0	- -	0	- -	⬇	0.18	⬆	0.01
	2.8	0	- -	0	- -	0	- -	⬇	0.16	0	- -
	1.4	0	- -	0	- -	0	- -	0	- -	0	- -
	0.6	0	- -	0	- -	⬇	0.05	⬆	0.29	⬇	0.10
	0.2	0	- -	0	- -	⬇	0.05	0	- -	⬇	0.01
Nitrate[e]	4.9	0	- -	⬆	0.04	0	- -	0	- -	0	- -
	2.8	0	- -	0	- -	0	- -	0	- -	0	- -
	1.4	0	- -	⬆	0.08	0	- -	0	- -	⬆	0.04
	0.6	⬆	0.04	⬆	0.25	⬆	0.03	0	- -	⬆	0.08
	0.2	⬆	0.05	⬆	0.25	⬆	0.05	0	- -	⬆	0.09

Table C-1 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients (continued)											
Nitrite[e]	4.9	↑	0.14	↑	0.06	0	- -	0	- -	↑	0.06
	2.8	↑	0.06	↑	0.03	↑	0.04	0	- -	↑	0.04
	1.4	↑	0.05	0		0	- -	0	- -	0	- -
	0.6	0	- -	0	- -	0	- -	↑	0.17	0	- -
	0.2	0	- -	↑	0.02	0	- -	0	- -	0	- -
Organic Nitrogen[c]	4.9	↑	0.03	↑	0.03	0	- -	↓	0.12	↑	0.02
	2.8	0	- -	↑	0.02	0	- -	↓	0.11	↑	0.01
	1.4	0	- -	↑	0.02	0	- -	0	- -	↑	0.01
	0.6	0	- -	↑	0.05	0	- -	↑	0.12	↑	0.01
	0.2	0	- -	↑	0.03	0	- -	0	- -	0	- -
Total Nitrogen[c]	4.9	0	- -	↑	0.26	0	- -	↓	0.15	↑	0.01
	2.8	0	- -	↑	0.03	0	- -	↓	0.13	↑	0.02
	1.4	↑	0.04	↑	0.03	0	- -	0	- -	↑	0.01
	0.6	0	- -	↑	0.04	0	- -	↑	0.24	0	- -
	0.2	0	- -	↑	0.06	0	- -	0	- -	0	- -
Dissolved Phosphorus[e]	4.9	↑	0.06	↑	0.04	↑	0.09	0	- -	↑	0.07
	2.8	0	- -	↑	0.02	↑	0.04	0	- -	↑	0.03
	1.4	↓	<0.01	0	- -	↓	0.12	0	- -	↓	0.03
	0.6	0	- -	↑	0.04	0	- -	↓	0.25	0	- -
	0.2	0	- -	↑	0.15	0	- -	↓	0.20	↑	0.01
Total Phosphorus[e]	4.9	↑	0.07	0	- -	↑	0.07	↑	0.10	↑	0.05
	2.8	0	- -	0	- -	↑	0.04	0	- -	↑	0.03
	1.4	↓	0.03	0	- -	↓	0.17	↑	0.21	↓	0.05
	0.6	0	- -	0	- -	↑	0.04	0	- -	↓	0.02
	0.2	0	- -	0	- -	↓	0.03	0	- -	0	- -
Metals											
Arsenic[e]	4.9	↓	0.19	0	- -	↓	0.32	- -	- -	↓	0.20
	2.8	↓	0.75	↓	0.68	↓	0.64	- -	- -	↓	0.70
	1.4	↓	0.56	0	- -	↓	0.22	- -	- -	↓	0.27
	0.6	↓	0.65	0	- -	0	- -	- -	- -	↓	0.27
	0.2	↓	0.71	0	- -	0	- -	- -	- -	↓	0.19
Cadmium[e]	4.9	↓	0.81	↓	0.75	↓	0.80	- -	- -	↓	0.78
	2.8	0	- -	0	- -	↓	0.03	0	- -	↓	0.09
	1.4	↓	0.59	↓	0.74	↓	0.81	- -	- -	↓	0.73
	0.6	↓	0.82	0	0.75	↓	0.71	- -	- -	↓	0.75
	0.2	↓	0.84	↓	0.72	↓	0.76	- -	- -	↓	0.77
Chromium[e]	4.9	0	- -	0	- -	0	- -	- -	- -	0	- -
	2.8	↑	0.10	0	- -	0	- -	- -	- -	↑	0.02
	1.4	0	- -	↓	0.06	↓	0.28	- -	- -	↓	0.16
	0.6	0	- -	0	- -	0	- -	↑	0.98	↓	0.02
	0.2	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-1 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)											
Copper[e]	4.9	↑	0.07	↑	0.56	0	- -	0	- -	↑	0.03
	2.8	0	- -	↑	0.08	↑	0.15	0	- -	↑	0.11
	1.4	0	- -	↑	0.12	0	- -	↑	0.44	↑	0.02
	0.6	0	- -	↑	0.24	↑	0.09	0	- -	↑	0.14
	0.2	0	- -	↑	0.22	↑	0.15	0	- -	↑	0.15
Lead[e]	4.9	↓	0.53	↓	0.50	↓	0.71	0	- -	↓	0.58
	2.8	↓	0.06	↓	0.06	↓	0.10	0	- -	↓	0.09
	1.4	↓	0.38	↓	0.36	↓	0.57	0	- -	↓	0.46
	0.6	↓	0.61	↓	0.43	↓	0.52	0	- -	↓	0.52
	0.2	↓	0.62	↓	0.53	↓	0.65	0	- -	↓	0.60
Mercury[e]	4.9	- -	- -	↓	0.33	↓	0.61	- -	- -	↓	0.45
	2.8	↓	1.0	↓	0.33	↓	0.71	↓	- -	↓	0.55
	1.4	0	- -	↓	0.20	0	- -	- -	- -	↓	0.27
	0.6	- -	- -	↓	0.57	↓	0.62	- -	- -	↓	0.61
	0.2	0	- -	↓	0.67	↓	0.62	- -	- -	↓	0.61
Nickel[e]	4.9	0	- -	0	- -	0	- -	- -	- -	0	- -
	2.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	1.4	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.6	↓	0.19	0	- -	0	- -	- -	- -	↓	0.04
	0.2	↓	0.19	0	- -	0	- -	- -	- -	0	- -
Zinc[e]	4.9	0	- -	0	- -	0	- -	0	- -	0	- -
	2.8	↓	0.07	0	- -	↓	0.08	0	- -	0	- -
	1.4	0	- -	↑	0.10	0	- -	0	- -	0	- -
	0.6	0	- -	↑	0.25	0	- -	0	- -	↑	0.12
	0.2	↑	0.09	↑	0.30	↑	0.14	0	- -	↑	0.18

[a]Trends were assessed through linear regression analysis. A trend was considered significant if the regression showed a significant slope at P = 0.05 or less. Symbols: ↑ indicates a statistically significant increase, ↓ indicates a statistically significant decrease, 0 indicates that no trend was detected. R^2 indicates the fraction of variance accounted for by the regression. Higher R^2 values indicate that higher portions of the variation in the data are attributable to the trend. Lower R^2 values indicate that more of the variation is due to random factors.

[b]The seasonal breakouts are defined in Chapter III of this report, "Data Sources and Methods of Analysis." The seasons are defined as follows: Spring is March through May, Summer is June through August, Fall is September through November, and Winter is December through February.

[c]Because MMSD stopped sampling during the winter in 1987, data from winter months are not included in the annual trend analysis.

[d]The river miles are associated with the locations shown on Map 18 and defined in Table 29 in Chapter V of this report.

[e]These data were log-transformed before being entered into regression analysis.

Source: SEWRPC.

Table C-2

SEASONAL AND ANNUAL TRENDS IN WATER QUALITY PARAMETERS AMONG STATIONS IN THE MENOMONEE RIVER WATERSHED: 1975-2001[a]

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological											
Fecal Coliform[e]	0.0	↓	0.200	0	- -	↓	0.161	0	- -	↓	0.056
	0.8	0	- -	0	- -	0	- -	- -	- -	↓	0.027
	0.9	↓	0.193	↓	0.035	↓	0.232	0	- -	↓	0.116
	1.8	↓	0.116	↓	0.072	↓	0181	0	- -	↓	0.112
	8.0	- -	- -	↑	0.057	0	- -	0	- -	↑	0.025
	12.5	0	- -	0	- -	0	- -	0	- -	0	- -
	13.5	0	- -	↑	0.033	0	- -	0	- -	0	- -
	23.5	0	- -	0	- -	0	- -	0	- -	0	- -
E. coli[e]	0.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	1.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	8.0	- -	- -	0	- -	0	- -	- -	- -	0	- -
	12.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	13.5	0	- -	0	- -	↑	0.223	- -	- -	↑	0.160
	23.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chlorophyll-*a*[e]	0.0	0	- -	↓	0.383	↓	0.126	0	- -	↓	0.151
	0.8	↓	0.290	0	- -	0	- -	- -	- -	↓	0.049
	0.9	0	- -	↓	0.305	↓	0.150	0	- -	↓	0.117
	1.8	0	- -	↓	0.039	0	- -	0	- -	0	- -
	8.0	- -	- -	↓	0.055	0	- -	0	- -	0	- -
	12.5	0	- -	↓	0.056	0	- -	0	- -	0	- -
	13.5	0	- -	0	- -	0	- -	0	- -	0	- -
	23.5	0	- -	↓	0.101	0	- -	0	- -	↓	0.015
Chemical											
Alkalinity	0.0	0	- -	0	- -	0	- -	0	- -	0	- -
	0.8	↓	0.145	0	- -	0	- -	- -	- -	0	- -
	0.9	0	- -	0	- -	0	- -	0	- -	0	- -
	1.8	0	- -	0	- -	0	- -	0	- -	0	- -
	8.0	- -	- -	↓	0.060	0	- -	0	- -	↓	0.027
	12.5	↓	0.070	0	- -	0	- -	0	- -	↓	0.014
	13.5	↓	0.060	0	- -	0	- -	0	- -	0	- -
	23.5	↓	0.044	0	- -	↑	0.035	0	- -	0	- -
BOD[e]	0.0	↓	0.323	↓	0.258	↓	0.297	0	- -	↓	0.288
	0.8	↓	0.412	↓	0.254	↓	0.254	- -	- -	↓	0.299
	0.9	↓	0.293	↓	0.235	↓	0.328	0	- -	↓	0.278
	1.8	↓	0.190	↓	0.202	↓	0.117	0	- -	↓	0.162
	8.0	- -	- -	↓	0.074	↓	0.183	0	- -	↓	0.113
	12.5	↓	0.156	↓	0.056	↓	0.200	0	- -	↓	0.133
	13.5	↓	0.235	↓	0.160	↓	0.259	0	- -	↓	0.231
	23.5	↓	0.329	↓	0.217	↓	0.408	↓	0.132	↓	0.309

Table C-2 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Chemical (continued)											
Chloride[e]	0.0	↑	0.112	↑	0.238	↑	0.306	0	- -	↑	0.126
	0.8	0	- -	↑	0.110	↑	0.278		- -	↑	0.057
	0.9	0	- -	0	- -	↑	0.136	0	- -	↑	0.018
	1.8	↑	0.095	0	- -	↑	0.112	0	- -	↑	0.039
	8.0	- -	- -	0	- -	↑	0.031	0	- -	↑	0.017
	12.5	0	- -	0	- -	↑	0.127	0	- -	0	- -
	13.5	0	- -	↑	0.058	↑	0.085	0	- -	0	- -
	23.5	↑	0.196	↑	0.033	0	- -	0	- -	↑	0.044
Dissolved Oxygen	0.0	0		↑	0.069	↑	0.035	0	- -	↑	0.009
	0.8	0	- -	0	- -	0	- -	0	- -	0	- -
	0.9	0	- -	↑	0.224	↑	0.039	0	- -	↑	0.048
	1.8	↑	0.093	↑	0.212	0	- -	0	- -	↑	0.069
	8.0	- -	- -	0	- -	↓	0.023	0	- -	0	- -
	12.5	0	- -	↑	0.069	0	- -	0	- -	0	- -
	13.5	0	- -	0	- -	0	- -	0	- -	0	- -
	23.5	0	- -	0	- -	0	- -	↑	0.599	↑	0.025
Hardness	0.0	↑	0.110	0	- -	0	- -	- -	- -	0	- -
	0.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.9	0	- -	0	- -	0	- -	0	- -	0	- -
	1.8	0	- -	↓	0.059	0	- -	0	- -	0	- -
	8.0	- -	- -	↓	0.105	0	- -	0	- -	↓	0.015
	12.5	0	- -	0	- -	0	- -	0	- -	0	- -
	13.5	0	- -	0	- -	0	- -	0	- -	0	- -
	23.5	0	- -	↓	0.074	↑	0.087	0	- -	0	- -
pH	0.0	0	- -	0	- -	↓	0.040	0	- -	↓	0.019
	0.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.9	0	- -	0	- -	↓	0.055	↑	0.212	0	- -
	1.8	0	- -	0	- -	↓	0.049	↓	0.561	0	- -
	8.0	- -	- -	↓	0.013	0	- -	↑	0.232	0	- -
	12.5	↓	0.070	↓	0.116	↓	0.042	0	- -	↓	0.067
	13.5	↓	0.208	↓	0.109	0	- -	0	- -	↓	0.053
	23.5	0	- -	↓	0.099	0	- -	↑	0.207	↓	0.032
Specific Conductance	0.0	0	- -	↑	0.081	↑	0.043	0	- -	↑	0.016
	0.8	0	- -	0	- -	↑	0.203	- -	- -	↑	0.041
	0.9	0	- -	0	- -	↑	0.038	0	- -	0	- -
	1.8	↑	0.073	0	- -	0	- -	0	- -	↑	0.014
	8.0	- -	- -	↓	0.015	0	- -	0	- -	0	- -
	12.5	0	- -	↓	0.041	0	- -	0	- -	0	- -
	13.5	0	- -	↓	0.161	0	- -	0	- -	↓	0.012
	23.5	↓	0.072	0	- -	0	- -	0	- -	0	- -

Table C-2 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Suspended Material											
Total Suspended Sediment	0.0	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	1.8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	8.0	- -	- -	- -	- -	- -	- -	↓	0.995	0	- -
	12.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	13.5	0	- -	0	- -	0	- -	↑	0.977	0	- -
	23.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Total Suspended Solids	0.0	0	- -	↑	0.064	0	- -	↑	0.035	↑	0.015
	0.8	0	- -	0	- -	0	- -	0	- -	↑	0.021
	0.9	↑	0.023	↑	0.032	↓	0.006	0	- -	↑	0.005
	1.8	↑	0.044	↑	0.012	↓	0.028	↑	0.133	0	- -
	8.0	- -	- -	0	- -	↓	0.184	↑	0.268	↓	0.044
	12.5	↑	0.077	0	- -	0	- -	0	- -	0	- -
	13.5	0	- -	0	- -	0	- -	0	- -	0	- -
	23.5	0	- -	↑	0.055	↓	0.032	0	- -	0	- -
Nutrients											
Ammonia[e]	0.0	↓	0.136	↓	0.245	↓	0.157	0	- -	↓	0.166
	0.8	↓	0.120	0	- -	0	- -	- -	- -	↓	0.073
	0.9	↓	0.161	↓	0.067	↓	0.189	0	- -	↓	0.121
	1.8	↓	0.208	↓	0.242	↓	0.173	0	- -	↓	0.188
	8.0	- -	- -	↓	0.100	↓	0.133	↓	0.489	↓	0.104
	12.5	↓	0.101	↓	0.155	↓	0.169	0	- -	↓	0.128
	13.5	↓	0.217	↓	0.103	↓	0.170	0	- -	↓	0.164
	23.5	↓	0.394	↓	0.114	↓	0.311	↓	0.271	↓	0.230
Kjeldahl Nitrogen[e]	0.0	0	- -	0	- -	0	- -	0	- -	↓	0.012
	0.8	0	- -	↓	0.084	0	- -	- -	- -	↑	0.058
	0.9	↓	0.004	↓	0.095	↓	0.037	0	- -	↓	0.058
	1.8	0	- -	0	- -	0	- -	0	- -	↓	0.013
	8.0	- -	- -	0	- -	↓	0.029	0	- -	0	- -
	12.5	0	- -	0	- -	0	- -	0	- -	0	- -
	13.5	0	- -	0	- -	0	- -	0	- -	0	- -
	23.5	0	- -	0	- -	↓	0.105	0	- -	↓	0.029
Nitrate[e]	0.0	0	- -	↓	0.224	0	- -	0	- -	↑	0.066
	0.8	↑	0.147	↑	0.321	↑	0.138	- -	- -	↑	0.203
	0.9	0	- -	↑	0.268	0	- -	↓	0.113	↑	0.066
	1.8	0	- -	↑	0.072	0	- -	↓	0.319	0	- -
	8.0	- -	- -	0	- -	↓	0.056	↓	0.363	0	- -
	12.5	0	- -	0	- -	↓	0.133	0	- -	↓	0.024
	13.5	0	- -	0	- -	↓	0.102	0	- -	↓	0.036
	23.5	0	- -	↓	0.045	↓	0.108	↑	0.350	↓	0.053

Table C-2 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients (continued)											
Nitrite[e]	0	0	- -	⬆	0.031	0	- -	0	- -	0	- -
	0.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.9	0	- -	0	- -	0	- -	0	- -	0	- -
	1.8	0	- -	0	- -	0	- -	⬇	0.458	0	- -
	8.0	- -	- -	⬇	0.016	⬇	0.056	⬇	0.478	⬇	0.024
	12.5	0	- -	⬆	0.068	0	- -	0	- -	0	- -
	13.5	⬇	0.071	⬆	0.038	⬇	0.043	0	- -	⬇	0.012
	23.5	⬇	0.114	⬇	0.102	⬇	0.244	0	- -	⬇	0.118
Organic Nitrogen[c]	0.0	0	- -	0	- -	0	- -	0	- -	0	- -
	0.8	0	- -	⬆	0.107	⬆	0.205	- -	- -	⬆	0.100
	0.9	0	- -	0	- -	0	- -	0	- -	0	- -
	1.8	0	- -	0	- -	0	- -	0	- -	0	- -
	8.0	- -	- -	⬆	0.033	0	- -	0	- -	⬆	0.016
	12.5	0	- -	0	- -	0	- -	0	- -	0	- -
	13.5	⬆	0.069	0	- -	0	- -	0	- -	⬆	0.026
	23.5	0	- -	0	- -	0	- -	0	- -	0	- -
Total Nitrogen[c]	0.0	0	- -	⬆	0.030	0	- -	0	- -	0	- -
	0.8	⬆	0.148	⬆	0.259	⬆	0.140	- -	- -	⬆	0.161
	0.9	⬇	0.058	0	- -	⬇	0.061	0	- -	⬇	0.042
	1.8	0	- -	0	- -	⬇	0.084	0	- -	0	- -
	8.0	- -	- -	0	- -	⬇	0.037	⬇	0.202	0	- -
	12.5	0	- -	0	- -	⬇	0.058	0	- -	0	- -
	13.5	0	- -	0	- -	⬇	0.038	0	- -	0	- -
	23.5	⬇	0.127	⬇	0.168	⬇	0.22	⬇	0.203	⬇	0.178
Dissolved Phosphorus[e]	0.0	0	- -	⬆	0.179	0	- -	⬆	0.521	⬆	0.069
	0.8	⬆	0.460	⬆	0.345	⬆	0.248	- -	- -	⬆	0.329
	0.9	0	- -	0	- -	0	- -	0	- -	0	- -
	1.8	⬆	0.144	⬆	0.169	⬆	0.060	0	- -	⬆	0.105
	8.0	- -	- -	⬇	0.230	0	- -	0	- -	⬇	0.151
	12.5	⬆	0.047	⬆	0.065	0	- -	0	- -	⬆	0.023
	13.5	0	- -	0	- -	0	- -	0	- -	0	- -
	23.5	⬇	0.086	⬇	0.107	⬇	0.301	⬇	0.716	⬇	0.128
Total Phosphorus[e]	0.0	0	- -	⬆	0.025	0	- -	0	- -	0	- -
	0.8	⬆	0.204	0	- -	⬆	0.246	- -	- -	⬆	0.099
	0.9	0	- -	⬇	0.035	⬇	0.038	0	- -	⬇	0.023
	1.8	0	- -	0	- -	0	- -	⬆	0.287	0	- -
	8.0	- -	- -	⬇	0.056	0	- -	⬆	0.072	⬇	0.036
	12.5	0	- -	0	- -	0	- -	0	- -	0	- -
	13.5	0	- -	⬇	0.036	0	- -	⬆	0.637	⬇	0.014
	23.5	⬇	0.066	⬇	0.148	⬇	0.231	⬇	0.447	⬇	0.138

Table C-2 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals											
Arsenic[e]	0.0	↓	0.418	0	- -	↓	0.280	- -	- -	↓	0.217
	0.8	↓	0.430	0	- -	↓	0.303	- -	- -	↓	0.172
	0.9	↓	0.481	↓	0.545	↓	0.334	- -	- -	↓	0.425
	1.8	↓	0.513	0	- -	↓	0.324	- -	- -	↓	0.290
	8.0	- -	- -	↓	0.065	↓	0.367	- -	- -	↓	0.272
	12.5	↓	0.697	0	- -	↓	0.603	- -	- -	↓	0.292
	13.5	↓	0.789	↓	0.589	↓	0.284	- -	- -	↓	0.507
	23.5	0	- -	0	- -	0	- -	- -	- -	0	- -
Cadmium[e]	0.0	↓	0.809	↓	0.738	↓	0.737	- -	- -	↓	0.755
	0.8	↓	0.430	↓	0.740	↓	0.668	- -	- -	↓	0.749
	0.9	↓	0.481	↓	0.750	↓	0.707	- -	- -	↓	0.734
	1.8	↓	0.818	↓	0.810	↓	0.606	- -	- -	↓	0.737
	8.0	- -	- -	↓	0.698	↓	0.608	↓	0.808	↓	0.656
	12.5	↓	0.734	↓	0.803	↓	0.738	- -	- -	↓	0.754
	13.5	↓	0.889	↓	0.562	↓	0.485	- -	- -	↓	0.603
	23.5	↓	0.850	↓	0.805	↓	0.672	0	- -	↓	0.769
Chromium[e]	0.0	↓	0.172	↓	0.130	↓	0.363	- -	- -	↓	0.236
	0.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.9	↓	0.132	↓	0.146	↓	0.257	0	- -	↓	0.197
	1.8	0	- -	0	- -	0	- -	- -	- -	↓	0.060
	8.0	- -	- -	↓	0.062	↓	0.075	0	- -	↓	0.070
	12.5	↓	0.080	0	- -	0	- -	- -	- -	↓	0.049
	13.5	↓	0.136	0	- -	0	- -	- -	- -	0	- -
	23.5	0	- -	0	- -	0	- -	0	- -	↓	0.089
Copper[e]	0.0	0	- -	↑	0.139	↑	0.125	0	- -	↑	0.089
	0.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.9	0	- -	↑	0.245	0	- -	0	- -	↑	0.087
	1.8	0	- -	↑	0.096	0	- -	- -	- -	↑	0.044
	8.0	- -	- -	↑	0.114	0	- -	↑	0.740	↑	0.079
	12.5	0	- -	↑	0.111	↑	0.178	- -	- -	↑	0.063
	13.5	0	- -	↑	0.092	↑	0.240	- -	- -	↑	0.058
	23.5	0	- -	↑	0.135	0	- -	0	- -	↑	0.072
Lead[e]	0.0	↓	0.540	↓	0.501	↓	0.681	0	- -	↓	0.584
	0.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.9	↓	0.645	↓	0.497	↓	0.707	0	- -	↓	0.622
	1.8	↓	0.532	↓	0.522	↓	0.601	0	- -	↓	0.559
	8.0	- -	- -	↓	0.330	↓	0.469	0	- -	↓	0.404
	12.5	↓	0.385	↓	0.386	↓	0.620	- -	- -	↓	0.433
	13.5	↓	0.619	↓	0.371	↓	0.274	- -	- -	↓	0.385
	23.5	↓	0.691	↓	0.556	↓	0.625	0	- -	↓	0.618

Table C-2 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)											
Mercury[e]	0.0	0	- -	↓	0.527	↓	0.574	- -	- -	↓	0.492
	0.8	0	- -	↓	0.225	0	- -	- -	- -	↓	0.148
	0.9	0	- -	↓	0.268	↓	0.440	- -	- -	↓	0.253
	1.8	0	- -	0	- -	↓	0.405	- -	- -	↓	0.135
	8.0	- -	- -	0	- -	0	- -	- -	- -	0	- -
	12.5	0	- -	↓	0.304	0	- -	- -	- -	↓	0.156
	13.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.5	0	- -	↓	0.171	0	- -	- -	- -	0	- -
Nickel[e]	0.0	0	- -	0	- -	0	- -	- -	- -	↓	0.038
	0.8	↓	0.271	↓	0.130	0	- -	- -	- -	↓	0.141
	0.9	↓	0.144	0	- -	0	- -	- -	- -	0	- -
	1.8	0	- -	0	- -	0	- -	- -	- -	↓	0.046
	8.0	- -	- -	↓	0.111	0	- -	↓	0.999	↓	0.031
	12.5	0	- -	↓	0.120	0	- -	- -	- -	↓	0.040
	13.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.5	0	- -	0	- -	0	- -	- -	- -	0	- -
Zinc[e]	0.0	0	- -	↑	0.284	0	- -	↑	0.416	↑	0.056
	0.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.9	0	- -	↑	0.321	0	- -	0	- -	↑	0.049
	1.8	0	- -	↑	0.146	0	- -	- -	- -	↑	0.082
	8.0	- -	- -	↑	0.118	0	- -	0	- -	↑	0.086
	12.5	↑	0.361	↑	0.102	0	- -	- -	- -	↑	0.150
	13.5	0	- -	↑	0.144	0	- -	- -	- -	↑	0.061
	23.5	↑	0.236	↑	0.119	0	- -	0	- -	↑	0.113

[a]Trends were assessed through linear regression analysis. A trend was considered significant if the regression showed a significant slope at P = 0.05 or less. Symbols: ↑ indicates a statistically significant increase, ↓ indicates a statistically significant decrease, 0 indicates that no trend was detected. R^2 indicates the fraction of variance accounted for by the regression. Higher R^2 values indicate that higher portions of the variation in the data are attributable to the trend. Lower R^2 values indicate that more of the variation is due to random factors.

[b]The seasonal breakouts are defined in Chapter III of this report, "Data Sources and Methods of Analysis." The seasons are defined as follows: Spring is March through May, Summer is June through August, Fall is September through November, and Winter is December through February.

[c]Because MMSD stopped sampling during the winter in 1987, data from winter months are not included in the annual trend analysis.

[d]The river miles are associated with the locations shown on Map 33 and defined in Table 53 in Chapter VI of this report.

[e]These data were log-transformed before being entered into regression analysis.

Source: SEWRPC.

Table C-3

SEASONAL AND ANNUAL TRENDS IN WATER QUALITY PARAMETERS AMONG STATIONS IN THE MILWAUKEE RIVER WATERSHED: 1975-2001[a]

Constituent	Stream	River Mile[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological												
Fecal Coliform[e]	Milwaukee River	26.25	0	- -	↓	0.03	↓	0.03	0	- -	↓	0.01
		14.99	↓	0.06	0	- -	0	- -	0	- -	0	- -
		8.49	↓	0.08	0	- -	↓	0.04	0	- -	↓	0.01
		6.91	↓	0.09	0	- -	0	- -	↓	0.09	0	- -
		6.65	↓	0.21	0	- -	0	- -	0	- -	0	- -
		3.10	↓	0.16	0	- -	↓	0.07	0	- -	↓	0.01
		2.25	↓	0.14	0	- -	↓	0.08	0	- -	↓	0.05
		1.41	↓	0.18	↓	0.09	↓	0.22	↓	0.08	↓	0.15
		0.78	↓	0.33	↓	0.02	↓	0.23	0	- -	↓	0.13
		0.44	↓	0.25	↓	0.05	↓	0.29	0	- -	↓	0.16
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	0	- -	0	- -	- -	- -	↓	0.08
		3.33	0	- -	↓	0.06	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	↓	0.59	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	↓	0.34	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
E. coli[e]	Milwaukee River	26.25	0	- -	0	- -	0	- -	0	- -	0	- -
		14.99	↓	0.38	0	- -	0	- -	- -	- -	0	- -
		8.49	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.91	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.65	0	- -	- -	- -	0	- -	- -	- -	0	- -
		3.10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		2.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.41	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.78	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.44	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Lincoln Creek	8.42	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		6.92	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		5.86	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		3.33	0	- -	↓	0.22	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	↓	0.24	- -	- -	0	- -
	Southbranch Creek	1.45	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		1.25	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.75	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.20	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological												
E. coli (continued)	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	⬇	0.32
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chlorophyll-*a*[e]	Milwaukee River	26.25	0	- -	⬇	0.02	⬆	0.04	0	- -	0	- -
		14.99	0	- -	⬇	0.15	0	- -	0	- -	0	- -
		8.49	0	- -	⬇	0.16	0	- -	0	- -	0	- -
		6.91	0	- -	⬇	0.12	0	- -	0	- -	0	- -
		6.65	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.10	0	- -	⬇	0.17	0	- -	0	- -	0	- -
		2.25	0	- -	⬇	0.17	0	- -	0	- -	0	- -
		1.41	0	- -	⬇	0.13	0	- -	0	- -	0	- -
		0.78	0	- -	⬇	0.32	⬇	0.06	0	- -	⬇	0.06
		0.44	0	- -	⬇	0.35	⬇	0.11	0	- -	⬇	0.11
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	⬆	0.06
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.33	0	- -	⬆	0.18	⬆	0.20	- -	- -	⬆	0.14
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	⬆	0.11	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	⬆	0.66	0	- -	⬆	0.45	- -	- -	0	- -
		1.25	⬆	0.68	⬆	0.68	⬆	0.46	- -	- -	⬆	0.47
		0.75	0	- -	⬆	0.23	0	- -	- -	- -	0	- -
		0.20	0	- -	⬆	0.35	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	⬇	0.60	0	- -	- -	- -	⬇	0.55
		4.74	0	- -	0	- -	0	- -	0	- -	⬇	0.30
		4.04	0	- -	0	- -	0	- -	0	- -	⬇	0.23
Chemical/Physical												
Alkalinity	Milwaukee River	26.25	0	- -	0	- -	⬆	0.05	0	- -	⬆	0.01
		14.99	0	- -	0	- -	⬆	0.03	0	- -	0	- -
		8.49	0	- -	0	- -	⬆	0.03	0	- -	0	- -
		6.91	0	- -	0	- -	0	- -	0	- -	0	- -
		6.65	0	- -	0	- -	⬇	0.08	0	- -	0	- -
		3.10	0	- -	0	- -	0	- -	0	- -	0	- -
		2.25	0	- -	⬆	0.02	0	- -	⬆	0.16	⬆	0.01
		1.41	0	- -	⬆	0.04	0	- -	0	- -	⬆	0.01
		0.78	⬆	0.03	0	- -	0	- -	0	- -	0	- -
		0.44	0	- -	0	- -	0	- -	⬆	0.28	0	- -
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.33	0	- -	0	- -	0	- -	⬆	0.45	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)												
Alkalinity (continued)	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Biochemical Oxygen Demand[e]	Milwaukee River	26.25	↓	0.07	↓	0.14	↓	0.33	0	- -	↓	0.17
		14.99	↓	0.09	↓	.20	↓	0.22	↓	0.23	↓	0.15
		8.49	↓	0.11	↓	0.21	↓	0.25	0	- -	↓	0.16
		6.91	↓	0.09	↓	0.19	↓	0.15	↓	0.12	↓	0.12
		6.65	0	- -	0	- -	0	- -	0	- -	↓	0.23
		3.10	0	- -	↓	0.21	↓	0.12	↓	0.19	↓	0.10
		2.25	↓	0.13	↓	0.25	↓	0.29	0	- -	↓	0.21
		1.41	↓	0.29	↓	0.31	↓	0.33	↓	0.17	↓	0.30
		0.78	↓	0.26	↓	0.27	↓	0.37	↓	0.08	↓	0.30
		0.44	↓	0.25	↓	0.32	↓	0.37	0	- -	↓	0.32
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	↓	0.10	0	- -	- -	- -	↓	0.04
		3.33	0	- -	↓	0.23	↓	0.19	0	- -	↓	0.16
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	↑	0.34	0	- -	- -	- -	↑	0.13
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chloride[e]	Milwaukee River	26.25	↑	0.36	↑	0.28	↑	0.60	↑	0.24	↑	0.38
		14.99	↑	0.47	↑	0.32	↑	0.61	0	- -	↑	0.45
		8.49	↑	0.29	↑	0.28	↑	0.61	0	- -	↑	0.39
		6.91	↑	0.28	↑	0.30	↑	0.58	0	- -	↑	0.39
		6.65	0	- -	0	- -	0	- -	0	- -	0	- -
		3.10	↑	0.27	↑	0.28	↑	0.57	0	- -	↑	0.37
		2.25	↑	0.26	↑	0.21	↑	0.48	0	- -	↑	0.31
		1.41	↑	0.26	↑	0.25	↑	0.45	0	- -	↑	0.31
		0.78	↑	0.13	↑	0.23	↑	0.33	0	- -	↑	0.16
		0.44	↑	0.29	↑	0.29	↑	0.18	0	- -	↑	0.16
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	↑	0.06
		5.86	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.33	0	- -	↑	0.14	↑	0.29	- -	- -	↑	0.15
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)												
Chloride (continued)	Cedar Creek	6.77	↑	0.65	↑	0.79	↑	0.74	- -	- -	↑	0.75
		4.74	0	- -	↑	0.49	0	- -	0	- -	↑	0.13
		4.04	0	- -	↑	0.37	↑	0.89	- -	- -	↑	0.11
Dissolved Oxygen	Milwaukee River	26.25	↑	- -	0	- -	↑	0.04	0	- -	↑	0.01
		14.99	0	- -	↓	0.04	0	- -	0	- -	↓	0.01
		8.49	0	- -	↓	0.05	0	- -	0	- -	↓	0.02
		6.91	0	- -	↓	0.06	0	- -	0	- -	↓	0.02
		6.65	0	- -	0	- -	0	- -	↑	0.26	0	- -
		3.10	0	- -	0	- -	0	- -	0	- -	0	- -
		2.25	0	- -	0	- -	0	- -	0	- -	0	- -
		1.41	0	- -	↑	0.07	0	- -	0	- -	0	- -
		0.78	0	- -	↑	0.02	0	- -	0	- -	0	- -
		0.44	0	- -	↑	0.03	0	- -	0	- -	0	- -
	Lincoln Creek	8.42	0	- -	↓	0.10	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	↑	0.12	- -	- -	0	- -
		5.86	0	- -	↑	0.15	0	- -	- -	- -	↑	0.08
		3.33	0	- -	0	- -	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	↑	0.56	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	↑	0.21	0	- -	- -	- -	↑	0.06
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Hardness	Milwaukee River	26.25	0	- -	0	- -	↑	0.03	0	- -	↑	0.02
		14.99	↑	0.06	0	- -	0	- -	0	- -	0	- -
		8.49	↑	0.05	0	- -	0	- -	0	- -	↑	0.02
		6.91	0	- -	0	- -	0	- -	0	- -	0	- -
		6.65	0	- -	0	- -	0	- -	0	- -	0	- -
		3.10	↑	0.08	0	- -	↑	0.05	↑	0.17	↑	0.04
		2.25	↑	0.06	0	- -	0	- -	0	- -	↑	0.01
		1.41	↑	0.08	0	- -	0	- -	↑	0.19	↑	0.03
		0.78	↑	0.08	0	- -	↑	0.05	0	- -	↑	0.01
		0.44	↑	0.11	0	- -	0	- -	0	- -	0	- -
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.33	↑	0.06	↑	0.22	↑	0.13	0	- -	↑	0.13
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Chemical/Physical (continued)												
Hardness (continued)	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	⬆	0.61
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
pH	Milwaukee River	26.25	0	- -	0	- -	⬆	0.06	0	- -	⬆	0.02
		14.99	0	- -	⬇	0.09	0	- -	0	- -	0	- -
		8.49	0	- -	⬇	0.11	0	- -	0	- -	⬇	0.02
		6.91	0	- -	⬇	0.18	0	- -	0	- -	⬇	0.06
		6.65	⬆	0.04	0	- -	0	- -	⬆	0.11	0	- -
		3.10	0	- -	⬇	0.11	0	- -	0	- -	⬇	0.04
		2.25	0	- -	⬇	0.09	0	- -	0	- -	⬇	0.03
		1.41	0	- -	0	- -	0	- -	0	- -	0	- -
		0.78	⬆	0.02	0	- -	⬇	0.02	0	- -	0	- -
		0.44	0	- -	⬆	0.03	0	- -	0	- -	0	- -
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.33	0	- -	0	- -	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	⬆	0.30	0	- -	0	- -	- -	- -	0	- -
		1.25	⬆	0.51	⬆	0.27	0	- -	- -	- -	⬆	0.29
		0.75	0	- -	0	- -	0	- -	- -	- -	⬆	0.14
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	⬇	0.19	0	- -	⬇	0.42	0	- -	0	- -
		4.74	0	- -	- -	- -	- -	- -	- -	- -	⬆	0.71
		4.04	0	- -	- -	- -	- -	- -	- -	- -	⬆	0.82
Specific Conductance	Milwaukee River	26.25	⬆	0.07	⬆	0.13	⬆	0.34	⬆	0.07	⬆	0.16
		14.99	⬆	0.10	⬆	0.13	⬆	0.36	⬆	0.08	⬆	0.17
		8.49	0	- -	⬆	0.21	⬆	0.27	0	- -	⬆	0.12
		6.91	⬆	0.04	⬆	0.04	⬆	0.21	0	- -	⬆	0.12
		6.65	⬆	0.04	⬆	0.04	⬆	0.11	0	- -	⬆	0.05
		3.10	0	- -	⬆	0.21	⬆	0.29	0	- -	⬆	0.13
		2.25	0	- -	⬆	0.10	⬆	0.17	0	- -	⬆	0.06
		1.41	0	- -	⬆	0.14	⬆	0.10	0	- -	⬆	0.06
		0.78	0	- -	⬆	0.06	⬆	0.06	0	- -	⬆	0.02
		0.44	0	- -	⬆	0.09	0	- -	⬆	0.23	⬆	0.02
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	⬆	0.14	0	- -	- -	- -	⬆	0.04
		5.86	0	- -	⬆	0.15	0	- -	- -	- -	⬆	0.05
		3.33	0	- -	⬆	0.21	⬆	0.21	0	- -	⬆	0.09
		3.03	⬆	0.48	0	- -	⬆	0.17	⬆	0.19	0	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Chemical/Physical (continued)												
Specific Conductance (continued)	Cedar Creek	6.77	0	--	⬆	0.27	0	0.43	0	--	⬆	0.35
		4.74	--	--	--	--	--	--	--	--	0	--
		4.04	0	--	--	--	--	--	--	--	--	--
Temperature	Milwaukee River	26.25	0	--	0	--	0	--	0	--	0	--
		14.99	0	--	0	--	0	--	0	--	0	--
		8.49	0	--	0	--	0	--	0	--	0	--
		6.91	0	--	0	--	0	--	0	--	0	--
		6.65	0	--	0	--	0	--	⬆	0.05	0	--
		3.10	0	--	0	--	0	--	0	--	0	--
		2.25	0	--	0	--	0	--	0	--	0	--
		1.41	0	--	⬆	0.04	0	--	0	--	⬆	0.01
		0.78	0	--	⬆	0.05	0	--	0	--	⬆	0.02
		0.44	0	--	⬆	0.02	⬆	0.03	0	--	⬆	0.01
	Lincoln Creek	8.42	0	--	0	--	0	--	--	--	0	--
		6.92	0	--	0	--	0	--	--	--	0	--
		5.86	0	--	0	--	0	--	--	--	0	--
		3.33	0	--	⬆	0.09	0	--	0	--	0	--
		3.03	⬆	0.81	0	--	⬆	0.64	⬆	0.09	⬆	0.53
		0.42	0	--	⬆	0.09	0	--	--	--	0	--
	Southbranch Creek	1.45	0	--	0	--	⬆	0.41	--	--	0	--
		1.25	0	--	0	--	0	--	--	--	⬆	0.17
		0.75	0	--	0	--	⬆	0.38	--	--	⬆	0.15
		0.20	0	--	0	--	0	--	--	--	0	--
	Cedar Creek	6.77	0	--	0	--	0	--	0	--	0	--
		4.74	--	--	--	--	--	--	--	--	--	--
		4.04	--	--	--	--	--	--	--	--	--	--
Suspended Material												
Total Suspended Sediment	Milwaukee River	26.25	0	--	0	--	0	--	0	--	0	--
		14.99	--	--	--	--	--	--	--	--	--	--
		8.49	--	--	--	--	--	--	--	--	--	--
		6.91	--	--	--	--	--	--	--	--	--	--
		6.65	0	--	0	--	0	--	⬆	0.50	0	--
		3.10	--	--	--	--	--	--	--	--	--	--
		2.25	--	--	--	--	--	--	--	--	--	--
		1.41	--	--	--	--	--	--	--	--	--	--
		0.78	--	--	--	--	--	--	--	--	--	--
		0.44	--	--	--	--	--	--	--	--	--	--
	Lincoln Creek	8.42	--	--	--	--	--	--	--	--	--	--
		6.92	--	--	--	--	--	--	--	--	--	--
		5.86	--	--	--	--	--	--	--	--	--	--
		3.33	0	--	0	--	0	--	0	--	0	--
		3.03	--	--	--	--	--	--	--	--	--	--
		0.42	--	--	--	--	--	--	--	--	--	--

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Suspended Material (continued)												
Total Suspended Sediment (continued)	Southbranch Creek	1.45	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		1.25	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.75	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.20	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Cedar Creek	6.77	0	- -	↓	0.98	0	- -	- -	- -	↓	0.63
		4.74	0	- -	0	- -	- -	- -	0	- -	0	- -
		4.04	0	- -	0	- -	- -	- -	- -	- -	0	- -
Total Suspended Solids	Milwaukee River	26.25	↑	0.09	0	- -	↓	0.11	0	- -	0	- -
		14.99	↑	0.03	↓	0.02	0	- -	0	- -	0	- -
		8.49	↑	0.06	↓	0.03	0	- -	0	- -	0	- -
		6.91	↑	0.04	0	- -	0	- -	0	- -	0	- -
		6.65	- -	- -	- -	- -	- -	- -	- -	- -	0	- -
		3.10	↑	0.06	0	- -	0	- -	0	- -	↑	0.01
		2.25	↑	0.05	↑	0.03	0	- -	0	- -	↑	0.01
		1.41	↑	0.03	↑	0.03	0	- -	0	- -	↑	0.01
		0.78	↑	0.04	↑	0.05	↑	0.03	0	- -	↑	0.04
		0.44	↑	0.04	0	- -	0	- -	0	- -	0	- -
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	0	- -	0	- -
		6.92	0	- -	↓	0.16	↓	0.37	0	- -	↓	0.21
		5.86	0	- -	↓	0.42	↓	0.58	0	- -	↓	0.33
		3.33	0	- -	↓	0.19	↓	0.33	0	- -	↓	0.16
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	↓	0.06	0	- -	0	- -	↓	0.04
	Southbranch Creek	1.45	0	- -	↓	0.38	0	- -	- -	- -	0	- -
		1.25	0	- -	↓	0.12	0	- -	- -	- -	0	- -
		0.75	0	- -	↓	0.14	0	- -	- -	- -	0	- -
		0.20	0	- -	↓	0.13	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	0	- -	- -	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nutrients												
Ammonia[e]	Milwaukee River	26.25	↓	0.05	↓	0.06	↓	0.06	↓	0.62	↓	0.06
		14.99	↓	0.09	↓	0.06	↓	0.24	↓	0.39	↓	0.12
		8.49	↓	0.11	↓	0.07	↓	0.11	↓	0.58	↓	0.10
		6.91	↓	0.12	↓	0.06	↓	0.16	↓	0.71	↓	0.10
		6.65	↓	0.21	0	- -	0	- -	↓	0.35	↓	0.07
		3.10	↓	0.13	↓	0.03	↓	0.09	↓	0.61	↓	0.08
		2.25	↓	0.13	↓	0.06	↓	0.08	↓	0.10	↓	0.08
		1.41	↓	0.14	↓	0.12	↓	0.16	↓	0.39	↓	0.13
		0.78	↓	0.23	↓	0.29	↓	0.15	↓	0.18	↓	0.20
		0.44	↓	0.09	↓	0.24	↓	0.23	↓	0.29	↓	0.20
	Lincoln Creek	8.42	↓	0.31	0	- -	0	- -	- -	- -	↓	0.09
		6.92	↓	0.48	↓	0.36	↓	0.55	- -	- -	↓	0.45
		5.86	↓	0.62	↓	0.62	↓	0.22	- -	- -	↓	0.49
		3.33	↓	0.18	↓	0.17	0	- -	0	- -	↓	0.09
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	↓	0.27	↓	0.16	- -	- -	↓	0.21

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients (continued)												
Ammonia (continued)	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	↓	0.20
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	↓	0.25	↓	0.54	- -	- -	↓	0.44
		0.20	0	- -	0	- -	↓	0.72	- -	- -	↓	0.36
	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Kjeldahl Nitrogen[e]	Milwaukee River	26.25	0	- -	0	- -	0	- -	0	- -	0	- -
		14.99	0	- -	0	- -	0	- -	0	- -	0	- -
		8.49	0	- -	0	- -	0	- -	0	- -	0	- -
		6.91	0	- -	0	- -	0	- -	0	- -	0	- -
		6.65	↓	0.10	↓	0.16	0	- -	↓	0.44	↓	0.09
		3.10	0	- -	0	- -	0	- -	0	- -	0	- -
		2.25	0	- -	0	- -	0	- -	↓	0.20	0	- -
		1.41	0	- -	0	- -	0	- -	0	- -	0	- -
		0.78	0	- -	0	- -	↓	0.05	0	- -	↓	0.02
		0.44	0	- -	0	- -	↓	0.05	0	- -	↓	0.01
	Lincoln Creek	8.42	0	- -	0	- -	↓	0.11	- -	- -	0	- -
		6.92	0	- -	↓	0.12	↓	0.25	- -	- -	↓	0.15
		5.86	0	- -	↓	0.19	↓	0.18	- -	- -	↓	0.15
		3.33	0	- -	0	- -	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	↑	0.15
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nitrate[e]	Milwaukee River	26.25	0	- -	0	- -	0	- -	0	- -	0	- -
		14.99	↑	0.05	↑	0.04	0	- -	0	- -	↑	0.02
		8.49	↑	0.03	↑	0.04	0	- -	0	- -	↑	0.02
		6.91	↑	0.04	↑	0.05	0	- -	0	- -	↑	0.02
		6.65	0	- -	↑	0.16	0	- -	↑	0.11	↑	0.04
		3.10	0	- -	↑	0.09	0	- -	0	- -	↑	0.03
		2.25	↑	0.04	↑	0.09	0	- -	0	- -	↑	0.04
		1.41	↑	0.04	↑	0.14	0	- -	0	- -	↑	0.05
		0.78	0	- -	↑	0.25	↑	0.02	0	- -	↑	0.06
		0.44	↑	0.05	↑	0.22	↑	0.04	0	- -	↑	0.08
	Lincoln Creek	8.42	0	- -	0	- -	↑	0.14	- -	- -	↑	0.03
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	↑	0.21	0	- -	- -	- -	0	- -
		3.33	0	- -	0	- -	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)												
Nitrate (continued)	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	↓	0.15
		0.75	0	- -	↓	0.45	0	- -	- -	- -	↓	0.19
		0.20	0	- -	↓	0.33	0	- -	- -	- -	↓	0.14
	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nitrite[e]	Milwaukee River	26.25	0	- -	↓	0.03	↓	0.04	0	- -	↓	0.03
		14.99	0	- -	0	- -	↓	0.05	0	- -	0	- -
		8.49	0	- -	0	- -	↓	0.04	↓	0.08	0	- -
		6.91	0	- -	↑	0.02	0	- -	0	- -	0	- -
		6.65	↑	0.08	↓	0.06	0	- -	0	- -	0	- -
		3.10	0	- -	0	- -	0	- -	0	- -	0	- -
		2.25	0	- -	↑	0.02	0	- -	0	- -	0	- -
		1.41	0	- -	↑	0.03	0	- -	0	- -	0	- -
		0.78	0	- -	↑	0.02	0	- -	0	- -	0	- -
		0.44	0	- -	0	- -	↓	0.02	0	- -	0	- -
	Lincoln Creek	8.42	0	- -	0	- -	↑	0.11	- -	- -	↑	0.06
		6.92	0	- -	↓	0.22	↓	0.17	- -	- -	↓	0.18
		5.86	↓	0.34	↓	0.45	↓	0.31	- -	- -	↓	0.36
		3.33	0	- -	↓	0.13	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	↓	0.12	- -	- -	↓	0.04
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	**0**	- -	↓	0.23	0	- -	- -	- -	↓	0.23
		0.20	0	- -	0	- -	0	- -	0	- -	0	- -
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Organic Nitrogen[c]	Milwaukee River	26.25	0	- -	0	- -	0	- -	0	- -	0	- -
		14.99	↑	0.03	0	- -	0	- -	0	- -	0	- -
		8.49	↑	0.03	0	- -	0	- -	0	- -	0	- -
		6.91	0	- -	0	- -	0	- -	0	- -	0	- -
		6.65	0	- -	↓	0.11	0	- -	0	- -	↓	0.05
		3.10	0	- -	0	- -	0	- -	0	- -	0	- -
		2.25	0	- -	0	- -	0	- -	0	- -	0	- -
		1.41	0	- -	0	- -	0	- -	0	- -	0	- -
		0.78	0	- -	0	- -	0	- -	0	- -	0	- -
		0.44	0	- -	0	- -	0	- -	0	- -	0	- -
	Lincoln Creek	8.42	0	- -	0	- -	↓	0.12	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	↓	0.07
		5.86	0	- -	0	- -	↓	0.14	- -	- -	↓	0.06
		3.33	0	- -	0	- -	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)												
Organic Nitrogen (continued)	Southbranch Creek	1.45	↑	0.67	0	- -	0	- -	- -	- -	↑	0.21
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	↑	0.40	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	0	- -	0	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Total Nitrogen[c]	Milwaukee River	26.25	0	- -	↑	0.03	0	- -	0	- -	↑	0.01
		14.99	↑	0.04	↑	0.04	0	- -	0	- -	↑	0.03
		8.49	0	- -	↑	0.02	0	- -	0	- -	↑	0.01
		6.91	↑	0.03	↑	0.07	0	- -	0	- -	↑	0.03
		6.65	0	- -	0	- -	0	- -	0	- -	0	- -
		3.10	0	- -	↑	0.04	0	- -	0	- -	↑	0.01
		2.25	0	- -	↑	0.03	0	- -	↓	0.13	↑	0.01
		1.41	0	- -	↑	0.03	0	- -	0	- -	0	- -
		0.78	0	- -	↑	0.03	0	- -	0	- -	0	- -
		0.44	0	- -	↑	0.02	0	- -	0	- -	0	- -
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	↓	0.08
		5.86	0	- -	↓	0.25	0	- -	- -	- -	↓	0.18
		3.33	0	- -	0	- -	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	0	- -	0	- -	0	- -	- -	- -	0	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Dissolved Phosphorus[e]	Milwaukee River	26.25	0	- -	0	- -	↓	0.13	↓	0.44	↓	0.04
		14.99	0	- -	0	- -	↓	0.13	↓	0.32	↓	0.01
		8.49	0	- -	↑	0.04	↓	0.09	↓	0.23	0	- -
		6.91	0	- -	↑	0.05	↓	0.09	↓	0.18	0	- -
		6.65	0	- -	0	- -	0	- -	↓	0.24	↓	0.03
		3.10	0	- -	↑	0.05	↓	0.09	↓	0.31	0	- -
		2.25	0	- -	↑	0.07	↓	0.07	↓	0.48	0	- -
		1.41	0	- -	↑	0.08	↓	0.05	↓	0.36	0	- -
		0.78	0	- -	↑	0.09	0	- -	↓	0.07	0	- -
		0.44	0	- -	↑	0.15	0	- -	↓	0.21	↑	0.02
	Lincoln Creek	8.42	0	- -	↑	0.31	↑	0.12	- -	- -	↑	0.13
		6.92	0	- -	↑	0.12	0	- -	- -	- -	0	- -
		5.86	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.33	0	- -	↑	0.27	0	- -	↑	0.59	↑	0.15
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)												
Dissolved Phosphorus (continued)	Southbranch Creek	1.45	0	- -	0	- -	↑	0.58	- -	- -	↑	0.22
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	↑	0.09
	Cedar Creek	6.77	- -	- -	0	- -	↓	0.75	- -	- -	↓	0.64
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Total Phosphorus[e]	Milwaukee River	26.25	0	- -	↓	0.04	↓	0.15	0	- -	↓	0.01
		14.99	0	- -	↓	0.03	↓	0.11	0	- -	↓	0.03
		8.49	0	- -	↓	0.02	↓	0.10	0	- -	↓	0.01
		6.91	0	- -	0	- -	↓	0.08	0	- -	0	- -
		6.65	↓	0.06	↓	0.09	↓	0.11	↓	0.37	↓	0.06
		3.10	0	- -	0	- -	↓	0.07	↓	0.16	**0**	- -
		2.25	0	- -	0	- -	↓	0.11	0	- -	↓	0.01
		1.41	↓	0.04	0	- -	↓	0.10	↓	0.18	↓	0.02
		0.78	0	- -	0	- -	↓	0.07	0	- -	↓	0.01
		0.44	0	- -	0	- -	↓	0.08	0	- -	↓	0.01
	Lincoln Creek	8.42	↑	0.26	↑	0.33	0	- -	- -	- -	↑	0.11
		6.92	0	- -	0	- -	↓	0.29	- -	- -	↓	0.04
		5.86	0	- -	0	- -	↓	0.42	- -	- -	↓	0.20
		3.33	0	- -	0	- -	↑	0.05	↑	0.32	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	0	- -	↑	0.55	- -	- -	↑	0.11
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	↓	0.63	↓	0.80	↓	0.84	- -	- -	↓	0.80
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Metals												
Arsenic[e]	Milwaukee River	26.25	↓	0.22	0	- -	↓	0.33	- -	- -	↓	0.14
		14.99	↓	0.57	0	- -	↓	0.57	- -	- -	↓	0.17
		8.49	↓	0.58	0	- -	↓	0.41	- -	- -	↓	0.24
		6.91	↓	0.50	0	- -	↓	0.45	- -	- -	↓	0.19
		6.65	↑	0.54	0	- -	↑	0.56	0	- -	↑	0.33
		3.10	↓	0.82	↓	0.38	↓	0.76	↓	0.99	↓	0.62
		2.25	↓	0.71	0	- -	↓	0.55	- -	- -	↓	0.23
		1.41	↓	0.55	0	- -	↓	0.53	- -	- -	↓	0.25
		0.78	↓	0.20	↓	0.08	↓	0.44	- -	- -	↓	0.22
		0.44	↓	0.57	↓	0.24	↓	0.52	- -	- -	↓	0.38
	Lincoln Creek	8.42	↓	0.38	↓	0.12	↓	0.75	- -	- -	↓	0.36
		6.92	↓	0.34	↓	0.56	↓	0.75	- -	- -	↓	0.60
		5.86	↓	0.82	↓	0.65	↓	0.70	- -	- -	↓	0.66
		3.33	↓	0.41	↓	0.42	↓	0.7	- -	- -	↓	0.51
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	↓	0.39	0	- -	↓	0.56	- -	- -	↓	0.23

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Metals (continued)												
Arsenic (continued)	Southbranch Creek	1.45	0	- -	0	- -	0	- -	- -	- -	↓	0.18
		1.25	0	- -	↓	0.34	0	- -	- -	- -	↓	0.29
		0.75	0	- -	0	- -	0	- -	- -	- -	↓	0.75
		0.20	0	- -	0	- -	0	- -	- -	- -	↓	0.14
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cadmium[e]	Milwaukee River	26.25	↓	0.83	↓	0.77	↓	0.77	↓	0.94	↓	0.79
		14.99	↓	0.82	↓	0.74	↓	0.79	↓	0.94	↓	0.78
		8.49	↓	0.37	↓	0.41	↓	0.26	0	- -	↓	0.35
		6.91	↓	0.84	↓	0.76	↓	0.81	↓	0.94	↓	0.80
		6.65	0	- -	↓	0.75	↓	0.73	↓	0.82	↓	0.30
		3.10	↓	0.37	↓	0.33	↓	0.39	0	- -	↓	0.37
		2.25	↓	0.83	↓	0.76	↓	0.79	- -	- -	↓	0.79
		1.41	↓	0.83	↓	0.74	↓	0.83	↓	0.95	↓	0.80
		0.78	↓	0.78	↓	0.75	↓	0.79	↓	0.95	↓	0.78
		0.44	↓	0.80	↓	0.75	↓	0.76	- -	- -	↓	0.77
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	0	- -	0	- -	- -	- -	0	- -
		5.86	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.33	0	- -	0	- -	0	- -	- -	- -	0	- -
		3.03	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	↑	0.63	0	- -	- -	- -	0	- -
		1.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		0.75	↑	0.53	↑	0.31	0	- -	- -	- -	↑	0.27
		0.20	0	- -	↑	0.41	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chromium[e]	Milwaukee River	26.25	0	- -	0	- -	0	- -	0	- -	0	- -
		14.99	0	- -	0	- -	0	- -	0	- -	0	- -
		8.49	↑	0.11	0	- -	0	- -	0	- -	↑	0.05
		6.91	0	- -	0	- -	0	- -	0	- -	↓	0.02
		6.65	↓	0.71	↓	0.74	↓	0.84	↓	0.77	↓	0.76
		3.10	0	- -	0	- -	↓	0.17	↓	0.21	↓	0.05
		2.25	↓	0.14	0	- -	↓	0.33	↑	0.56	↓	0.14
		1.41	↓	0.15	↓	0.27	↓	0.41	0	- -	↓	0.31
		0.78	0	- -	↓	0.23	↓	0.43	0	- -	↓	0.28
		0.44	0	- -	↓	0.05	↓	0.08	0	- -	↓	0.06
	Lincoln Creek	8.42	↓	0.82	↓	0.83	↓	0.82	- -	- -	↓	0.82
		6.92	↓	0.79	↓	0.84	↓	0.82	- -	- -	↓	0.82
		5.86	↓	0.92	↓	0.88	↓	0.90	- -	- -	↓	0.89
		3.33	↓	0.78	↓	0.77	↓	0.80	- -	- -	↓	0.78
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	↓	0.77	↓	0.27	↓	0.81	- -	- -	↓	0.48

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Metals (continued)												
Chromium (continued)	Southbranch Creek	1.45	0	- -	↓	0.85	↓	0.65	- -	- -	↓	0.19
		1.25	0	- -	↓	0.55	↓	0.65	- -	- -	↓	0.22
		0.75	0	- -	↓	0.55	↓	0.65	- -	- -	↓	0.24
		0.20	0	- -	↓	0.74	↓	0.65	- -	- -	↓	0.23
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Copper[e]	Milwaukee River	26.25	0	- -	↑	0.08	0	- -	↑	0.96	↑	0.06
		14.99	↑	0.24	↑	0.21	0	- -	↑	0.77	↑	0.09
		8.49	↑	0.07	↑	0.09	0	- -	↑	0.89	↑	0.06
		6.91	↑	0.17	↑	0.17	0	- -	↑	0.54	↑	0.09
		6.65	↓	0.59	↓	0.78	↓	0.79	↓	0.72	↓	0.71
		3.10	0	- -	↑	0.09	0	- -	0	- -	↑	0.03
		2.25	0	- -	0	- -	0	- -	↑	0.63	0	- -
		1.41	0	- -	0	- -	0	- -	0	- -	0	- -
		0.78	↑	0.10	↑	0.07	0	- -	0	- -	↑	0.04
		0.44	↑	0.08	↑	0.13	0	- -	0	- -	↑	0.09
	Lincoln Creek	8.42	↓	0.75	0	- -	↓	0.49	- -	- -	↓	0.25
		6.92	↓	0.59	↓	0.49	↓	0.62	- -	- -	↓	0.55
		5.86	↓	0.64	↓	0.77	↓	0.75	- -	- -	↓	0.75
		3.33	↓	0.48	↓	0.42	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	**- -**	- -	- -	- -	**- -**	- -
		0.42	↓	0.20	↓	0.60	↓	0.27	- -	- -	↓	0.41
	Southbranch Creek	1.45	↓	0.49	0	- -	0	- -	- -	- -	↓	0.24
		1.25	0	- -	0	- -	↓	0.59	- -	- -	↓	0.46
		0.75	0	- -	↓	0.22	↓	0.65	- -	- -	↓	0.45
		0.20	0	- -	0	- -	↓	0.60	- -	- -	↓	0.44
	Cedar Creek	6.77	- -	- -	0	- -	**0**	- -	- -	- -	**0**	- -
		4.74	- -	- -	- -	- -	**- -**	- -	- -	- -	**- -**	- -
		4.04	- -	- -	- -	- -	**- -**	- -	- -	- -	**- -**	- -
Lead[e]	Milwaukee River	26.25	↓	0.66	↓	0.60	↓	0.66	↓	0.31	↓	0.64
		14.99	↓	0.66	↓	0.56	↓	0.61	0	- -	↓	0.60
		8.49	↓	0.64	↓	0.44	↓	0.54	0	- -	↓	0.53
		6.91	↓	0.66	↓	0.41	↓	0.62	↓	0.42	↓	0.54
		6.65	↓	0.37	↓	0.45	↓	0.33	↓	0.45	↓	0.38
		3.10	↓	0.58	↓	0.45	↓	0.59	0	- -	↓	0.53
		2.25	↓	0.69	↓	0.48	↓	0.71	0	- -	↓	0.62
		1.41	↓	0.67	↓	0.47	↓	0.73	↓	0.45	↓	0.62
		0.78	↓	0.55	↓	0.57	↓	0.69	↓	0.50	↓	0.62
		0.44	↓	0.58	↓	0.52	↓	0.61	0	- -	↓	0.57
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	↓	0.07
		6.92	↓	0.27	↓	0.28	↓	0.60	- -	- -	↓	0.37
		5.86	0	- -	↓	0.23	↓	0.45	- -	- -	↓	0.29
		3.33	0	- -	↓	0.14	0	- -	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	↓	0.05

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Metals (continued)												
Lead (continued)	Southbranch Creek	1.45	0	- -	↓	0.39	↓	0.66	- -	- -	↓	0.45
		1.25	0	- -	0	- -	↓	0.79	- -	- -	↓	0.21
		0.75	0	- -	0	- -	↓	0.77	- -	- -	↓	0.18
		0.20	0	- -	0	- -	↓	0.40	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Mercury[e]	Milwaukee River	26.25	0	- -	0	- -	0	- -	- -	- -	0	- -
		14.99	↑	0.28	0	- -	0	- -	- -	- -	0	- -
		8.49	0	- -	0	- -	0	- -	0	- -	0	- -
		6.91	0	- -	↑	0.11	0	- -	- -	- -	0	- -
		6.65	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		3.10	↓	0.62	↓	0.25	↓	0.49	↓	0.99	↓	0.32
		2.25	0	- -	↓	0.34	↓	0.80	- -	- -	↓	0.43
		1.41	↓	0.63	↓	0.34	↓	0.75	- -	- -	↓	0.47
		0.78	↓	0.92	↓	0.67	↓	0.80	- -	- -	↓	0.65
		0.44	↓	0.75	↓	0.79	↓	0.83	- -	- -	↓	0.78
	Lincoln Creek	8.42	↓	0.73	↓	0.64	↓	0.77	- -	- -	↓	0.66
		6.92	↓	0.68	↓	0.57	↓	0.76	- -	- -	↓	0.60
		5.86	- -	- -	↓	0.63	↓	0.75	- -	- -	↓	0.67
		3.33	0	- -	↓	0.62	↓	0.91	- -	- -	↓	0.61
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	0	- -	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	0	- -	↓	0.85	↓	0.50	- -	- -	↓	0.51
		1.25	0	- -	0	- -	**0**	- -	- -	- -	0	- -
		0.75	0	- -	↓	0.78	↓	0.50	- -	- -	↓	0.65
		0.20	0	- -	0	- -	0	- -	- -	- -	0	- -
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nickel[e]	Milwaukee River	26.25	0	- -	0	- -	0	- -	- -	- -	↓	0.03
		14.99	0	- -	0	- -	0	- -	- -	- -	↓	0.05
		8.49	0	- -	0	- -	0	- -	↓	0.99	0	- -
		6.91	0	- -	↓	0.08	↓	0.10	- -	- -	↓	0.09
		6.65	↓	0.57	↓	0.24	↑	0.37	↑	0.58	↓	0.35
		3.10	0	- -	0	- -	0	- -	↓	0.48	0	- -
		2.25	0	- -	0	- -	↓	0.09	- -	- -	0	- -
		1.41	↓	0.09	↓	0.06	0	- -	- -	- -	↓	0.09
		0.78	0	- -	↓	0.08	0	- -	- -	- -	↓	0.04
		0.44	↓	0.18	↓	0.07	0	- -	- -	- -	↓	0.10
	Lincoln Creek	8.42	↓	0.79	↓	0.68	↓	0.79	- -	- -	↓	0.73
		6.92	↓	0.77	↓	0.82	↓	0.79	- -	- -	↓	0.79
		5.86	↓	0.42	↓	0.59	↓	0.86	- -	- -	↓	0.61
		3.33	↓	0.78	↓	0.67	↓	0.73	- -	- -	↓	0.71
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	↓	0.77	↓	0.35	↓	0.77	- -	- -	↓	0.55

Table C-3 (continued)

Constituent	Stream	River Mile[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)												
Nickel (continued)	Southbranch Creek	1.45	0	- -	- -	- -	↓	0.61	- -	- -	↓	0.31
		1.25	0	- -	0	- -	↓	0.61	- -	- -	↓	0.30
		0.75	0	- -	- -	- -	↓	0.61	- -	- -	↓	0.32
		0.20	0	- -	- -	- -	↓	0.61	- -	- -	↓	0.32
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Zinc[e]	Milwaukee River	26.25	↑	0.24	↑	0.26	↑	0.07	↑	0.32	↑	0.19
		14.99	↑	0.19	↑	0.57	0	- -	0	- -	↑	0.15
		8.49	↑	0.20	↑	0.12	↑	0.08	↑	0.27	↑	0.14
		6.91	↑	0.14	↑	0.25	↑	0.07	0	- -	↑	0.17
		6.65	↓	0.36	↓	0.49	↓	0.51	↓	0.70	↓	0.44
		3.10	0	- -	↑	0.24	0	- -	0	- -	↑	0.28
		2.25	0	- -	↑	0.17	0	- -	0	- -	↑	0.02
		1.41	0	- -	↑	0.27	0	- -	0	- -	↑	0.02
		0.78	↑	0.07	↑	0.21	0	- -	0	- -	↑	0.05
		0.44	0	- -	↑	0.17	↑	0.06	0	- -	↑	0.11
	Lincoln Creek	8.42	0	- -	0	- -	0	- -	- -	- -	0	- -
		6.92	0	- -	↓	0.25	↓	0.13	- -	- -	↓	0.17
		5.86	0	- -	↓	0.19	0	- -	- -	- -	↓	0.12
		3.33	0	- -	↓	0.15	↑	0.15	0	- -	0	- -
		3.03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		0.42	0	- -	↓	0.17	0	- -	- -	- -	0	- -
	Southbranch Creek	1.45	↓	0.56	0	- -	0	- -	- -	- -	↓	0.15
		1.25	0	- -	↓	0.22	0	- -	- -	- -	↓	0.26
		0.75	0	- -	0	- -	0	- -	- -	- -	↓	0.20
		0.20	↓	0.55	0	- -	0	- -	- -	- -	↓	0.15
	Cedar Creek	6.77	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.74	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		4.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

[a] *Trends were assessed through linear regression analysis. A trend was considered significant if the regression showed a significant slope at P = 0.05 or less. Symbols: ↑ indicates a statistically significant increase, ↓ indicates a statistically significant decrease, 0 indicates that no trend was detected. R^2 indicates the fraction of variance accounted for by the regression. Higher R^2 values indicate that higher portions of the variation in the data are attributable to the trend. Lower R^2 values indicate that more of the variation is due to random factors.*

[b] *The seasonal breakouts are defined in Chapter III of this report, "Data Sources and Methods of Analysis." The seasons are defined as follows: Spring is March through May, Summer is June through August, Fall is September through November, and Winter is December through February.*

[c] *Because MMSD stopped sampling during the winter in 1987, data from winter months are not included in the annual trend analysis.*

[d] *The river miles are associated with the locations shown on Map 52 and defined in Table 86 in Chapter VII of this report.*

[e] *These data were log-transformed before being entered into regression analysis.*

Source: SEWRPC.

Table C-4

SEASONAL AND ANNUAL TRENDS IN WATER QUALITY PARAMETERS AMONG STATIONS ALONG OAK CREEK: 1975-2001[a]

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological											
Fecal Coliform[e]	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	⬆	0.01
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
E. coli[e]	10.06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	9.23	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	6.25	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	4.71	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	2.84	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	1.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.28	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chlorophyll-*a*[e]	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	⬆	0.12	0	- -	⬆	0.02
	4.71	0	- -	0	- -	⬆	0.26	0	- -	⬆	0.02
	2.84	0	- -	0	- -	⬆	0.16	0	- -	⬆	0.02
	1.04	0	- -	0	- -	⬆	0.13	0	- -	0	- -
	0.28	0	- -	0	- -	⬆	0.10	0	- -	0	- -
Chemical											
Alkalinity	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	⬇	0.04	0	- -	0	- -
	2.84	0	- -	0	- -	⬇	0.04	0	- -	⬇	0.02
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Biochemical Oxygen Demand[e]	10.06	⬇	0.16	⬇	0.16	⬇	0.25	0	- -	⬇	0.20
	9.23	⬇	0.25	⬇	0.22	⬇	0.19	0	- -	⬇	0.21
	6.25	⬇	0.23	⬇	0.14	⬇	0.15	0	- -	⬇	0.16
	4.71	⬇	0.13	⬇	0.12	⬇	0.13	- -	- -	⬇	0.13
	2.84	0	- -	⬇	0.12	⬇	0.14	⬇	0.98	⬇	0.11
	1.04	⬇	0.19	⬇	0.18	⬇	0.24	- -	- -	⬇	0.21
	0.28	⬇	0.11	⬇	0.13	⬇	0.18	- -	- -	⬇	0.16
Chloride[e]	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	⬆	0.07	0	- -	0	- -	0	- -	⬆	0.02
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	⬆	0.01
	2.84	0	- -	0	- -	0	- -	0	- -	⬆	0.01
	1.04	⬆	0.06	0	- -	0	- -	0	- -	⬆	0.02
	0.28	⬆	0.07	0	- -	0	- -	0	- -	⬆	0.03

Table C-4 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical (continued)											
Dissolved Oxygen	10.06	↓	0.17	↓	0.05	↓	0.19	0	- -	↓	0.09
	9.23	**0**	- -	0	- -	↓	0.08	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	↓	0.08	↓	0.13	↑	0.88	↓	0.03
	1.04	0	- -	↓	0.05	↓	0.12	0	- -	↓	0.01
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Hardness	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
pH	10.06	↓	0.57	↓	0.38	↓	0.58	0	- -	↓	0.44
	9.23	↓	0.12	↓	0.19	↓	0.30	0	- -	↓	0.18
	6.25	↓	0.19	↓	0.31	↓	0.33	0	- -	↓	0.27
	4.71	↓	0.35	↓	0.39	↓	0.41	0	- -	↓	0.34
	2.84	↓	0.07	↓	0.33	↓	0.43	0	- -	↓	0.24
	1.04	↓	0.09	↓	0.44	0	- -	0	- -	↓	0.03
	0.28	0	- -	↓	0.32	↓	0.18	0	- -	↓	0.09
Specific Conductance	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Temperature	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	↑	0.16	↑	0.01
	1.04	0	- -	0	- -	↑	0.04	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Suspended Material											
Total Suspended Sediment	10.06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	9.23	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	6.25	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	4.71	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.28	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Total Suspended Solids	10.06	0	- -	↑	0.04	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -

Table C-4 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients											
Ammonia[e]	10.06	↓	0.07	↓	0.14	**0**	- -	0	- -	↓	0.08
	9.23	↓	0.14	↓	0.13	↓	0.26	0	- -	↓	0.17
	6.25	0	- -	↓	0.15	↓	0.26	0	- -	↓	0.16
	4.71	0	- -	↓	0.19	↓	0.33	0	- -	↓	0.18
	2.84	0	- -	↓	0.12	↓	0.21	0	- -	↓	0.11
	1.04	↓	0.06	↓	0.16	↓	0.34	0	- -	↓	0.19
	0.28	**0**	- -	↓	0.15	↓	0.20	0	- -	↓	0.13
Kjeldahl Nitrogen[e]	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Nitrate[e]	10.06	0	- -	0	- -	↓	0.04	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	↓	0.05	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Nitrite[e]	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	↑	0.08	0	- -	0	- -	↑	0.02
	6.25	0	- -	↑	0.07	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Organic Nitrogen[c]	10.06	0	- -	0	- -	0	- -	0	- -	↑	0.01
	9.23	0	- -	0	- -			0	- -	0	- -
	6.25	0	- -	0	- -	↑	0.13	0	- -	↑	0.04
	4.71	0	- -	↑	0.03	↑	0.04	0	- -	↑	0.03
	2.84	0	- -	0	- -	↑	0.08	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	↑	0.02
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Total Nitrogen[c]	10.06	0	- -	0	- -	0	- -	0	- -	0	- -
	9.23	0	- -	0	- -	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	0	- -	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	0	- -	0	- -	0	- -	0	- -
	1.04	0	- -	0	- -	0	- -	0	- -	0	- -
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Dissolved Phosphorus[e]	10.06	0	- -	0	- -	0	- -	↓	0.99	0	- -
	9.23	0	- -	↑	0.09	0	- -	0	- -	↑	0.03
	6.25	0	- -	0	- -	0	- -	↓	0.99	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	↑	0.13	0	- -	0	- -	↑	0.04
	1.04	0	- -	↑	0.16	0	- -	0	- -	↑	0.04
	0.28	0	- -	↑	0.11	0	- -	0	- -	↑	0.04

Table C-4 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)											
Total Phosphorus[e]	10.06	↑	0.06	↑	0.08	0	- -	0	- -	↑	0.04
	9.23	0	- -	↑	0.06	0	- -	0	- -	0	- -
	6.25	0	- -	0	- -	↑	0.05	0	- -	0	- -
	4.71	0	- -	0	- -	0	- -	0	- -	0	- -
	2.84	0	- -	↑	0.07	0	- -	0	- -	↑	0.03
	1.04	0	- -	↑	0.06	0	- -	0	- -	↑	0.02
	0.28	0	- -	0	- -	0	- -	0	- -	0	- -
Metals											
Arsenic[e]	10.06	↓	0.99	0	- -	0	- -	- -	- -	↓	0.42
	9.23	↓	0.99	↓	0.68	0	- -	- -	- -	↓	0.66
	6.25	↓	0.99	0	- -	0	- -	- -	- -	↓	0.39
	4.71	↓	0.77	0	- -	0	- -	- -	- -	↓	0.50
	2.84	↓	0.99	0	- -	0	- -	- -	- -	↓	0.31
	1.04	↓	0.60	↓	0.50	0	- -	- -	- -	↓	0.41
	0.28	↓	0.74	↓	0.48	0	- -	- -	- -	↓	0.17
Cadmium[e]	10.06	↓	0.85	↓	0.82	↓	0.86	- -	- -	↓	0.84
	9.23	↓	0.75	↓	0.84	↓	0.89	- -	- -	↓	0.84
	6.25	↓	0.86	↓	0.80	↓	0.87	- -	- -	↓	0.84
	4.71	↓	0.14	0	- -	↓	0.21	↑	0.99	↓	0.16
	2.84	↓	0.86	↓	0.82	↓	0.89	- -	- -	↓	0.86
	1.04	↓	0.86	↓	0.81	↓	0.90	- -	- -	↓	0.86
	0.28	↓	0.86	↓	0.83	↓	0.89	- -	- -	↓	0.86
Chromium[e]	10.06	↓	0.14	0	- -	0	- -	- -	- -	↓	0.04
	9.23	0	- -	0	- -	0	- -	- -	- -	0	- -
	6.25	↓	0.16	0	- -	0	- -	- -	- -	0	- -
	4.71	0	- -	0	- -	0	- -	↑	0.98	0	- -
	2.84	↓	0.12	0	- -	0	- -	- -	- -	0	- -
	1.04	↓	0.16	0	- -	0	- -	0	- -	↓	0.03
	0.28	↓	0.13	0	- -	0	- -	- -	- -	0	- -
Copper[e]	10.06	↑	0.18	↑	0.22	↑	0.14	- -	- -	↑	0.18
	9.23	↑	0.14	↑	0.13	↑	0.21	- -	- -	↑	0.16
	6.25	↑	0.12	↑	0.25	↑	0.30	- -	- -	↑	0.23
	4.71	↑	0.14	↑	0.46	↑	0.34	0	- -	↑	0.30
	2.84	0	- -	↑	0.26	↑	0.29	- -	- -	↑	0.21
	1.04	0	- -	↑	0.24	↑	0.26	- -	- -	↑	0.19
	0.28	0	- -	↑	0.23	↑	0.24	- -	- -	↑	0.16
Lead[e]	10.06	↓	0.54	↓	0.46	↓	0.54	- -	- -	↓	0.51
	9.23	↓	0.74	↓	0.47	↓	0.73	- -	- -	↓	0.63
	6.25	↓	0.79	↓	0.50	↓	0.45	- -	- -	↓	0.56
	4.71	↓	0.26	↓	0.22	↓	0.16	↓	0.95	↓	0.22
	2.84	↓	0.64	↓	0.48	↓	0.31	- -	- -	↓	0.47
	1.04	↓	0.60	↓	0.48	↓	0.46	- -	- -	↓	0.50
	0.28	↓	0.62	↓	0.42	↓	0.46	- -	- -	↓	0.49
Mercury[e]	10.06	0	- -	0	- -	0	- -	- -	- -	0	- -
	9.23	0	- -	0	- -	0	- -	- -	- -	0	- -
	6.25	↓	0.51	0	- -	0	- -	- -	- -	0	- -
	4.71	0	- -	0	- -	0	- -	- -	- -	↓	0.26
	2.84	0	- -	0	- -	0	- -	- -	- -	0	- -
	1.04	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.28	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-4 (continued)

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)											
Nickel[e]	10.06	0	- -	0	- -	0	- -	- -	- -	0	- -
	9.23	0	- -	0	- -	⬇	0.12	- -	- -	0	- -
	6.25	0	- -	0	- -	⬇	0.13	- -	- -	0	- -
	4.71	0	- -	0	- -	0	- -	- -	- -	0	- -
	2.84	0	- -	⬆	0.11	0	- -	- -	- -	0	- -
	1.04	⬇	0.19	0	- -	⬇	0.16	- -	- -	0	- -
	0.28	⬇	0.19	0	- -	⬇	0.13	- -	- -	0	- -
Zinc[e]	10.06	⬆	0.21	⬆	0.23	⬆	0.17	- -	- -	⬆	0.21
	9.23	0	- -	⬆	0.23	0	- -	- -	- -	⬆	0.12
	6.25	⬆	0.10	⬆	0.24	⬆	0.13	- -	- -	⬆	0.16
	4.71	⬆	0.10	⬆	0.18	0	- -	- -	- -	⬆	0.10
	2.84	0	- -	⬆	0.16	⬆	0.09	- -	- -	⬆	0.09
	1.04	⬆	0.10	⬆	0.08	0	- -	- -	- -	⬆	0.08
	0.28	0	- -	⬆	0.14	0	- -	- -	- -	⬆	0.07

[a]*Trends were assessed through linear regression analysis. A trend was considered significant if the regression showed a significant slope at P = 0.05 or less. Symbols: ⬆ indicates a statistically significant increase, ⬇ indicates a statistically significant decrease, 0 indicates that no trend was detected. R^2 indicates the fraction of variance accounted for by the regression. Higher R^2 values indicate that higher portions of the variation in the data are attributable to the trend. Lower R^2 values indicate that more of the variation is due to random factors.*

[b]*The seasonal breakouts are defined in Chapter III of this report, "Data Sources and Methods of Analysis." The seasons are defined as follows: Spring is March through May, Summer is June through August, Fall is September through November, and Winter is December through February.*

[c]*Because MMSD stopped sampling during the winter in 1987, data from winter months are not included in the annual trend analysis.*

[d]*The river miles are associated with the locations shown on Map 77 and defined in Table 132 in Chapter VIII of this report.*

[e]*These data were log-transformed before being entered into regression analysis.*

Source: SEWRPC.

Table C-5

SEASONAL AND ANNUAL TRENDS IN WATER QUALITY PARAMETERS AMONG STATIONS IN THE ROOT RIVER WATERSHED: 1975-2001[a]

Constituent	River Mile[d]	Season[b]								Annual[c]	
		Spring		Summer		Fall		Winter			
		Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological											
Fecal Coliform[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	↓	0.08	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	↓	0.16	0	- -	↓	0.08	↓	0.44	↓	0.05
	5.9	0	- -	0	- -	↑	0.09	- -	- -	↑	0.11
	0.4	0	- -	0	- -	0	- -	- -	- -	0	- -
E. coli[e]	41.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	41.0	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	39.2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	36.7	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	28.0	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	23.8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	11.5	0	- -	0	- -	0	- -	0	- -	0	- -
	5.9	0	- -	0	- -	0	- -	- -	- -	0	- -
	0.4	0	- -	0	- -	0	- -	- -	- -	0	- -
Chlorophyll-*a*[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	↓	0.50	0	- -	0	- -	0	- -	↓	0.21
	5.9	- -	- -	↑	0.90	↑	0.96	- -	- -	0	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chemical/Physical											
Alkalinity	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	↓	0.39	0	- -	0	- -	- -	- -	0	- -
	28.0	↓	0.77	0	- -	0	- -	- -	- -	↓	0.23
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	0	- -	0	- -	↓	0.44	0	- -	0	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Biochemical Oxygen Demand[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	↓	0.21	↓	0.20	- -	- -	↓	0.14
	28.0	0	- -	↓	0.14	↓	0.34	- -	- -	↓	0.29
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-5 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)											
Biochemical Oxygen Demand[e] (continued)	11.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	5.9	- -	- -	- -	- -	⬇	0.10	- -	- -	⬇	0.15
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	0	- -
Chloride[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	⬆	0.31	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	⬆	0.24	⬆	0.22	⬆	0.37	0	- -	⬆	0.29
	5.9	- -	- -	0	- -	⬆	0.99	- -	- -	⬆	0.20
	0.4	- -	- -	⬆	0.61	- -	- -	- -	- -	⬆	0.62
Dissolved Oxygen	41.5	⬆	0.56	0	- -	0	- -	- -	- -	**0**	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	⬆	0.14	0	- -	0	- -	⬆	0.14	0	- -
	5.9	- -	- -	0	- -	0	- -	- -	- -	⬇	0.04
	0.4	- -	- -	0	- -	⬆	0.37	- -	- -	⬆	0.08
Hardness	41.5	⬇	0.62	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	⬇	0.47	0	- -	0	- -	- -	- -	0	- -
	28.0	⬇	0.72	0	- -	0	- -	- -	- -	0	- -
	23.8	⬇	0.94	0	- -	0	- -	- -	- -	0	- -
	11.5	0	- -	0	- -	0	- -	0	- -	0	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
pH	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	⬆	0.12
	36.7	- -	- -	0	- -	⬆	0.33	- -	- -	⬆	0.14
	28.0	- -	- -	0	- -	⬆	0.42	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	0	- -	0	- -	0	- -	0	- -	0	- -
	5.9	- -	⬆	0.13	- -	0	- -	- -	- -	⬆	0.11
	0.4	- -	- -	0	- -	0	- -	- -	- -	0	- -
Specific Conductance	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	⬇	0.44	0	- -	⬆	0.43	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	0	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	⬇	0.26
	11.5	⬆	0.20	⬆	0.26	⬆	0.15	⬆	0.17	⬆	0.21
	5.9	0	- -	⬇	0.16	0	- -	⬇	0.38	⬇	0.02
	0.4	- -	- -	⬇	0.14	⬆	0.19	- -	- -	0	- -

Table C-5 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)											
Temperature	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	0	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	0	- -	0	- -	0	- -	0	- -	0	- -
	5.9	0	- -	↓	0.04	0	- -	0	- -	↑	0.03
	0.4	- -	- -	0	- -	↓	0.88	- -	- -	↓	0.06
Suspended Material											
Total Suspended Sediment	41.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	41.0	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	39.2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	36.7	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	28.0	↓	0.98	- -	- -	- -	- -	- -	- -	↓	0.96
	23.8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	11.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	5.9	- -	- -	↓	0.95	↓	0.73	- -	- -	↓	0.92
	0.4	- -	- -	0	- -	- -	- -	- -	- -	0	- -
Total Suspended Solids	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	↓	0.31	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	↓	0.25	0	- -	0	- -	0	- -	↓	0.10
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nutrients											
Ammonia[e]	41.5	↓	0.81	0	- -	0	- -	- -	- -	↓	0.12
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	↓	0.40	- -	- -	↓	0.33
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	↓	0.57	- -	- -	0	- -
	23.8	↓	0.80	0	- -	↓	0.61	- -	- -	↓	0.47
	11.5	0	- -	↓	0.16	↓	0.23	0	- -	↓	0.17
	5.9	- -	- -	↓	0.83	↓	0.86	- -	- -	0	- -
	0.4	- -	- -	0	- -	- -	- -	- -	- -	0	- -
Kjeldahl Nitrogen[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	↑	0.59	- -	- -	0	- -
	23.8	0	- -	↑	0.55	0	- -	- -	- -	↑	0.42
	11.5	0	- -	0	- -	0	- -	0	- -	↓	0.11
	5.9	- -	- -	↓	0.74	0	- -	- -	- -	0	- -
	0.4	- -	- -	0	- -	- -	- -	- -	- -	0	- -

Table C-5 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)											
Nitrate[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	↓	0.60	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	↑	0.40	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	↑	0.81	0	- -	0	- -	- -	- -	0	- -
	11.5	0	- -	0	- -	↓	0.14	0	- -	0	- -
	5.9	- -	- -	0	- -	0	- -	- -	- -	↓	0.18
	0.4	- -	- -	↓	0.49	- -	- -	- -	- -	↓	0.44
Nitrite[e]	41.5	↓	0.55	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	5.9	- -	- -	0	- -	- -	- -	- -	- -	0	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Organic Nitrogen[c]	41.5	0	- -	0	- -	0	- -	- -	- -	- -	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	↑	0.12
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	↑	0.63	↑	0.43	- -	- -	↑	0.52
	11.5	0	- -	0	- -	0	- -	0	- -	↓	0.08
	5.9	- -	- -	↑	0.82	↑	0.77	- -	- -	0	- -
	0.4	- -	- -	0	- -	- -	- -	- -	- -	0	- -
Total Nitrogen[c]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	↑	0.52	0	- -	0	- -	- -	- -	↑	0.29
	11.5	0	- -	0	- -	↓	0.34	0	- -	0	- -
	5.9	- -	- -	0	- -	↓	0.61	- -	- -	0	- -
	0.4	- -	- -	0	- -	- -	- -	- -	- -	0	- -
Dissolved Phosphorus[e]	41.5	0	- -	↑	0.46	0	- -	- -	- -	0	- -
	41.0	0	- -	↑	0.70	0	- -	- -	- -	0	- -
	39.2	0	- -	↑	0.39	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	↓	0.51	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	↑	0.55	0	- -	- -	- -	0	- -
	11.5	0	- -	0	- -	0	- -	0	- -	↓	0.10
	5.9	- -	- -	0	- -	- -	- -	- -	- -	0	- -
	0.4	- -	- -	0	- -	- -	- -	- -	- -	0	- -

Table C-5 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)											
Total Phosphorus[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	0	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	0	- -	0	- -	0	- -	0	- -	0	- -
	5.9	- -	- -	↓	0.45	0	- -	- -	- -	↓	0.51
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	0	- -
Metals											
Arsenic[e]	41.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	41.0	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	39.2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	36.7	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	28.0	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	23.8	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	11.5	- -	- -	0	- -	0	- -	- -	- -	0	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Cadmium[e]	41.5	- -	- -	↓	0.58	↓	0.48	- -	- -	↓	0.45
	41.0	0	- -	↓	0.29	↓	0.76	- -	- -	↓	0.39
	39.2	0	- -	↓	0.49	↓	0.79	- -	- -	↓	0.63
	36.7	0	- -	0	- -	↓	0.73	- -	- -	↓	0.34
	28.0	0	- -	0	- -	↓	0.79	- -	- -	0	- -
	23.8	0	- -	0	- -	↓	0.75	- -	- -	↓	0.42
	11.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chromium[e]	41.5	0	- -	0	- -	↓	0.79	- -	- -	↓	0.28
	41.0	0	- -	0	- -	↓	0.76	- -	- -	↓	0.24
	39.2	0	- -	0	- -	↓	0.79	- -	- -	↓	0.26
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	↓	0.64	0	- -	↓	0.79	- -	- -	↓	0.25
	23.8	0	- -	0	- -	↓	0.75	- -	- -	↓	0.20
	11.5	- -	- -	0	- -	0	- -	- -	- -	0	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Copper[e]	41.5	0	- -	0	- -	↓	0.78	- -	- -	↓	0.31
	41.0	0	- -	0	- -	↓	0.63	- -	- -	↓	0.15
	39.2	0	- -	0	- -	↓	0.79	- -	- -	↓	0.42
	36.7	↓	0.98	0	- -	↓	0.79	- -	- -	↓	0.45
	28.0	0	- -	0	- -	↓	0.79	- -	- -	↓	0.37
	23.8	↓	0.72	0	- -	↓	0.46	- -	- -	↓	0.26
	11.5	- -	- -	0	- -	0	- -	- -	- -	0	- -
	5.9	- -	- -	↓	0.99	↓	0.78	- -	- -	↓	0.43
	0.4	- -	- -	0	- -	- -	- -	- -	- -	0	- -

Table C-5 (continued)

Constituent	River Mile[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Metals (continued)											
Lead[e]	41.5	0	- -	0	- -	0	- -	- -	- -	⬇	0.14
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	- -	- -	0	- -	0	- -	- -	- -	0	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Mercury[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	0	- -	0	- -	⬆	0.63	- -	- -	0	- -
	36.7	0	- -	⬇	0.61	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	⬆	0.67	- -	- -	⬆	0.37
	23.8	0	- -	0	- -	0	- -	- -	- -	0	- -
	11.5	- -	- -	0	- -	0	- -	- -	- -	0	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nickel[e]	41.5	0	- -	0	- -	⬇	0.79	- -	- -	⬇	0.47
	41.0	0	- -	0	- -	⬇	0.76	- -	- -	⬇	0.43
	39.2	0	- -	0	- -	⬇	0.50	- -	- -	⬇	0.38
	36.7	0	- -	⬇	0.42	0	- -	- -	- -	⬇	0.31
	28.0	0	- -	0	- -	⬇	0.79	- -	- -	⬇	0.41
	23.8	0	- -	0	- -	⬇	0.75	- -	- -	⬇	0.35
	11.5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Zinc[e]	41.5	0	- -	0	- -	0	- -	- -	- -	0	- -
	41.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	39.2	⬇	0.95	0	- -	0	- -	- -	- -	0	- -
	36.7	0	- -	0	- -	0	- -	- -	- -	0	- -
	28.0	0	- -	0	- -	0	- -	- -	- -	0	- -
	23.8	⬇	0.68	0	- -	0	- -	- -	- -	0	- -
	11.5	- -	- -	0	- -	0	- -	- -	- -	0	- -
	5.9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	0.4	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

[a] *Trends were assessed through linear regression analysis. A trend was considered significant if the regression showed a significant slope at P = 0.05 or less. Symbols: ⬆ indicates a statistically significant increase, ⬇ indicates a statistically significant decrease, 0 indicates that no trend was detected. R^2 indicates the fraction of variance accounted for by the regression. Higher R^2 values indicate that higher portions of the variation in the data are attributable to the trend. Lower R^2 values indicate that more of the variation is due to random factors.*

[b] *The seasonal breakouts are defined in Chapter III of this report, "Data Sources and Methods of Analysis." The seasons are defined as follows: Spring is March through May, Summer is June through August, Fall is September through November, and Winter is December through February.*

[c] *Because MMSD stopped sampling during the winter in 1987, data from winter months are not included in the annual trend analysis.*

[d] *The river miles are associated with the locations shown on Map 97 and defined in Table 158 in Chapter IX of this report.*

[e] *These data were log-transformed before being entered into regression analysis.*

Source: SEWRPC.

Table C-6

SEASONAL AND ANNUAL TRENDS IN WATER QUALITY PARAMETERS AMONG STATIONS IN THE MILWAUKEE HARBOR ESTUARY AND NEARSHORE LAKE MICHIGAN AREA: 1975-2001[a]

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological												
Fecal Coliform[e]	Outer Harbor	OH-01	↓	0.24	↓	0.14	↓	0.15	↓	0.53	↓	0.17
		OH-02	0	- -	0	- -	↓	0.04	↑	0.34	0	- -
		OH-03	0	- -	0	- -	↓	0.05	↓	0.65	↓	0.02
		OH-04	0	- -	0	- -	↓	0.06	↑	0.55	↓	0.01
		OH-05	↓	0.04	0	- -	↓	0.05	↑	0.29	↓	0.02
		OH-06	0	- -	0	- -	0	- -	↑	0.62	0	- -
		OH-07	0	- -	↓	0.02	↓	0.07	↑	0.67	↓	0.03
		OH-08	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	0	- -	↓	0.05	↑	0.56	↓	0.01
		OH-10	0	- -	0	- -	↓	0.07	0	- -	↓	0.02
		OH-11	0	- -	0	- -	↓	0.04	↑	0.73	0	- -
		OH-12	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-13	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-14	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-15	0	- -	↓	0.03	↓	0.15	0	- -	↓	0.05
	Nearshore	NS-01	↓	0.26	↓	0.15	0	- -	- -	- -	↓	0.12
		NS-02	0	- -	↓	0.20	↓	0.16	- -	- -	↓	0.08
		NS-03	↓	0.15	↓	0.17	↓	0.24	- -	- -	↓	0.20
		NS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-05	0	- -	0	- -	↓	0.48	- -	- -	0	- -
		NS-07	0	- -	0	- -	0	- -	- -	- -	↓	0.07
		NS-08	↓	0.37	↓	0.13	↓	0.72	- -	- -	↓	0.32
		NS-10	↓	0.37	0	- -	↓	0.33	- -	- -	↓	0.18
		NS-11	0	- -	0	- -	↓	0.04	- -	- -	↓	0.02
		NS-12	0	- -	0	- -	↓	0.05	↓	0.65	↓	0.02
		NS-13	0	- -	↓	0.02	↓	0.07	↑	0.67	↓	0.03
		NS-14	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-27	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-28	↓	0.24	↓	0.14	↓	0.15	↓	0.53	↓	0.17
	South Shore	SS-01	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-02	0	- -	↑	0.03	0	- -	↑	0.99	0	- -
		SS-03	0	- -	0	- -	0	- -	↑	0.99	0	- -
		SS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-05	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-06	0	- -	0	- -	0	- -	↑	0.99	0	- -
		SS-07	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	↑	0.99	0	- -
		SS-09	0	- -	0	- -	0	- -	↑	0.99	0	- -
		SS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-11	0	- -	0	- -	↓	0.04	- -	- -	↑	0.02
		SS-12	0	- -	0	- -	0	- -	- -	- -	0	- -
E. coli[e]	Outer Harbor	OH-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-04	0	- -	0	- -	0	- -	- -	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Bacteria and Biological (continued)												
E. coli (continued)	Outer Harbor (continued)	OH-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-09	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-11	↑	0.99	0	- -	0	- -	- -	- -	0	- -
		OH-12	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-13	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-14	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-15	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Nearshore	NS-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-11	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-12	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-13	- -	- -	0	- -	0	- -	- -	- -	0	- -
		NS-14	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-27	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-28	0	- -	0	- -	0	- -	- -	- -	0	- -
	South Shore	SS-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-09	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-11	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-12	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Chlorophyll-*a*[e]	Outer Harbor	OH-01	↓	0.09	↓	0.16	↓	0.03	0	- -	↓	0.07
		OH-02	↓	0.03	0	- -	0	- -	0	- -	0	- -
		OH-03	↓	0.05	0	- -	0	- -	0	- -	0	- -
		OH-04	↓	0.15	0	- -	0	- -	0	- -	↓	0.01
		OH-05	↓	0.37	↓	0.02	↓	0.12	0	- -	↓	0.11
		OH-06	↓	0.50	↓	0.24	↓	0.24	0	- -	↓	0.31
		OH-07	↓	0.18	0	- -	0	- -	0	- -	↓	0.01
		OH-08	↓	0.58	↓	0.07	↓	0.28	0	- -	↓	0.24
		OH-09	↓	0.29	0	- -	↓	0.02	0	- -	↓	0.05
		OH-10	↓	0.35	0	- -	↓	0.07	0	- -	↓	0.09

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Bacteria and Biological (continued)												
Chlorophyll-*a* (continued)	Outer Harbor (continued)	OH-11	↓	0.06	0	- -	0	- -	0	- -	0	- -
		OH-12	↓	0.67	↓	0.11	↓	0.40	↓	0.87	↓	0.32
		OH-13	↓	0.65	↓	0.06	↓	0.40	↓	0.91	↓	0.27
		OH-14	↓	0.63	↓	0.15	↓	0.26	0	- -	↓	0.28
		OH-15	↓	0.38	↓	0.14	↓	0.42	0	- -	↓	0.28
	Nearshore	NS-01	↓	0.31	↓	0.11	↓	0.32	- -	- -	↓	0.19
		NS-02	↓	0.44	↓	0.16	↓	0.47	- -	- -	↓	0.31
		NS-03	↓	0.61	↓	0.09	↓	0.39	- -	- -	↓	0.25
		NS-04	↓	0.65	↓	0.20	↓	0.56	- -	- -	↓	0.39
		NS-05	↓	0.57	↓	0.07	↓	0.42	- -	- -	↓	0.25
		NS-07	↓	0.55	↓	0.07	↓	0.30	- -	- -	↓	0.21
		NS-08	↓	0.21	↓	0.18	0	- -	- -	- -	↓	0.14
		NS-10	0	- -	↓	0.12	0	- -	- -	- -	↓	0.07
		NS-11	↓	0.57	↓	0.26	↓	0.37	- -	- -	↓	0.34
		NS-12	↓	0.05	0	- -	0	- -	0	- -	0	- -
		NS-13	↓	0.18	0	- -	0	- -	0	- -	↓	0.01
		NS-14	↓	0.63	↓	0.15	↓	0.26	0	- -	↓	0.28
		NS-27	↓	0.43	↓	0.22	↓	0.31	- -	- -	↓	0.29
		NS-28	↓	0.09	↓	0.16	↓	0.03	0	- -	↓	0.07
	South Shore	SS-01	↓	0.51	↓	0.23	↓	0.28	- -	- -	↓	0.31
		SS-02	↓	0.52	↓	0.22	↓	0.32	- -	- -	↓	0.33
		SS-03	↓	0.52	↓	0.21	↓	0.39	- -	- -	↓	0.34
		SS-04	↓	0.50	↓	0.21	↓	0.31	- -	- -	↓	0.32
		SS-05	↓	0.51	↓	0.27	↓	0.51	- -	- -	↓	0.40
		SS-06	↓	0.55	↓	0.19	↓	0.48	- -	- -	↓	0.36
		SS-07	↓	0.43	↓	0.22	↓	0.31	- -	- -	↓	0.29
		SS-08	↓	0.50	↓	0.21	↓	0.52	- -	- -	↓	0.37
		SS-09	↓	0.60	↓	0.17	↓	0.49	- -	- -	↓	0.36
		SS-10	↓	0.49	↓	0.24	↓	0.35	- -	- -	↓	0.33
		SS-11	↓	0.57	↓	0.26	↓	0.37	- -	- -	↓	0.34
		SS-12	↓	0.50	↓	0.23	↓	0.28	- -	- -	↓	0.31
Chemical/Physical												
Alkalinity	Outer Harbor	OH-01	0	- -	↑	0.03	↓	0.03	0	- -	0	- -
		OH-02	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-03	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-04	0	- -	0	- -	↓	0.05	0	- -	0	- -
		OH-05	0	- -	0	- -	↓	0.05	0	- -	0	- -
		OH-06	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-07	0	- -	↑	0.03	↓	0.07	0	- -	0	- -
		OH-08	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	↑	0.03	0	- -	0	- -	0	- -
		OH-10	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-11	0	- -	↑	0.04	0	- -	0	- -	0	- -
		OH-12	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-13	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-14	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-15	0	- -	↑	0.06	0	- -	0	- -	↑	0.01

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)												
Alkalinity (continued)	Nearshore	NS-01	0	- -	0	- -	- -	- -	- -	- -	0	- -
		NS-02	0	- -	0	- -	- -	- -	- -	- -	0	- -
		NS-03	0	- -	↑	0.91	- -	- -	- -	- -	0	- -
		NS-04	0	- -	↑	0.84	- -	- -	- -	- -	0	- -
		NS-05	0	- -	↑	0.81	- -	- -	- -	- -	0	- -
		NS-07	0	- -	0	- -	- -	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	- -	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	- -	- -	- -	- -	0	- -
		NS-11	0	- -	↓	0.03	0	- -	- -	- -	0	- -
		NS-12	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-13	0	- -	↑	0.03	↓	0.07	0	- -	0	- -
		NS-14	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-27	0	- -	0	- -	- -	- -	- -	- -	0	- -
		NS-28	0	- -	↑	0.03	↓	0.03	0	- -	0	- -
	South Shore	SS-01	0	- -	0	- -	↓	0.04	- -	- -	0	- -
		SS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-03	0	- -	↓	0.07	0	- -	- -	- -	0	- -
		SS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-05	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-06	0	- -	↓	0.03	0	- -	- -	- -	↓	0.01
		SS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-09	0	- -	↓	0.03	0	- -	- -	- -	↓	0.02
		SS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-11	0	- -	↓	0.03	0	- -	- -	- -	0	- -
		SS-12	0	- -	0	- -	0	- -	- -	- -	↓	0.02
Biochemical Oxygen Demand[e]	Outer Harbor	OH-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-03	0	- -	↓	0.13	↓	0.31	0	- -	↓	0.13
		OH-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-07	↓	0.46	↓	0.36	↓	0.36	- -	- -	↓	0.35
		OH-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-09	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-11	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-12	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-13	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-14	↓	0.39	↓	0.44	↓	0.51	- -	- -	↓	0.45
		OH-15	0	- -	0	- -	0	- -	- -	- -	↑	0.02
	Nearshore	NS-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)												
Biochemical Oxygen Demand[e](continued)	Nearshore (continued)	NS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-11	↓	0.42	↓	0.48	↓	0.44	- -	- -	↓	0.45
		NS-12	0	- -	↓	0.13	↓	0.31	0	- -	↓	0.13
		NS-13	↓	0.46	↓	0.31	↓	0.36	- -	- -	↓	0.35
		NS-14	↓	0.39	↓	0.44	↓	0.51	- -	- -	↓	0.45
		NS-27	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-28	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	South Shore	SS-01	0	- -	↓	0.08	↓	0.33	- -	- -	↓	0.08
		SS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-09	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-10	↓	0.41	↓	0.46	↓	0.45	- -	- -	↓	0.45
		SS-11	↓	0.42	↓	0.48	↓	0.44	- -	- -	↓	0.45
		SS-12	↓	0.50	↓	0.31	↓	0.45	- -	- -	↓	0.39
Chloride[e]	Outer Harbor	OH-01	↑	0.20	↑	0.16	↑	0.10	0	- -	↑	0.12
		OH-02	↑	0.15	↑	0.04	↑	0.21	0	- -	↑	0.09
		OH-03	↑	0.24	↑	0.13	↑	0.08	0	- -	↑	0.11
		OH-04	↑	0.19	↑	0.02	0	- -	0	- -	↑	0.03
		OH-05	↑	0.07	↑	0.03	0	- -	0	- -	↑	0.04
		OH-06	↑	0.16	0	- -	↑	0.04	0	- -	↑	0.03
		OH-07	↑	0.18	↑	0.05	↑	0.03	0	- -	↑	0.06
		OH-08	↑	0.05	0	- -	↑	0.06	0	- -	↑	0.04
		OH-09	↑	0.20	↑	0.12	↑	0.06	0	- -	↑	0.10
		OH-10	↑	0.20	↑	0.19	↑	0.09	0	- -	↑	0.12
		OH-11	↑	0.32	↑	0.03	↑	0.08	0	- -	↑	0.06
		OH-12	0	- -	0	- -	0	- -	0	- -	↑	0.01
		OH-13	0	- -	0	- -	↑	0.03	0	- -	↑	0.02
		OH-14	0	- -	0	- -	0	- -	0	- -	↑	0.01
		OH-15	↑	0.34	↑	0.32	↑	0.03	↓	0.74	↑	0.17
	Nearshore	NS-01	0	- -	↑	0.15	0	- -	- -	- -	↑	0.09
		NS-02	0	- -	0	- -	0	- -	- -	- -	↑	0.03
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	↑	0.18	↑	0.16	0	- -	- -	- -	↑	0.06
		NS-05	↑	0.15	0	- -	0	- -	- -	- -	↑	0.05
		NS-07	0	- -	0	- -	0	- -	- -	- -	↑	0.04
		NS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	↑	0.22	↑	0.13	↑	0.17	- -	- -	↑	0.13
		NS-12	↑	0.24	↑	0.13	↑	0.08	0	- -	↑	0.11

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Chemical/Physical (continued)												
Chloride[e] (continued)	Nearshore (continued)	NS-13	↑	0.18	↑	0.05	↑	0.03	0	- -	↑	0.06
		NS-14	0	- -	0	- -	0	- -	0	- -	↑	0.01
		NS-27	↑	0.16	↑	0.15	↑	0.09	0	- -	↑	0.12
		NS-28	↑	0.20	↑	0.16	↑	0.10	0	- -	↑	0.12
	South Shore	SS-01	↑	0.32	↑	0.05	↑	0.08	0	- -	↑	0.10
		SS-02	↑	0.20	↑	0.22	↑	0.08	0	- -	↑	0.14
		SS-03	↑	0.22	↑	0.13	↑	0.18	0	- -	↑	0.15
		SS-04	↑	0.21	↑	0.18	↑	0.16	0	- -	↑	0.17
		SS-05	↑	0.28	↑	0.11	↑	0.18	0	- -	↑	0.15
		SS-06	↑	0.16	↑	0.13	↑	0.22	0	- -	↑	0.15
		SS-07	↑	0.16	↑	0.15	↑	0.09	0	- -	↑	0.12
		SS-08	↑	0.23	↑	0.16	↑	0.14	0	- -	↑	0.15
		SS-09	↑	0.16	↑	0.09	↑	0.16	0	- -	↑	0.12
		SS-10	↑	0.19	↑	0.15	↑	0.06	- -	- -	↑	0.11
		SS-11	↑	0.22	↑	0.13	↑	0.17	- -	- -	↑	0.13
		SS-12	↑	0.32	↑	0.15	↑	0.05	- -	- -	↑	0.13
Dissolved Oxygen	Outer Harbor	OH-01	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-02	0	- -	0	- -	0	- -	0	- -	↓	0.01
		OH-03	↓	0.02	0	- -	0	- -	0	- -	0	- -
		OH-04	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-05	↓	0.04	0	- -	0	- -	0	- -	↓	0.02
		OH-06	↓	0.03	↓	0.08	0	- -	0	- -	↓	0.04
		OH-07	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-08	0	- -	↓	0.04	0	- -	0	- -	↓	0.02
		OH-09	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-10	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-11	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-12	0	- -	↓	0.07	0	- -	0	- -	↓	0.02
		OH-13	0	- -	↓	0.08	0	- -	0	- -	↓	0.01
		OH-14	↓	0.06	↓	0.03	0	- -	0	- -	↓	0.02
		OH-15	↓	0.10	0	- -	↓	0.06	0	- -	↓	0.05
	Nearshore	NS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-02	↓	0.18	0	- -	0	- -	- -	- -	0	- -
		NS-03	↓	0.11	0	- -	↓	0.11	- -	- -	0	- -
		NS-04	↓	0.13	0	- -	0	- -	- -	- -	0	- -
		NS-05	↓	0.13	0	- -	0	- -	- -	- -	0	- -
		NS-07	↓	0.25	0	- -	0	- -	- -	- -	0	- -
		NS-08	↓	0.20	0	- -	0	- -	- -	- -	0	- -
		NS-10	↓	0.22	0	- -	0	- -	- -	- -	0	- -
		NS-11	↓	0.05	↓	0.03	↓	0.04	- -	- -	↓	0.02
		NS-12	↓	0.02	0	- -	0	- -	0	- -	0	- -
		NS-13	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-14	↓	0.06	↓	0.03	0	- -	- -	- -	↓	0.02
		NS-27	↓	0.08	↓	0.03	↓	0.03	0	- -	↓	0.03
		NS-28	0	- -	0	- -	0	- -	0	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)												
Dissolved Oxygen (continued)	South Shore	SS-01	↓	0.22	↓	0.16	↓	0.05	0	- -	↓	0.13
		SS-02	0	- -	↓	0.04	0	- -	0	- -	↓	0.03
		SS-03	0	- -	↓	0.05	↓	0.04	0	- -	↓	0.04
		SS-04	0	- -	↓	0.05	↓	0.04	0	- -	↓	0.03
		SS-05	↓	0.05	↓	0.05	0	- -	0	- -	↓	0.04
		SS-06	↓	0.06	↓	0.05	↓	0.04	0	- -	↓	0.04
		SS-07	↓	0.08	↓	0.03	↓	0.03	0	- -	↓	0.03
		SS-08	0	- -	↓	0.03	↓	0.03	0	- -	↓	0.03
		SS-09	↓	0.06	↓	0.05	↓	0.06	**0**	- -	↓	0.04
		SS-10	0	- -	0	- -	0	- -	- -	- -	↓	0.01
		SS-11	↓	0.05	↓	0.03	↓	0.04	- -	- -	↓	0.02
		SS-12	0	- -	↓	0.03	0	- -	- -	- -	↓	0.02
Hardness	Outer Harbor	OH-01	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-02	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-03	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-04	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-05	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-06	0	- -	↓	0.13	0	- -	0	- -	0	- -
		OH-07	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-08	↓	0.26	↓	0.11	0	- -	0	- -	↓	0.04
		OH-09	0	- -	0	- -	↓	0.04	0	- -	0	- -
		OH-10	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-11	0	- -	0	- -	↓	0.05	0	- -	0	- -
		OH-12	↓	0.21	0	- -	0	- -	- -	- -	0	- -
		OH-13	↓	0.25	0	- -	0	- -	- -	- -	0	- -
		OH-14	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-15	0	- -	↓	0.21	↑	0.09	0	- -	0	- -
	Nearshore	NS-01	0	- -	↓	0.14	0	- -	- -	- -	0	- -
		NS-02	0	- -	↓	0.13	0	- -	- -	- -	0	- -
		NS-03	0	- -	↓	0.18	0	- -	- -	- -	0	- -
		NS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-05	0	- -	↓	0.21	0	- -	- -	- -	0	- -
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	↓	0.31	0	- -	- -	- -	0	- -
		NS-10	0	- -	↓	0.11	0	- -	- -	- -	0	- -
		NS-11	0	- -	0	- -	↓	0.07	- -	- -	0	- -
		NS-12	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-13	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-14	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-27	0	- -	0	- -	↓	0.06	- -	- -	0	- -
		NS-28	0	- -	0	- -	0	- -	0	- -	0	- -
	South Shore	SS-01	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-02	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-03	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-04	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-05	0	- -	0	- -	0	- -	0	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Chemical/Physical (continued)												
Hardness (continued)	South Shore (continued)	SS-06	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-07	0	- -	0	- -	↓	0.06	- -	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-09	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-10	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-11	0	- -	0	- -	↓	0.07	- -	- -	0	- -
		SS-12	0	- -	0	- -	0	- -	0	- -	0	- -
pH	Outer Harbor	OH-01	↑	0.12	↑	0.25	↑	0.08	0	- -	↑	0.13
		OH-02	0	- -	0	- -	↓	0.04	0	- -	0	- -
		OH-03	0	- -	↑	0.17	0	- -	0	- -	↑	0.06
		OH-04	0	- -	↑	0.19	0	- -	0	- -	↑	0.06
		OH-05	0	- -	↑	0.04	0	- -	0	- -	0	- -
		OH-06	0	- -	↑	0.09	↓	0.03	0	- -	0	- -
		OH-07	0	- -	↑	0.13	0	- -	0	- -	↑	0.03
		OH-08	0	- -	↑	0.12	↓	0.03	0	- -	0	- -
		OH-09	0	- -	↑	0.13	0	- -	0	- -	↑	0.03
		OH-10	0	- -	↑	0.05	0	- -	0	- -	↑	0.02
		OH-11	0	- -	↑	0.18	0	- -	0	- -	↑	0.07
		OH-12	0	- -	↑	0.07	0	- -	0	- -	0	- -
		OH-13	0	- -	↑	0.11	0	- -	0	- -	0	- -
		OH-14	0	- -	↑	0.05	0	- -	0	- -	0	- -
		OH-15	0	- -	0	- -	↓	0.16	0	- -	↓	0.05
	Nearshore	NS-01	0	- -	↑	0.05	0	- -	- -	- -	0	- -
		NS-02	0	- -	↑	0.06	0	- -	- -	- -	0	- -
		NS-03	0	- -	↑	0.06	0	- -	- -	- -	0	- -
		NS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-05	↓	0.24	0	- -	0	- -	- -	- -	0	- -
		NS-07	0	- -	↑	0.07	0	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	↑	0.05	0	- -	- -	- -	0	- -
		NS-12	0	- -	↑	0.17	0	- -	0	- -	↑	0.06
		NS-13	0	- -	↑	0.13	0	- -	0	- -	↑	0.03
		NS-14	0	- -	↑	0.05	0	- -	- -	- -	0	- -
		NS-27	0	- -	↑	0.14	0	- -	- -	- -	↑	0.03
		NS-28	↑	0.12	↑	0.25	↑	0.08	0	- -	↑	0.13
	South Shore	SS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-02	↑	0.05	↑	0.20	0	- -	- -	- -	↑	0.06
		SS-03	0	- -	↑	0.21	0	- -	- -	- -	↑	0.03
		SS-04	0	- -	↑	0.16	0	- -	- -	- -	↑	0.02
		SS-05	0	- -	↑	0.12	0	- -	- -	- -	↑	0.03
		SS-06	0	- -	↑	0.18	0	- -	- -	- -	↑	0.02
		SS-07	0	- -	↑	0.14	0	- -	- -	- -	↑	0.03
		SS-08	0	- -	↑	0.11	0	- -	- -	- -	↑	0.02
		SS-09	0	- -	↑	0.18	0	- -	- -	- -	↑	0.03
		SS-10	0	- -	↑	0.05	0	- -	- -	- -	↑	0.03

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)												
pH (continued)	South Shore (continued)	SS-11	0	- -	↑	0.05	0	- -	- -	- -	0	- -
		SS-12	0	- -	↑	0.14	0	- -	- -	- -	0	- -
Secchi Depth	Outer Harbor	OH-01	↑	0.13	↑	0.08	↑	0.27	0	- -	↑	0.14
		OH-02	↑	0.15	0	- -	↑	0.17	0	- -	↑	0.07
		OH-03	↑	0.09	0	- -	↑	0.39	0	- -	↑	0.08
		OH-04	↑	0.20	↑	0.09	↑	0.49	0	- -	↑	0.23
		OH-05	↑	0.40	0	- -	↑	0.44	0	- -	↑	0.07
		OH-06	↑	0.41	↑	0.20	↑	0.50	0	- -	↑	0.31
		OH-07	↑	0.15	- -	- -	↑	0.37	0	- -	↑	0.08
		OH-08	↑	037	↑	0.15	↑	0.53	0	- -	↑	0.31
		OH-09	↑	0.37	↑	0.05	↑	0.48	0	- -	↑	0.25
		OH-10	↑	0.43	↑	0.15	↑	0.56	0	- -	↑	0.35
		OH-11	↑	0.15	↑	0.02	↑	0.42	0	- -	↑	0.13
		OH-12	↑	0.33	↑	0.07	↑	0.40	0	- -	↑	0.23
		OH-13	↑	0.24	↑	0.11	↑	0.56	0	- -	↑	0.26
		OH-14	↑	0.39	↑	0.09	↑	0.57	0	- -	↑	0.27
		OH-15	↑	0.38	↑	0.14	↑	0.43	0	- -	↑	0.24
	Nearshore	NS-01	↑	0.52	↑	0.09	↑	0.47	- -	- -	↑	0.21
		NS-02	↑	0.13	↑	0.25	↑	0.54	- -	- -	↑	0.27
		NS-03	↑	0.58	0	- -	↑	0.36	- -	- -	↑	0.15
		NS-04	↑	0.29	↑	0.32	↑	0.53	- -	- -	↑	0.37
		NS-05	↑	0.56	↑	0.07	↑	0.52	- -	- -	↑	0.22
		NS-07	↑	0.40	↑	0.12	↑	0.50	- -	- -	↑	0.24
		NS-08	↑	0.18	↑	0.05	↑	0.25	- -	- -	↑	0.11
		NS-10	↑	0.18	↑	0.17	↑	0.18	- -	- -	↑	0.18
		NS-11	↑	0.30	↑	0.30	↑	0.46	- -	- -	↑	0.32
		NS-12	↑	0.09	0	- -	↑	0.39	0	- -	↑	0.08
		NS-13	↑	0.15	0	- -	↑	0.37	0	- -	↑	0.08
		NS-14	↑	0.39	↑	0.09	↑	0.57	0	- -	↑	0.27
		NS-27	↑	0.31	↑	0.28	↑	0.38	- -	- -	↑	0.31
		NS-28	↑	0.13	↑	0.08	↑	0.27	0	- -	↑	0.14
	South Shore	SS-01	↑	0.28	↑	0.12	↑	0.22	- -	- -	↑	0.17
		SS-02	↑	0.24	↑	0.30	↑	0.39	- -	- -	↑	0.29
		SS-03	↑	0.33	↑	0.28	↑	0.37	- -	- -	↑	0.30
		SS-04	↑	0.41	↑	0.31	↑	0.36	- -	- -	↑	0.33
		SS-05	↑	0.28	↑	0.27	↑	0.41	- -	- -	↑	0.29
		SS-06	↑	0.38	↑	0.30	↑	0.35	- -	- -	↑	0.32
		SS-07	↑	0.31	↑	0.28	↑	0.38	- -	- -	↑	0.31
		SS-08	↑	0.26	↑	0.31	↑	0.30	- -	- -	↑	0.27
		SS-09	↑	0.37	↑	0.28	↑	0.39	- -	- -	↑	0.32
		SS-10	↑	0.31	↑	0.32	↑	0.40	- -	- -	↑	0.32
		SS-11	↑	0.30	↑	0.30	↑	0.46	- -	- -	↑	0.32
		SS-12	↑	0.33	↑	0.28	↑	0.39	- -	- -	↑	0.30
Specific Conductance	Outer Harbor	OH-01	0	- -	0	- -	↓	0.08	0	- -	0	- -
		OH-02	↓	0.06	0	- -	↓	0.10	0	- -	↓	0.04
		OH-03	0	- -	0	- -	↓	0.14	0	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Chemical/Physical (continued)												
Specific Conductance (continued)	Outer Harbor (continued)	OH-04	↓	0.22	0	- -	↓	0.20	0	- -	↓	0.06
		OH-05	↓	0.23	↓	0.06	↓	0.21	0	- -	↓	0.14
		OH-06	↓	0.24	↓	0.28	↓	0.21	0	- -	↓	0.19
		OH-07	0	- -	↓	0.06	↓	0.20	0	- -	↓	0.05
		OH-08	↓	0.14	↓	0.16	↓	0.17	0	- -	↓	0.12
		OH-09	↓	0.19	↓	0.07	↓	0.09	0	- -	↓	0.10
		OH-10	↓	0.12	0	- -	↓	0.17	0	- -	↓	0.10
		OH-11	↓	0.09	0	- -	↓	0.12	0	- -	↓	0.02
		OH-12	↓	0.24	↓	0.18	↓	0.28	0	- -	↓	0.21
		OH-13	↓	0.17	↓	0.14	↓	0.18	0	- -	↓	0.16
		OH-14	↓	0.24	↓	0.08	↓	0.16	0	- -	↓	0.15
		OH-15	↓	0.19	0	- -	↓	0.08	0	- -	↓	0.08
	Nearshore	NS-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-11	↓	0.38	↓	0.26	↓	0.51	- -	- -	↓	0.35
		NS-12	0	- -	0	- -	↓	0.14	0	- -	0	- -
		NS-13	0	- -	↓	0.06	↓	0.20	0	- -	↓	0.05
		NS-14	↓	0.24	↓	0.08	↓	0.16	0	- -	↓	0.15
		NS-27	↓	0.29	↓	0.30	↓	0.34	0	- -	↓	0.23
		NS-28	0	- -	0	- -	↓	0.08	0	- -	0	- -
	South Shore	SS-01	↓	0.23	↓	0.27	↓	0.30	0	- -	↓	0.19
		SS-02	↓	0.17	↓	0.31	↓	0.41	0	- -	↓	0.22
		SS-03	↓	0.34	↓	0.35	↓	0.39	0	- -	↓	0.29
		SS-04	↓	0.23	↓	0.33	↓	0.38	0	- -	↓	0.23
		SS-05	↓	0.23	↓	0.10	↓	0.26	0	- -	↓	0.16
		SS-06	↓	0.34	↓	0.41	↓	0.44	0	- -	↓	0.30
		SS-07	↓	0.29	↓	0.30	↓	0.34	0	- -	↓	0.23
		SS-08	↓	0.15	↓	0.24	↓	0.29	0	- -	↓	0.16
		SS-09	↓	0.30	↓	0.31	↓	0.44	0	- -	↓	0.28
		SS-10	↓	0.29	↓	0.27	↓	0.38	- -	- -	↓	0.27
		SS-11	↓	0.38	↓	0.26	↓	0.51	- -	- -	↓	0.35
		SS-12	↓	0.25	↓	0.20	↓	0.37	- -	- -	↓	0.22
Temperature	Outer Harbor	OH-01	0	- -	↑	0.11	0	- -	0	- -	↑	0.02
		OH-02	0	- -	↑	0.02	0	- -	0	- -	↑	0.01
		OH-03	0	- -	↑	0.07	0	- -	0	- -	↑	0.02
		OH-04	0	- -	↑	0.05	0	- -	0	- -	↑	0.01
		OH-05	0	- -	↑	0.04	0	- -	0	- -	0	- -
		OH-06	0	- -	↑	0.04	0	- -	0	- -	0	- -
		OH-07	0	- -	↑	0.05	0	- -	0	- -	↑	0.02
		OH-08	0	- -	↑	0.04	0	- -	0	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Chemical/Physical (continued)												
Temperature (continued)	Outer Harbor (continued)	OH-09	0	- -	↑	0.07	0	- -	0	- -	↑	0.01
		OH-10	0	- -	↑	0.04	0	- -	0	- -	0	- -
		OH-11	0	- -	↑	0.08	0	- -	0	- -	↑	0.02
		OH-12	0	- -	↑	0.06	0	- -	0	- -	0	- -
		OH-13	0	- -	↑	0.05	0	- -	0	- -	0	- -
		OH-14	0	- -	↑	0.02	0	- -	0	- -	0	- -
		OH-15	↑	0.05	0	- -	0	- -	0	- -	↑	0.01
	Nearshore	NS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-05	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-12	0	- -	↑	0.07	0	- -	0	- -	↑	0.02
		NS-13	0	- -	↑	0.05	0	- -	0	- -	↑	0.02
		NS-14	0	- -	↑	0.04	0	- -	0	- -	0	- -
		NS-27	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-28	0	- -	↑	0.11	0	- -	0	- -	↑	0.02
	South Shore	SS-01	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-02	0	- -	↑	0.03	0	- -	0	- -	0	- -
		SS-03	0	- -	↑	0.02	0	- -	0	- -	0	- -
		SS-04	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-05	0	- -	↑	0.02	0	- -	0	- -	0	- -
		SS-06	0	- -	↑	0.02	0	- -	0	- -	0	- -
		SS-07	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-09	0	- -	↑	0.03	0	- -	0	- -	0	- -
		SS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-11	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-12	0	- -	0	- -	0	- -	- -	- -	0	- -
Suspended Material												
Total Suspended Solids	Outer Harbor	OH-01	0	- -	0	- -	↓	0.07	0	- -	0	- -
		OH-02	↓	0.03	0	- -	↓	0.09	0	- -	↓	0.03
		OH-03	0	- -	↓	0.12	0	- -	0	- -	0	- -
		OH-04	↓	0.16	0	- -	↓	0.21	0	- -	↓	0.06
		OH-05	↓	0.17	↓	0.06	↓	0.19	0	- -	↓	0.11
		OH-06	↓	0.18	↓	0.30	↓	0.18	0	- -	↓	0.17
		OH-07	0	- -	↓	0.06	↓	0.18	0	- -	↓	0.05
		OH-08	↓	0.08	↓	0.16	↓	0.16	0	- -	↓	0.10
		OH-09	↓	0.16	↓	0.05	↓	0.09	0	- -	↓	0.09
		OH-10	↓	0.11	0	- -	↓	0.15	0	- -	↓	0.08
		OH-11	↓	0.07	0	- -	↓	0.10	0	- -	↓	0.02

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Suspended Material (continued)												
Total Suspended Solids (continued)	Outer Harbor (continued)	OH-12	↓	0.17	↓	0.18	↓	0.25	0	- -	↓	0.18
		OH-13	↓	0.12	↓	0.04	↓	0.06	0	- -	↓	0.06
		OH-14	↓	0.18	↓	0.09	↓	0.16	0	- -	↓	0.13
		OH-15	↓	0.31	↓	0.13	↓	0.30	0	- -	↓	0.22
	Nearshore	NS-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-11	↓	0.35	↓	0.25	↓	0.51	0	- -	↓	0.33
		NS-12	0	- -	0	- -	↓	0.12	0	- -	0	- -
		NS-13	0	- -	↓	0.06	↓	0.18	0	- -	↓	0.05
		NS-14	↓	0.18	↓	0.08	↓	0.16	0	- -	↓	0.13
		NS-27	↓	0.20	↓	0.30	↓	0.37	0	- -	↓	0.20
		NS-28	0	- -	0	- -	↓	0.07	0	- -	0	- -
	South Shore	SS-01	↓	0.14	↓	0.27	↓	0.20	0	- -	↓	0.13
		SS-02	↓	0.09	↓	0.26	↓	0.35	0	- -	↓	0.17
		SS-03	↓	0.25	↓	0.39	↓	0.43	0	- -	↓	0.28
		SS-04	↓	0.13	↓	0.37	↓	0.24	0	- -	↓	0.15
		SS-05	↓	0.11	↓	0.14	↓	0.26	0	- -	↓	0.14
		SS-06	↓	0.25	↓	0.39	↓	0.44	0	- -	↓	0.28
		SS-07	↓	0.20	↓	0.30	↓	0.37	0	- -	↓	0.20
		SS-08	↓	0.07	↓	0.24	↓	0.27	0	- -	↓	0.14
		SS-09	↓	0.24	↓	0.33	↓	0.42	0	- -	↓	0.26
		SS-10	↓	0.20	↓	0.29	↓	0.39	- -	- -	↓	0.25
		SS-11	↓	0.35	↓	0.25	↓	0.51	0	- -	↓	0.33
		SS-12	↓	0.18	↓	0.25	↓	0.43	- -	- -	↓	0.22
Nutrients												
Ammonia[e]	Outer Harbor	OH-01	↓	0.19	↓	0.26	↓	0.35	↓	0.37	↓	0.26
		OH-02	↓	0..43	↓	0.40	↓	0.37	0	- -	↓	0.39
		OH-03	↓	0.44	↓	0.48	↓	0.45	0	- -	↓	0.46
		OH-04	↓	0.47	↓	0.38	↓	0.55	0	- -	↓	0.44
		OH-05	↓	0.26	↓	0.26	↓	0.44	↓	0.40	↓	0.32
		OH-06	↓	0.15	↓	0.16	↓	0.13	0	- -	↓	0.15
		OH-07	↓	0.36	↓	0.28	↓	0.43	0	- -	↓	0.34
		OH-08	↓	0.14	↓	0.21	↓	0.12	0	- -	↓	0.17
		OH-09	↓	0.30	↓	0.41	↓	0.43	0	- -	↓	0.37
		OH-10	↓	0.33	↓	0.37	↓	0.27	↓	0.35	↓	0.31
		OH-11	↓	0.50	↓	0.53	↓	0.58	0	- -	↓	0.51
		OH-12	0	- -	↓	0.06	↓	0.04	0	- -	↓	0.05
		OH-13	0	- -	0	- -	↓	0.04	0	- -	↓	0.03
		OH-14	↓	0.03	↓	0.02	0	- -	↓	0.80	↓	0.01
		OH-15	↓	0.04	↓	0.06	↓	0.22	↓	0.73	↓	0.11

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients (continued)												
Ammonia (continued)	Nearshore	NS-01	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	↓	0.15	↓	0.17	0	- -	- -	- -	↓	0.06
		NS-05	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	↓	0.07	0	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	↓	0.02	0	- -	- -	- -	↓	0.01
		NS-12	↓	0.44	↓	0.48	↓	0.45	0	- -	↓	0.46
		NS-13	↓	0.36	↓	0.28	↓	0.43	0	- -	↓	0.34
		NS-14	↓	0.03	↓	0.02	0	- -	↓	0.80	↓	0.01
		NS-27	↓	0.08	↓	0.11	↓	0.05	↓	0.98	↓	0.07
		NS-28	↓	0.19	↓	0.26	↓	0.35	↓	0.37	↓	0.26
	South Shore	SS-01	0	- -	↓	0.02	↓	0.13	0	- -	↓	0.02
		SS-02	↓	0.13	0	- -	↓	0.05	↓	0.95	↓	0.05
		SS-03	↓	0.06	0	- -	0	- -	0	- -	↓	0.02
		SS-04	0	- -	↓	0.07	0	- -	0	- -	↓	0.02
		SS-05	0	- -	0	- -	0	- -	0	- -	↓	0.02
		SS-06	0	- -	↓	0.03	0	- -	0	- -	↓	0.03
		SS-07	↓	0.08	↓	0.11	↓	0.05	↓	0.98	↓	0.07
		SS-08	↓	0.11	↓	0.09	0	- -	↓	0.99	↓	0.05
		SS-09	↓	0.06	↓	0.04	0	- -	0	- -	↓	0.02
		SS-10	↓	0.08	↓	0.05	↓	0.08	- -	- -	↓	0.07
		SS-11	0	- -	↓	0.02	0	- -	- -	- -	↓	0.01
		SS-12	**0**	- -	↓	0.07	0	- -	- -	- -	↓	0.04
Kjeldahl Nitrogen[e]	Outer Harbor	OH-01	0	- -	0	- -	↓	0.28	0	- -	↓	0.08
		OH-02	↓	0.05	↓	0.06	↓	0.04	↓	0.40	↓	0.06
		OH-03	0	- -	↓	0.02	↓	0.17	↓	0.51	↓	0.06
		OH-04	0	- -	↓	0.09	↓	0.31	↓	0.50	↓	013
		OH-05	0	- -	0	- -	↓	0.20	↓	0.71	↓	0.05
		OH-06	↓	0.10	↓	0.06	↓	0.12	0	- -	↓	0.09
		OH-07	0	- -	↓	0.02	↓	0.14	0	- -	↓	0.05
		OH-08	0	- -	↓	0.02	↓	0.05	0	- -	↓	0.03
		OH-09	0	- -	↓	0.06	↓	0.10	↓	0.51	↓	0.06
		OH-10	↓	0.03	0	- -	↓	0.06	↓	0.40	↓	0.03
		OH-11	↓	0.03	↓	0.04	↓	0.21	0	- -	↓	0.08
		OH-12	0	- -	0	- -	0	- -	0	- -	↓	0.02
		OH-13	0	- -	0	- -	↓	0.04	0	- -	0	- -
		OH-14	0	- -	0	- -	↓	0.08	0	- -	↓	0.01
		OH-15	0	- -	0	- -	↓	0.03	0	- -	0	- -
	Nearshore	NS-01	0	- -	0	- -	↓	0.15	- -	- -	0	- -
		NS-02	↑	0.13	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-05	0	- -	0	- -	↓	0.22	- -	- -	0	- -
		NS-07	0	- -	0	- -	↓	0.13	- -	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)												
Kjeldahl Nitrogen (continued)	Nearshore (continued)	NS-08	0	- -	0	- -	↓	0.14	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	0	- -	↓	0.03	- -	- -	0	- -
		NS-12	0	- -	↓	0.02	↓	0.17	↓	0.51	↓	0.06
		NS-13	0	- -	↓	0.02	↓	0.14	0	- -	↓	0.05
		NS-14	0	- -	0	- -	↓	0.08	0	- -	↓	0.01
		NS-27	0	- -	0	- -	↓	0.05	0	- -	0	- -
		NS-28	0	- -	0	- -	↓	0.28	0	- -	↓	0.08
	South Shore	SS-01	0	- -	0	- -	↓	0.05	0	- -	↓	0.02
		SS-02	↓	0.06	0	- -	↓	0.06	0	- -	↓	0.04
		SS-03	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-04	↓	0.06	↓	0.03	0	- -	0	- -	0	- -
		SS-05	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-06	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-07	0	- -	0	- -	↓	0.05	0	- -	0	- -
		SS-08	↓	0.07	0	- -	0	- -	↓	0.90	↓	0.02
		SS-09	↓	0.08	0	- -	0	- -	0	- -	0	- -
		SS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-11	0	- -	0	- -	↓	0.03	- -	- -	0	- -
		SS-12	0	- -	0	- -	0	- -	- -	- -	0	- -
Nitrate[e]	Outer Harbor	OH-01	↑	0.18	↑	0.19	0	- -	0	- -	↑	0.09
		OH-02	↑	0.47	↑	0.27	↑	0.39	0	- -	↑	0.34
		OH-03	↑	0.34	↑	0.19	↑	0.13	0	- -	↑	0.19
		OH-04	↑	0.19	↑	0.09	↑	0.12	0	- -	↑	0.10
		OH-05	↑	0.22	↑	0.07	↑	0.04	0	- -	↑	0.09
		OH-06	↑	0.29	↑	0.08	↑	0.05	0	- -	↑	0.12
		OH-07	↑	0.34	↑	0.10	↑	0.09	0	- -	↑	0.13
		OH-08	↑	0.28	↑	0.11	↑	0.06	↑	0.54	↑	0.13
		OH-09	↑	0.29	↑	0.23	↑	0.07	0	- -	↑	0.18
		OH-10	↑	0.15	↑	0.17	↑	0.02	0	- -	↑	0.10
		OH-11	↑	0.30	↑	0.26	↑	0.15	0	- -	↑	0.21
		OH-12	↑	0.20	↑	0.06	↑	0.04	0	- -	↑	0.09
		OH-13	↑	0.23	↑	0.10	0	- -	0	- -	↑	0.10
		OH-14	↑	0.13	↑	0.06	0	- -	↑	0.60	↑	0.05
		OH-15	0	- -	0	- -	0	- -	0	- -	0	- -
	Nearshore	NS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-02	0	- -	0	- -	0	- -	- -	- -	↑	0.03
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	0	- -	↑	0.06	0	- -	- -	- -	0	- -
		NS-05	0	- -	0	- -	0	- -	- -	- -	↑	0.03
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	0	- -	- -	- -	↑	0.03
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	↑	0.06	↑	0.09	↑	0.03	- -	- -	↑	0.07
		NS-12	↑	0.34	↑	0.19	↑	0.13	0	- -	↑	0.19
		NS-13	↑	0.34	↑	0.10	↑	0.09	0	- -	↑	0.13
		NS-14	↑	0.13	↑	0.06	0	- -	0	- -	↑	0.05

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)												
Nitrate (continued)	Nearshore (continued)	NS-27	↑	0.31	↑	0.28	↑	0.17	↑	0.99	↑	0.24
		NS-28	↑	0.18	↑	0.19	0	- -	0	- -	↑	0.09
	South Shore	SS-01	↑	0.40	↑	0.26	↑	0.21	0	- -	↑	0.27
		SS-02	↑	0.35	↑	0.40	↑	0.23	↑	0.93	↑	0.34
		SS-03	↑	0.30	↑	0.32	↑	0.30	↑	0.99	↑	0.31
		SS-04	↑	0.30	↑	0.30	↑	0.21	↑	0.99	↑	0.27
		SS-05	↑	0.39	↑	0.36	↑	0.26	↑	0.99	↑	0.34
		SS-06	↑	0.30	↑	0.31	↑	0.25	↑	0.99	↑	0.29
		SS-07	↑	0.31	↑	0.28	↑	0.17	↑	0.99	↑	0.24
		SS-08	↑	0.33	↑	0.36	↑	0.24	↑	0.99	↑	0.32
		SS-09	↑	0.26	↑	0.27	↑	0.23	↑	0.99	↑	0.25
		SS-10	↑	0.27	↑	0.20	0	- -	- -	- -	↑	0.13
		SS-11	↑	0.06	↑	0.09	↑	0.03	- -	- -	↑	0.07
		SS-12	↑	0.13	↑	0.10	↑	0.05	- -	- -	↑	0.09
Nitrite[e]	Outer Harbor	OH-01	0	- -	0	- -	↓	0.12	0	- -	↓	0.03
		OH-02	0	- -	↓	0.06	0	- -	0	- -	↓	0.01
		OH-03	↑	0.03	↓	0.03	↓	0.05	0	- -	↓	0.01
		OH-04	0	- -	↓	0.02	↓	0.11	0	- -	↓	0.01
		OH-05	↑	0.03	0	- -	0	- -	0	- -	0	- -
		OH-06	↑	0.03	↑	0.05	0	- -	0	- -	↑	0.02
		OH-07	↑	0.06	0	- -	0	- -	0	- -	0	- -
		OH-08	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-10	↑	0.04	0	- -	0	- -	0	- -	0	- -
		OH-11	↑	0.04	↓	0.02	↓	0.06	0	- -	↓	0.01
		OH-12	0	- -	↑	0.03	↑	0.03	0	- -	↑	0.03
		OH-13	0	- -	0	- -	0	- -	0	- -	↑	0.02
		OH-14	0	- -	↑	0.03	0	- -	0	- -	↑	0.02
		OH-15	↑	0.04	0	- -	0	- -	0	- -	0	- -
	Nearshore	NS-01	0	- -	0	- -	↓	0.20	- -	- -	0	- -
		NS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	0	- -	↑	0.07	0	- -	- -	- -	0	- -
		NS-05	0	- -	↑	0.06	0	- -	- -	- -	0	- -
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	↓	0.22	- -	- -	0	- -
		NS-11	0	- -	↑	0.05	↑	0.06	- -	- -	↑	0.02
		NS-12	↑	0.03	↓	0.03	↓	0.05	0	- -	↓	0.01
		NS-13	↑	0.06	0	- -	0	- -	0	- -	0	- -
		NS-14	0	- -	↑	0.03	0	- -	0	- -	↑	0.02
		NS-27	↓	0.12	↓	0.09	0	- -	↓	0.99	↓	0.04
		NS-28	0	- -	0	- -	↓	0.12	0	- -	↓	0.03
	South Shore	SS-01	0	- -	0	- -	0	- -	↓	0.91	0	- -
		SS-02	↓	0.22	↓	0.07	↓	0.07	↓	0.99	↓	0.10
		SS-03	↓	0.22	↓	0.14	↓	0.04	↓	0.99	↓	0.11
		SS-04	↓	0.08	↓	0.05	↓	0.03	↓	0.98	↓	0.05

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients (continued)												
Nitrite (continued)	South Shore (continued)	SS-05	↓	0.11	↓	0.03	↓	0.07	↓	0.98	↓	0.06
		SS-06	↓	0.18	↓	0.12	↓	0.04	↓	0.99	↓	0.10
		SS-07	↓	0.12	↓	0.09	0	- -	↓	0.99	↓	0.04
		SS-08	↓	0.08	↓	0.06	0	- -	↓	0.99	↓	0.04
		SS-09	↓	0.20	↓	0.10	0	- -	↓	0.98	↓	0.05
		SS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-11	0	- -	↑	0.05	↑	0.06	- -	- -	↑	0.02
		SS-12	0	- -	↑	0.14	0	- -	- -	- -	↓	0.02
Organic Nitrogen[c]	Outer Harbor	OH-01	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-02	↑	0.17	↑	0.04	↑	0.21	0	- -	↑	0.12
		OH-03	↑	0.06	↑	0.14	↑	0.03	0	- -	↑	0.09
		OH-04	0	- -	↑	0.03	0	- -	0	- -	↑	0.01
		OH-05	0	- -	↑	0.05	0	- -	↓	0.74	**0**	- -
		OH-06	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-07	0	- -	↑	0.05	0	- -	0	- -	↑	0.02
		OH-08	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	↑	0.03	0	- -	0	- -	↑	0.03
		OH-10	0	- -	↑	0.06	0	- -	0	- -	↑	0.03
		OH-11	↑	0.04	↑	0.07	↑	0.04	0	- -	↑	0.06
		OH-12	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-13	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-14	0	- -	0	- -	↓	0.04	0	- -	0	- -
		OH-15	0	- -	↑	0.04	0	- -	0	- -	↑	0.01
	Nearshore	NS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-02	↑	0.20	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	0	- -	↑	0.07	0	- -	- -	- -	↑	0.03
		NS-05	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-12	↑	0.06	↑	0.14	↑	0.03	0	- -	↑	0.09
		NS-13	0	- -	↑	0.05	0	- -	0	- -	↑	0.02
		NS-14	0	- -	0	- -	↓	0.04	0	- -	0	- -
		NS-27	0	- -	↑	0.03	0	- -	0	- -	0	- -
		NS-28	0	- -	0	- -	0	- -	0	- -	0	- -
	South Shore	SS-01	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-02	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-03	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-04	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-05	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-06	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-07	0	- -	↑	0.03	0	- -	0	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-09	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-10	0	- -	↑	0.04	0	- -	- -	- -	↑	0.02

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Nutrients (continued)												
Organic Nitrogen[c] (continued)	South Shore (continued)	SS-11	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-12	0	- -	↑	0.04	0	- -	- -	- -	↑	0.02
Total Nitrogen[c]	Outer Harbor	OH-01	0	- -	0	- -	↓	0.13	0	- -	↓	0.02
		OH-02	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-03	0	- -	0	- -	↓	0.04	0	- -	0	- -
		OH-04	0	- -	↓	0.05	↓	0.14	↓	0.48	↓	0.05
		OH-05	0	- -	0	- -	↓	0.08	↓	0.43	0	- -
		OH-06	0	- -	↓	0.02	↓	0.05	0	- -	↓	0.03
		OH-07	0	- -	0	- -	↓	0.05	0	- -	0	- -
		OH-08	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	0	- -	↓	0.02	0	- -	0	- -
		OH-10	0	- -	0	- -	↓	0.02	0	- -	0	- -
		OH-11	0	- -	0	- -	↓	0.06	0	- -	0	- -
		OH-12	0	- -	0	- -	0	- -	0	- -	↓	0.01
		OH-13	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-14	0	- -	0	- -	↓	0.07	0	- -	↓	0.01
		OH-15	0	- -	0	- -	↓	0.07	0	- -	0	- -
	Nearshore	NS-01	0	- -	0	- -	↓	0.02	- -	- -	0	- -
		NS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	↓	0.04	↓	0.15	- -	- -	↓	0.05
		NS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-05	↓	0.13	0	- -	↓	0.23	- -	- -	↓	0.03
		NS-07	0	- -	0	- -	↓	0.17	- -	- -	0	- -
		NS-08	0	- -	0	- -	↓	0.18	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	0	- -	↓	0.03	- -	- -	0	- -
		NS-12	0	- -	0	- -	↓	0.04	0	- -	0	- -
		NS-13	0	- -	0	- -	↓	0.05	0	- -	0	- -
		NS-14	0	- -	0	- -	↓	0.07	0	- -	↓	0.01
		NS-27	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-28	0	- -	0	- -	↓	0.13	0	- -	↓	0.02
	South Shore	SS-01	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-02	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-03	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-04	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-05	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-06	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-07	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-09	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-11	0	- -	0	- -	↓	0.03	- -	- -	0	- -
		SS-12	0	- -	0	- -	0	- -	- -	- -	0	- -
Dissolved Phosphorus[e]	Outer Harbor	OH-01	↓	0.03	↑	0.07	↓	0.07	0	- -	0	- -
		OH-02	0	- -	0	- -	↓	0.07	0	- -	0	- -
		OH-03	0	- -	↑	0.05	0	- -	0	- -	0	- -
		OH-04	0	- -	0	- -	↓	0.03	0	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients (continued)												
Dissolved Phosphorus (continued)	Outer Harbor (continued)	OH-05	0	- -	↑	0.03	0	- -	0	- -	0	- -
		OH-06	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-07	0	- -	↑	0.05	0	- -	0	- -	↑	0.01
		OH-08	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-10	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-11	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-12	0	- -	0	- -	0	- -	0	- -	↑	0.01
		OH-13	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-14	0	- -	↑	0.04	0	- -	0	- -	0	- -
		OH-15	↑	0.04	↑	0.12	0	- -	↓	0.63	↑	0.04
	Nearshore	NS-01	0	- -	↑	0.19	0	- -	- -	- -	↑	0.05
		NS-02	0	- -	↑	0.21	0	- -	- -	- -	↑	0.08
		NS-03	0	- -	0	- -	↑	0.19	- -	- -	0	- -
		NS-04	0	- -	↑	0.26	0	- -	- -	- -	0	- -
		NS-05	0	- -	↑	0.20	0	- -	- -	- -	↑	0.05
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	↑	0.13	0	- -	- -	- -	↑	0.10
		NS-10	0	- -	↑	0.07	0	- -	- -	- -	0	- -
		NS-11	0	- -	↑	0.03	0	- -	- -	- -	↑	0.03
		NS-12	0	- -	↑	0.05	0	- -	0	- -	0	- -
		NS-13	0	- -	↑	0.05	0	- -	0	- -	↑	0.01
		NS-14	0	- -	↑	0.04	0	- -	0	- -	0	- -
		NS-27	0	- -	↑	0.09	↑	0.09	- -	- -	↑	0.07
		NS-28	↓	0.03	↑	0.07	↓	0.07	0	- -	0	- -
	South Shore	SS-01	↑	0.08	↑	0.09	0	- -	- -	- -	↑	0.06
		SS-02	↑	0.07	↑	0.04	↑	0.07	- -	- -	↑	0.06
		SS-03	0	- -	0	- -	↑	0.09	- -	- -	↑	0.04
		SS-04	0	- -	↑	0.05	0	- -	- -	- -	↑	0.05
		SS-05	0	- -	↑	0.11	↑	0.05	- -	- -	↑	0.07
		SS-06	0	- -	0	- -	↑	0.06	- -	- -	↑	0.03
		SS-07	0	- -	↑	0.09	↑	0.09	- -	- -	↑	0.07
		SS-08	0	- -	↑	0.06	↑	0.10	- -	- -	↑	0.06
		SS-09	0	- -	0	- -	↑	0.09	- -	- -	↑	0.02
		SS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-11	0	- -	↑	0.03	0	- -	- -	- -	↑	0.03
		SS-12	0	- -	↑	0.08	↑	0.05	- -	- -	↑	0.05
Total Phosphorus[e]	Outer Harbor	OH-01	↓	0.09	↓	0.02	↓	0.21	0	- -	↓	0.08
		OH-02	↓	0.05	0	- -	↓	0.05	0	- -	↓	0.02
		OH-03	0	- -	0	- -	↓	0.09	0	- -	↓	0.01
		OH-04	↓	0.04	0	- -	↓	0.12	0	- -	↓	0.03
		OH-05	↓	0.05	0	- -	↓	0.12	0	--	↓	0.02
		OH-06	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-07	0	- -	0	- -	↓	0.05	0	- -	↓	0.02
		OH-08	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	0	- -	↓	0.10	0	- -	↓	0.02
		OH-10	↓	0.12	0	- -	↓	0.07	0	- -	↓	0.05

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Nutrients (continued)												
Total Phosphorus (continued)	Outer Harbor (continued)	OH-11	0	- -	0	- -	↓	0.09	0	- -	↓	0.01
		OH-12	0	- -	0	- -	0	- -	↑	0.88	0	- -
		OH-13	0	- -	↑	0.04	↓	0.04	0	- -	0	- -
		OH-14	0	- -	↑	0.07	0	- -	↑	0.55	↑	0.02
		OH-15	0	- -	↑	0.02	↓	0.09	0	- -	0	- -
	Nearshore	NS-01	0	- -	↑	0.34	0	- -	- -	- -	↑	0.15
		NS-02	↑	0.40	↑	0.29	0	- -	- -	- -	↑	0.15
		NS-03	↑	0.35	↑	0.35	0	- -	- -	- -	↑	0.23
		NS-04	0	- -	↑	0.15	0	- -	- -	- -	0	- -
		NS-05	↑	0.20	↑	0.32	0	- -	- -	- -	↑	0.16
		NS-07	0	- -	↑	0.14	0	- -	- -	- -	↑	0.05
		NS-08	0	- -	↑	0.23	0	- -	- -	- -	↑	0.12
		NS-10	0	- -	↑	0.22	0	- -	- -	- -	↑	0.13
		NS-11	0	- -	↑	0.09	0	- -	- -	- -	↑	0.02
		NS-12	0	- -	0	- -	↓	0.09	0	- -	↓	0.01
		NS-13	0	- -	0	- -	↓	0.05	0	- -	↓	0.02
		NS-14	0	- -	↑	0.07	0	- -	↑	0.55	↑	0.02
		NS-27	0	- -	↑	0.06	0	- -	0	- -	0	- -
		NS-28	↓	0.09	↓	0.02	↓	0.21	0	- -	↓	0.08
	South Shore	SS-01	↑	0.08	↑	0.03	0	- -	0	- -	↑	0.03
		SS-02	0	- -	0	- -	0	- -	↑	0.97	0	- -
		SS-03	0	- -	↑	0.04	0	- -	0	- -	0	- -
		SS-04	0	- -	↑	0.03	0	- -	0	- -	↑	0.01
		SS-05	0	- -	↑	0.08	0	- -	0	- -	0	- -
		SS-06	0	- -	↑	0.04	0	- -	0	- -	0	- -
		SS-07	0	- -	↑	0.06	0	- -	0	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-09	0	- -	0	- -	0	- -	0	- -	0	- -
		SS-10	0	- -	0	- -	↓	0.06	- -	- -	0	- -
		SS-11	0	- -	↑	0.09	0	- -	- -	- -	↑	0.02
		SS-12	0	- -	0	- -	0	- -	- -	- -	0	- -
Metals												
Arsenic[e]	Outer Harbor	OH-01	0	- -	↑	0.39	↑	0.19	- -	- -	↑	0.23
		OH-02	0	- -	↑	0.017	↑	0.13	- -	- -	↑	0.13
		OH-03	0	- -	↑	0.11	↑	0.25	- -	- -	↑	0.13
		OH-04	0	- -	0	- -	↑	0.30	- -	- -	0	- -
		OH-05	0	- -	0	- -	↑	0.15	- -	- -	↑	0.14
		OH-06	↑	0.23	↑	0.22	0	- -	- -	- -	↑	0.20
		OH-07	0	- -	0	- -	↑	0.46	- -	- -	↑	0.20
		OH-08	↑	0.43	0	- -	0	- -	- -	- -	↑	0.11
		OH-09	0	- -	0	- -	0	- -	- -	- -	↑	0.09
		OH-10	0	- -	↑	0.13	↑	0.12	- -	- -	↑	0.14
		OH-11	0	- -	↑	0.10	↑	0.15	- -	- -	↑	0.14
		OH-12	↑	0.49	0	- -	↑	0.28	- -	- -	↑	0.27
		OH-13	↑	0.32	↑	0.42	↑	0.24	- -	- -	↑	0.36
		OH-14	↑	0.34	↑	0.30	↑	0.35	- -	- -	↑	0.34
		OH-15	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)												
Arsenic (continued)	Nearshore	NS-01	- -	- -	↑	0.54	- -	- -	- -	- -	↑	0.50
		NS-02	- -	- -	↑	0.51	- -	- -	- -	- -	↑	0.62
		NS-03	- -	- -	↑	0.73	0	- -	- -	- -	↑	0.61
		NS-04	- -	- -	↑	0.67	- -	- -	- -	- -	↑	0.59
		NS-05	- -	- -	↑	0.88	0	- -	- -	- -	↑	0.74
		NS-07	- -	- -	↑	0.88	- -	- -	- -	- -	↑	0.72
		NS-08	- -	- -	↑	0.78	- -	- -	- -	- -	↑	0.68
		NS-10	- -	- -	↑	0.74	- -	- -	- -	- -	↑	0.63
		NS-11	0	- -	↑	0.87	0	- -	- -	- -	0	- -
		NS-12	0	- -	↑	0.11	↑	0.25	- -	- -	↑	0.13
		NS-13	0	- -	0	- -	↑	0.46	- -	- -	↑	0.20
		NS-14	↑	0.34	↑	0.30	↑	0.35	- -	- -	↑	0.34
		NS-27	0	- -	↑	0.69	0	- -	- -	- -	↑	0.10
		NS-28	0	- -	↑	0.39	↑	0.19	- -	- -	↑	0.23
	South Shore	SS-01	0	- -	↑	0.91	0	- -	- -	- -	0	- -
		SS-02	0	- -	↑	0.87	0	- -	- -	- -	0	- -
		SS-03	0	- -	↑	0.70	0	- -	- -	- -	0	- -
		SS-04	0	- -	↑	0.77	0	- -	- -	- -	0	- -
		SS-05	0	- -	↑	0.84	0	- -	- -	- -	0	- -
		SS-06	0	- -	↑	0.70	0	- -	- -	- -	0	- -
		SS-07	0	- -	↑	0.69	0	-	- -	- -	↑	0.10
		SS-08	0	- -	↑	0.80	0	- -	- -	- -	0	- -
		SS-09	0	- -	↑	0.83	↑	0.47	- -	- -	0	- -
		SS-10	0	- -	↑	0.66	0	- -	- -	- -	0	- -
		SS-11	0	- -	↑	0.87	0	- -	- -	- -	0	- -
		SS-12	0	- -	↑	0.84	0	- -	- -	- -	0	- -
Cadmium[e]	Outer Harbor	OH-01	↓	0.53	↓	0.65	↓	0.60	0	- -	↓	0.60
		OH-02	↓	0.61	↓	0.60	↓	0.67	- -	- -	↓	0.63
		OH-03	↓	0.50	↓	0.65	↓	0.64	0	- -	↓	0.60
		OH-04	↓	0.64	↓	0.52	↓	0.67	- -	- -	↓	0.60
		OH-05	↓	0.67	↓	0.60	↓	0.66	- -	- -	↓	0.64
		OH-06	↓	0.62	↓	0.51	↓	0.60	0	- -	↓	0.57
		OH-07	↓	0.66	↓	0.60	↓	0.53	- -	- -	↓	0.59
		OH-08	↓	0.69	↓	0.61	↓	0.66	0	- -	↓	0.65
		OH-09	↓	0.69	↓	0.62	↓	0.59	- -	- -	↓	0.62
		OH-10	↓	0.70	↓	0.57	↓	0.63	- -	- -	↓	0.63
		OH-11	↓	0.71	↓	0.62	↓	0.65	- -	- -	↓	0.65
		OH-12	↓	0.72	↓	0.61	↓	0.68	- -	- -	↓	0.67
		OH-13	↓	0.68	↓	0.51	↓	0.67	- -	- -	↓	0.61
		OH-14	↓	0.58	↓	0.62	↓	0.50	0	- -	↓	0.59
		OH-15	- -	- -	↓	0.57	↓	0.57	- -	- -	↓	0.54
	Nearshore	NS-01	↓	0.83	↓	0.67	↓	0.68	- -	- -	↓	0.67
		NS-02	↓	0.83	↓	0.62	↓	0.68	- -	- -	↓	0.65
		NS-03	↓	0.83	↓	0.66	↓	0.71	- -	- -	↓	0.70
		NS-04	↓	0.83	↓	0.69	↓	0.68	- -	- -	↓	0.69
		NS-05	↓	0.83	↓	0.61	↓	0.66	- -	- -	↓	0.65
		NS-07	↓	0.85	↓	0.68	↓	0.68	- -	- -	↓	0.72

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Metals (continued)												
Cadmium (continued)	Nearshore (continued)	NS-08	↓	0.83	↓	0.61	↓	0.62	- -	- -	↓	0.64
		NS-10	↓	0.81	↓	0.70	↓	0.72	- -	- -	↓	0.72
		NS-11	↓	0.79	↓	0.62	↓	0.62	- -	- -	↓	0.63
		NS-12	↓	0.50	↓	0.65	↓	0.64	0	- -	↓	0.60
		NS-13	↓	0.66	↓	0.60	↓	0.53	- -	- -	↓	0.59
		NS-14	↓	0.58	↓	0.62	↓	0.56	0	- -	↓	0.59
		NS-27	↓	0.83	↓	0.66	↓	0.46	- -	- -	↓	0.63
		NS-28	↓	0.53	↓	0.65	↓	0.60	0	- -	↓	0.60
	South Shore	SS-01	↓	0.68	↓	0.66	↓	0.64	- -	- -	↓	0.64
		SS-02	↓	0.64	↓	0.72	↓	0.61	- -	- -	↓	0.65
		SS-03	↓	0.68	↓	0.64	↓	0.70	- -	- -	↓	0.67
		SS-04	↓	0.46	↓	0.61	↓	0.59	- -	- -	↓	0.56
		SS-05	↓	0.71	↓	0.54	↓	0.67	- -	- -	↓	0.59
		SS-06	↓	0.59	↓	0.65	↓	0.54	- -	- -	↓	0.59
		SS-07	↓	0.83	↓	0.66	↓	0.46	- -	- -	↓	0.63
		SS-08	↓	0.73	↓	0.59	↓	0.68	- -	- -	↓	0.65
		SS-09	↓	0.70	↓	0.60	↓	0.68	- -	- -	↓	0.64
		SS-10	↓	0.75	↓	0.54	↓	0.54	- -	- -	↓	0.56
		SS-11	↓	0.79	↓	0.62	↓	0.62	- -	- -	↓	0.63
		SS-12	↓	0.79	↓	0.62	↓	0.70	0	- -	↓	0.60
Chromium[e]	Outer Harbor	OH-01	↓	0.35	↓	0.34	↓	0.39	↓	0.85	↓	0.38
		OH-02	↓	0.47	↓	0.33	↓	0.41	↓	0.59	↓	0.42
		OH-03	↓	0.32	↓	0.29	↓	0.22	↓	0.71	↓	0.29
		OH-04	↓	0.16	↓	0.13	↓	0.20	↓	0.78	↓	0.19
		OH-05	↓	0.40	↓	0.33	↓	0.20	**0**	- -	↓	0.33
		OH-06	↓	0.36	↓	0.27	↓	0.20	0	- -	↓	0.30
		OH-07	↓	0.31	↓	0.23	↓	0.28	↓	0.89	↓	0.28
		OH-08	↓	0.42	↓	0.26	0	- -	0	- -	↓	0.27
		OH-09	↓	0.35	↓	0.30	↓	0.18	0	- -	↓	0.30
		OH-10	↓	0.36	↓	0.30	↓	0.29	↓	0.83	↓	0.34
		OH-11	↓	0.46	↓	0.24	↓	0.36	↓	0.85	↓	0.35
		OH-12	↓	0.28	↓	0.11	0	- -	- -	- -	↓	0.13
		OH-13	↓	0.20	↓	0.12	↓	0.18	- -	- -	↓	0.18
		OH-14	↓	0.21	↓	0.18	0	- -	- -	- -	↓	0.16
		OH-15	0	- -	0	- -	0	- -	0	- -	0	- -
	Nearshore	NS-01	0	- -	↓	0.31	0	- -	- -	- -	↓	0.16
		NS-02	0	- -	↓	0.21	0	- -	- -	- -	↓	0.13
		NS-03	0	- -	↓	0.20	0	- -	- -	- -	↓	0.10
		NS-04	0	- -	↓	0.29	0	- -	- -	- -	↓	0.17
		NS-05	0	- -	↓	0.13	0	- -	- -	- -	↓	0.08
		NS-07	0	- -	↓	0.26	0	- -	- -	- -	↓	0.15
		NS-08	0	- -	↓	0.11	0	- -	- -	- -	↓	0.08
		NS-10	0	- -	↓	0.26	0	- -	- -	- -	↓	0.15
		NS-11	↓	0.20	↓	0.07	↓	0.05	- -	- -	↓	0.11
		NS-12	↓	0.32	↓	0.29	↓	0.22	↓	0.71	↓	0.29
		NS-13	↓	0.31	↓	0.23	↓	0.28	↓	0.89	↓	0.28
		NS-14	↓	0.21	↓	0.18	0	- -	- -	- -	↓	0.16

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Metals (continued)												
Chromium (continued)	Nearshore (continued)	NS-27	↓	0.46	↓	0.38	↓	0.21	- -	- -	↓	0.37
		NS-28	↓	0.35	↓	0.34	↓	0.39	↓	0.85	↓	0.38
	South Shore	SS-01	↓	0.60	↓	0.37	↓	0.38	- -	- -	↓	0.44
		SS-02	↓	0.46	↓	0.30	↓	0.08	- -	- -	↓	0.32
		SS-03	↓	0.47	↓	0.34	↓	0.22	- -	- -	↓	0.35
		SS-04	↓	0.57	↓	0.27	↓	0.26	- -	- -	↓	0.36
		SS-05	↓	0.46	↓	0.30	↓	0.26	- -	- -	↓	0.36
		SS-06	↓	0.54	↓	0.33	↓	0.25	- -	- -	↓	0.38
		SS-07	↓	0.46	↓	0.38	↓	0.21	- -	- -	↓	0.37
		SS-08	↓	0.53	↓	0.32	↓	0.23	- -	- -	↓	0.37
		SS-09	↓	0.48	↓	0.35	↓	0.16	- -	- -	↓	0.36
		SS-10	↓	0.42	↓	0.14	↓	0.16	- -	- -	↓	0.24
		SS-11	↓	0.20	↓	0.07	↓	0.05	- -	- -	↓	0.11
		SS-12	↓	0.31	↓	0.24	↓	0.21	- -	- -	↓	0.26
Copper[e]	Outer Harbor	OH-01	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-02	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-03	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-04	0	- -	↑	0.04	↑	0.10	0	- -	↑	0.05
		OH-05	↑	0.09	0	- -	0	- -	0	- -	0	- -
		OH-06	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-07	0	- -	0	- -	↑	0.04	0	- -	0	- -
		OH-08	↑	0.11	0	- -	0	- -	0	- -	0	- -
		OH-09	0	- -	0	- -	↑	0.08	0	- -	0	- -
		OH-10	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-11	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-12	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-13	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-14	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-15	↑	0.54	↑	0.12	↑	0.27	0	- -	↑	0.25
	Nearshore	NS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-02	↑	0.18	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	↑	0..18	0	- -	0	- -	- -	- -	0	- -
		NS-05	0	- -	0	- -	0	- -	- -	- -	↑	0.04
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-12	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-13	0	- -	0	- -	↑	0.04	0	- -	0	- -
		NS-14	0	- -	0	- -	0	- -	0	- -	0	- -
		NS-27	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-28	0	- -	0	- -	0	- -	0	- -	0	- -
	South Shore	SS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-04	↑	0.10	0	- -	0	- -	- -	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)												
Copper (continued)	South Shore (continued)	SS-05	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-06	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-09	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-10	0	- -	0	- -	↑	0.17	- -	- -	0	- -
		SS-11	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-12	0	- -	0	- -	↑	0.12	- -	- -	0	- -
Lead[e]	Outer Harbor	OH-01	↓	0.62	↓	0.51	↓	0.62	0	- -	↓	0.58
		OH-02	↓	0.63	↓	0.57	↓	0.65	0	- -	↓	0.62
		OH-03	↓	0.57	↓	0.48	↓	0.62	0	- -	↓	0.55
		OH-04	↓	0.77	↓	0.40	↓	0.76	0	- -	↓	0.61
		OH-05	↓	0.64	↓	0.51	↓	0.67	0	- -	↓	0.60
		OH-06	↓	0.61	↓	0.38	↓	0.67	0	- -	↓	0.54
		OH-07	↓	0.57	↓	0.60	↓	0.72	0	- -	↓	0.63
		OH-08	↓	0.64	↓	0.62	↓	0.74	0	- -	↓	0.67
		OH-09	↓	0.66	↓	0.51	↓	0.67	0	- -	↓	0.62
		OH-10	↓	0.59	↓	0.54	↓	0.74	0	- -	↓	0.63
		OH-11	↓	0.55	↓	0.47	↓	0.68	0	- -	↓	0.57
		OH-12	↓	0.73	↓	0.69	↓	0.73	- -	- -	↓	0.72
		OH-13	↓	0.75	↓	0.54	↓	0.70	- -	- -	↓	0.66
		OH-14	↓	0.61	↓	0.67	↓	0.68	0	- -	↓	0.66
		OH-15	↓	0.44	↓	0.56	↓	0.64	0	- -	↓	0.58
	Nearshore	NS-01	↓	0.86	↓	0.63	↓	0.85	- -	- -	↓	0.73
		NS-02	↓	0.88	↓	0.65	↓	0.68	- -	- -	↓	0.69
		NS-03	↓	0.76	↓	0.57	↓	0.75	- -	- -	↓	0.65
		NS-04	↓	0.83	↓	0.57	↓	0.76	- -	- -	↓	0.63
		NS-05	↓	0.78	↓	0.65	↓	0.62	- -	- -	↓	0.67
		NS-07	↓	0.72	↓	0.68	↓	0.79	- -	- -	↓	0.70
		NS-08	↓	0.59	↓	0.61	↓	0.79	- -	- -	↓	0.64
		NS-10	↓	0.49	↓	0.64	↓	0.79	- -	- -	↓	0.64
		NS-11	↓	0.71	↓	0.64	↓	0.67	- -	- -	↓	0.66
		NS-12	↓	0.57	↓	0.48	↓	0.62	0	- -	↓	0.55
		NS-13	↓	0.57	↓	0.60	↓	0.72	0	- -	↓	0.63
		NS-14	↓	0.61	↓	0.67	↓	0.68	0	- -	↓	0.66
		NS-27	↓	0.73	↓	0.43	↓	0.74	- -	- -	↓	0.59
		NS-28	↓	0.62	↓	0.51	↓	0.62	0	- -	↓	0.58
	South Shore	SS-01	↓	0.64	↓	0.59	↓	0.66	- -	- -	↓	0.63
		SS-02	↓	0.80	↓	0.47	↓	0.79	- -	- -	↓	0.67
		SS-03	↓	0.75	↓	0.49	↓	0.79	- -	- -	↓	0.66
		SS-04	↓	0.32	↓	0.53	↓	0.69	- -	- -	↓	0.53
		SS-05	↓	0.66	↓	0.54	↓	0.71	- -	- -	↓	0.63
		SS-06	↓	0.52	↓	0.50	↓	0.66	- -	- -	↓	0.58
		SS-07	↓	0.73	↓	0.43	↓	0.74	- -	- -	↓	0.59
		SS-08	↓	0.64	↓	0.54	↓	0.63	- -	- -	↓	0.59
		SS-09	↓	0.67	↓	0.55	↓	0.69	- -	- -	↓	0.63

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)												
Lead (continued)	South Shore (continued)	SS-10	↓	0.73	↓	0.51	↓	0.69	- -	- -	↓	0.61
		SS-11	↓	0.71	↓	0.64	↓	0.67	- -	- -	↓	0.60
		SS-12	↓	0.70	↓	0.62	↓	0.57	- -	- -	↓	0.62
Mercury[e]	Outer Harbor	OH-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-03	- -	- -	↓	0.98	- -	- -	- -	- -	0	- -
		OH-04	0	- -	0	- -	- -	- -	- -	- -	↓	0.76
		OH-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-09	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-11	- -	- -	0	- -	- -	- -	- -	- -	0	- -
		OH-12	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-13	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-14	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		OH-15	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Nearshore	NS-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-11	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-12	- -	- -	↓	0.98	- -	- -	- -	- -	0	- -
		NS-13	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-14	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-27	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		NS-28	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
	South Shore	SS-01	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-02	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-03	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-04	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-05	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-06	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-07	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-08	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-09	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-10	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-11	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
		SS-12	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
Nickel[e]	Outer Harbor	OH-01	↓	0.48	↓	0.70	↓	0.50	- -	- -	↓	0.59
		OH-02	↓	0.48	↓	0.58	↓	0.52	- -	- -	↓	0.54
		OH-03	↓	0.48	↓	0.62	↓	0.65	- -	- -	↓	0.59

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b] Spring Trend	Spring R^2	Summer Trend	Summer R^2	Fall Trend	Fall R^2	Winter Trend	Winter R^2	Annual[c] Trend	Annual R^2
Metals (continued)												
Nickel (continued)	Outer Harbor (continued)	OH-04	↓	0.74	0	- -	↓	0.74	- -	- -	↓	0.07
		OH-05	↓	0.55	↓	0.62	↓	0.59	- -	- -	↓	0.60
		OH-06	↓	0.47	↓	0.62	↓	0.56	- -	- -	↓	0.57
		OH-07	↓	0.47	↓	0.65	↓	0.66	- -	- -	↓	0.62
		OH-08	↓	0.58	↓	0.63	↓	0.56	- -	- -	↓	0.60
		OH-09	↓	0.45	↓	0.56	↓	0.59	- -	- -	↓	0.56
		OH-10	↓	0.46	↓	0.65	↓	0.57	- -	- -	↓	0.59
		OH-11	↓	0.60	↓	0.55	↓	0.59	- -	- -	↓	0.58
		OH-12	↓	0.50	↓	0.53	↓	0.52	- -	- -	↓	0.53
		OH-13	↓	0.61	↓	0.57	↓	0.60	- -	- -	↓	0.60
		OH-14	↓	0.53	↓	0.69	↓	0.60	- -	- -	↓	0.63
		OH-15	0	- -	↓	0.64	↓	0.99	- -	- -	↓	0.46
	Nearshore	NS-01	↓	0.55	↓	0.74	↓	0.82	- -	- -	↓	0.72
		NS-02	↓	0.71	↓	0.74	↓	0.80	- -	- -	↓	0.74
		NS-03	↓	0.66	↓	0.76	↓	0.79	- -	- -	↓	0.74
		NS-04	↓	0.64	↓	0.71	↓	0.89	- -	- -	↓	0.74
		NS-05	↓	0.66	↓	0.69	↓	0.82	- -	- -	↓	0.73
		NS-07	↓	0.60	↓	0.73	↓	0.75	- -	- -	↓	0.71
		NS-08	↓	0.60	↓	0.65	↓	0.76	- -	- -	↓	0.66
		NS-10	↓	0.61	↓	0.73	↓	0.77	- -	- -	↓	0.71
		NS-11	↓	0.38	↓	0.57	↓	0.65	- -	- -	↓	0.56
		NS-12	↓	0.48	↓	0.62	↓	0.65	- -	- -	↓	0.59
		NS-13	↓	0.47	↓	0.65	↓	0.66	- -	- -	↓	0.62
		NS-14	↓	0.53	↓	0.69	↓	0.60	- -	- -	↓	0.63
		NS-27	↓	0.48	↓	0.58	↓	0.68	- -	- -	↓	0.58
		NS-28	↓	0.48	↓	0.70	↓	0.50	- -	- -	↓	0.59
	South Shore	SS-01	↓	0.32	↓	0.51	↓	0.47	- -	- -	↓	0.45
		SS-02	↓	0.46	↓	0.53	↓	0.56	- -	- -	↓	0.52
		SS-03	↓	0.45	↓	0.54	↓	0.57	- -	- -	↓	0.53
		SS-04	↓	0.44	↓	0.51	↓	0.58	- -	- -	↓	0.51
		SS-05	↓	0.47	↓	0.55	↓	0.53	- -	- -	↓	0.52
		SS-06	↓	0.47	↓	0.48	↓	0.57	- -	- -	↓	0.51
		SS-07	↓	0.48	↓	0.58	↓	0.68	- -	- -	↓	0.58
		SS-08	↓	0.21	↓	0.46	↓	0.56	- -	- -	↓	0.43
		SS-09	↓	0.49	↓	0.51	↓	0.57	- -	- -	↓	0.53
		SS-10	↓	0.46	↓	0.48	↓	0.56	- -	- -	↓	0.50
		SS-11	↓	0.38	↓	0.57	↓	0.65	- -	- -	↓	0.56
		SS-12	↓	0.58	↓	0.55	↓	0.57	- -	- -	↓	0.56
Zinc[e]	Outer Harbor	OH-01	0	- -	0	- -	↑	0.06	0	- -	↑	0.02
		OH-02	0	- -	↑	0.06	↑	0.14	0	- -	↑	0.02
		OH-03	0	- -	↑	0.03	0	- -	0	- -	↑	0.02
		OH-04	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-05	0	- -	↑	0.04	0	- -	0	- -	0	- -
		OH-06	0	- -	0	- -	0	- -	0	- -	0	- -
		OH-07	0	- -	↑	0.06	↑	0.11	0	- -	↑	0.04
		OH-08	↓	0.09	0	- -	0	- -	- -	- -	0	- -
		OH-09	0	- -	0	- -	↑	0.07	0	- -	0	- -

Table C-6 (continued)

Constituent	Lake Michigan	Station[d]	Season[b]								Annual[c]	
			Spring		Summer		Fall		Winter			
			Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2	Trend	R^2
Metals (continued)												
Zinc (continued)	Outer Harbor (continued)	OH-10	0	- -	0	- -	⬆	0.11	0	- -	0	- -
		OH-11	0	- -	⬆	0.04	⬆	0.05	0	- -	0	- -
		OH-12	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-13	0	- -	0	- -	0	- -	- -	- -	0	- -
		OH-14	0	- -	⬆	0.04	0	- -	0	- -	⬆	0.03
		OH-15	0	- -	⬆	0.33	0	- -	0	- -	⬆	0.16
	Nearshore	NS-01	0	- -	0	- -	⬆	0.36	- -	- -	⬆	0.04
		NS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-04	0	- -	⬆	0.12	0	- -	- -	- -	⬆	0.05
		NS-05	0	- -	0	- -	0	- -	- -	- -	⬆	0.06
		NS-07	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-08	0	- -	0	- -	⬆	0.18	- -	- -	0	- -
		NS-10	0	- -	0	- -	0	- -	- -	- -	0	- -
		NS-11	0	- -	⬆	0.03	0	- -	- -	- -	⬆	0.02
		NS-12	0	- -	⬆	0.03	0	- -	0	- -	⬆	0.02
		NS-13	0	- -	⬆	0.06	⬆	0.11	0	- -	⬆	0.04
		NS-14	0	- -	⬆	0.04	0	- -	0	- -	⬆	0.03
		NS-27	0	- -	⬆	0.06	0	- -	- -	- -	⬆	0.02
		NS-28	0	- -	0	- -	⬆	0.06	0	- -	⬆	0.02
	South Shore	SS-01	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-02	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-03	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-04	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-05	0	- -	⬆	0.05	0	- -	- -	- -	0	- -
		SS-06	0	- -	⬆	0.06	0	- -	- -	- -	0	- -
		SS-07	0	- -	⬆	0.06	0	- -	- -	- -	⬆	0.02
		SS-08	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-09	0	- -	0	- -	0	- -	- -	- -	0	- -
		SS-10	0	- -	⬆	0.06	0	- -	- -	- -	0	- -
		SS-11	0	- -	⬆	0.03	0	- -	- -	- -	⬆	0.02
		SS-12	0	- -	⬆	0.08	0	- -	- -	- -	⬆	0.03

[a] *Trends were assessed through linear regression analysis. A trend was considered significant if the regression showed a significant slope at P = 0.05 or less. Symbols: ⬆ indicates a statistically significant increase, ⬇ indicates a statistically significant decrease, 0 indicates that no trend was detected. R^2 indicates the fraction of variance accounted for by the regression. Higher R^2 values indicate that higher portions of the variation in the data are attributable to the trend. Lower R^2 values indicate that more of the variation is due to random factors.*

[b] *The seasonal breakouts are defined in Chapter III of this report, "Data Sources and Methods of Analysis." The seasons are defined as follows: Spring is March through May, Summer is June through August, Fall is September through November, and Winter is December through February.*

[c] *Because MMSD stopped sampling during the winter in 1987, data from winter months are not included in the annual trend analysis.*

[d] *The stations are associated with the locations shown on Map 117 and defined in Table 188 in Chapter X of this report.*

[e] *These data were log-transformed before being entered into regression analysis.*

Source: SEWRPC.

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Appendix D

MAMMALS KNOWN TO OCCUR IN THE SOUTHEASTERN WISCONSIN AREA

Scientific (family) and Common Name	Scientific Name	Fond du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Didelphidae										
Virginia Opossum	*Didelphis virginiana*	X	X	X	X	X	X	X	X	X
Soricidae										
Cinereous Shrew	*Sorex cinereus*	- -	X	- -	- -	X	X	X	- -	- -
Smokey Shrew	*Sorex fumeus*	- -	- -	- -	- -	- -	- -	- -	X	- -
American Pigmy Shrew[a]	*Microsorex hoyi hoyi*	- -	- -	- -	- -	- -	- -	X	X	- -
Short-Tailed Shrew	*Blarina brevicauda*	- -	X	- -	- -	X	X	X	X	- -
Least Shrew	*Cryptotis parva*	- -	- -	- -	- -	- -	- -	- -	- -	- -
Talpidae										
Prairie Mole	*Scalopus aquaticus*	- -	- -	- -	- -	- -	- -	- -	X	- -
Star-Nosed Mole	*Condylura cristata*	- -	- -	- -	- -	- -	- -	X	- -	- -
Vespertilionidae										
Little Brown Bat	*Myotis lucifugus*	- -	- -	- -	- -	X	X	X	X	- -
Silver-Haired Bat	*Lasisoncteris noctivagans*	- -	- -	- -	- -	X	- -	X	X	- -
Big Brown Bat	*Eptesicus fuscus*	X	- -	- -	- -	- -	X	X	X	- -
Red Bat	*Lasiurus borealus*	- -	- -	- -	- -	X	X	X	X	- -
Hoary Bat	*Lasiurus cinereus*	- -	- -	- -	- -	X	- -	X	X	- -
Leporidae										
White-Tailed Jack Rabbit[a]	*Lepus townsendii*	X	X	X	X	X	X	X	X	X
Minnesota Varying Hare	*Lepus americanus*	- -	X	- -	X[b]	- -	- -	X[b]	- -	- -
Cottontail Rabbit	*Sylvilgus floridanus*	X	X	X	X	X	X	X	X	X
Sciuridae										
Woodchuck	*Marmota monax*	X	X	X	X	X	X	X	X	X
Thirteen-Lined Ground Squirrel (gopher)	*Spermophilus tridencemilineatus*	X	X	X	X	X	X	X	X	X
Franklin's Ground Squirrel[a]	*Citellus franklinii*	X[b]	- -	- -	- -	X	X	- -	X	X
Eastern Chipmunk	*Tamias striatus*	X	- -	- -	- -	X	X	X	X	
Grey Squirrel	*Sciurus carolinensis*	X[b c]	X[b,c]	X	X[c]	X	X	X	X	X[b]
Eastern Fox Squirrel	*Sciurus niger*	X[b,c]	X[b,c]	X[c]	X	X	X	X	X	X[b,c]
Red Squirrel	*Tamiasciurus hudsonicus*	X[b]	X	X	X	X	X	X	X	X
Northern Flying Squirrel	*Glaucomys sabrinus*	- -	- -	- -	- -	- -	- -	X	- -	- -
Southern Flying Squirrel	*Glaucomys volans*	X	- -	- -	- -	X	X	X	X	- -
Castoridae										
American Beaver	*Castor canadensis*	- -	- -	- -	- -	- -	- -	X	- -	- -
Cricetidae										
Woodland Deer Mouse	*Peromyscus maniculatus gracilis*	- -	X	- -	- -	- -	- -	- -	- -	- -
Prairie Deer Mouse	*Peromyscus maniculatus bairdii*	- -	- -	- -	- -	X	- -	X	X	X
White-Footed Mouse	*Peromyscus leucopus*	- -	- -	- -	- -	X	X	X	X	- -
Cooper's Lemming Mouse	*Synaptomys cooperi*	- -	X	- -	- -	- -	- -	- -	- -	- -

Appendix D (continued)

Scientific (family) and Common Name	Scientific Name	Fond du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Cricetidae (continued)										
Gapper's Red-Backed Vole	*Clethrionomys gapperi*	- -	X	- -	- -	X	- -	X	- -	- -
Meadow Vole	*Microtus pennsylvanicus*	X	X	X	X	X	X	X	X	X
Prairie Vole[a]	*Microtus ochrogaster*	- -	- -	- -	- -	X	- -	- -	X	
Common Muskrat	*Ondatra zibethicus*	X	X	X	X	X	X	X	X	X
Muridae										
Norway Rat (introduced)	*Rattus norvegicus*	X	X	X	X	X	X	X	X	X
House Mouse (introduced)	*Mus musculus*	X	X	X	X	X	X	X	X	X
Zapodidae										
Meadow Jumping Mouse	*Zapas hudonius*	- -	X	- -	X	X	X	X	X	- -
Erethizontidae										
Canada Porcupine	*Erethizon dorsatum*	X	- -	- -	- -	- -	- -	- -	- -	- -
Canidae										
Coyote	*Canis latrans*	- -	X	- -	- -	- -	X	X	X	X
Eastern Wolf[d]	*Canis lupus*	- -	X[b]	- -	- -	- -	X[b]	X[b]	- -	X[b]
Eastern Red Fox	*Vulpes vulpes*	X	X	X	X	X	X	X	X	X
Gray Fox	*Urocyon cinereoargenteus*	X	X	X	X	X	X	X	X	X
Procyonidae										
Raccoon	*Procyon lotor*	X	X	X	X	X	X	X	X	X
Mustelidae										
Fisher	*Martes pennanti*	- -	- -	- -	- -	- -	- -	X	- -	- -
Short-Tailed Weasel	*Mustela erminea*	- -	- -	- -	- -	X	X	- -	- -	- -
Long-Tailed Weasel	*Mustela frenata*	X	- -	- -	- -	X	X	X	X	- -
Least Weasel	*Mustela nivalis*	- -	- -	- -	- -	- -	- -	- -	- -	- -
Allegheny Least Weasel	*Mustela rixosa*	- -	- -	- -	- -	X	- -	- -	X	X
Mink	*Mustela vison*	X	X	X	X	X	X	X	X	X
Wolverine	*Gulo luscus*	- -	- -	- -	- -	X	- -	- -	- -	- -
Badger (occasional visitor)	*Taxidea taxus*	X	- -	- -	X	X	X	X	- -	X
Stiped Skunk	*Mephitis mephitis*	X	X	X	X	X	X	X	X	X
Otter (occasional visitor)	*Lontra canadensis*	- -	- -	- -	- -	- -	- -	X	X	- -
Felidae										
Wisconsin Puma[a]	*Felis concolor*	X	- -	- -	- -	- -	X	- -	- -	- -
Canada Lynx	*Lynx canadensis*	- -	- -	- -	- -	- -	X	X	- -	- -
Lake Superior Bobcat	*Lynx rufus*	X	- -	- -	- -	X	- -	X[b]	X[b]	- -
Cervidae										
White-Tailed Deer	*Odecoileus virginianus*	X	X	X	X	X	X	X	X	X

[a] *Identified as a special concern species in Wisconsin.*

[b] *Authentic records before 1900.*

[c] *Presence assumed based on kill estimate numbers.*

[d] *Identified as threatened in Wisconsin.*

Source: H.T. Jackson, Mammals of Wisconsin*, 1961, U.S. Department of Agriculture Integrated Taxonomic Information System, National Museum of Natural History, Smithsonian Institute, and SEWRPC.*

Appendix E

BIRDS KNOWN OR LIKELY TO OCCUR IN THE SOUTHEASTERN WISCONSIN AREA

Scientific (family) and Common Name	Scientific Name	Fond Du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Gaviidae										
Common Loon[a]	*Gavia immer*	M	M	M	M	M	M	M	B, M	M
Red-Throated Loon	*Gavia stellata*	M	M	M	M	M	M	M	M	M
Podicipedidae										
Pied-Billed Grebe	*Podilymbos podiceps*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	M
Eared Grebe	*Podiceps nigricollis*	- -	- -	- -	- -	- -	- -	M	- -	- -
Red-Necked Grebe[e]	*Podiceps grisegena*	B, M	M	- -	M	M	M	M	- -	M
Horned Grebe	*Podiceps auritus*	M	M	M	M	M	M	M	M	M
Pelecanidae										
American White Pelican[a]	*Pelecanus erythrorhynchos*	- -	- -	- -	- -	B	- -	- -	- -	- -
Phalacrocoracidae										
Double-Crested Cormorant	*Phalacrocorax auritus*	B, M	M	M	M	B, M	M	M	M	M
Ardeidae										
American Bittern[a]	*Botaurus lentiginosus*	Bp, M	M	M	Bp, M	Bp, M	B, M	B, M	Bp	M
Least Bittern[a]	*Ixobrychus exilis*	M	M	M	B, M	B, M	B, M	B, M	B, M	M
Great Blue Heron[a]	*Ardea herodias*	B, M	B, M	B, M	B, M	B, M	B, M	B, M, W	M	B, M
Great Egret[b]	*Ardea alba*	B, M	M	M	M	B, M	B, M	M	M	M
Cattle Egret[a,c]	*Bubulcus ibis*	M	M	M	M	M	M	M	- -	M
Green Heron	*Butorides striatus*	B, M	B, M	B, M	B, M	Bp, M	B, M	B, M	Bp, M	B, M
Black-Crowned Night Heron[a]	*Nycticorax nycticorax*	Bp, M	M	M	B, M	B, M	B, M	M	B, M	M
Yellow-Crowned Night Heron[b]	*Nyctanassa violacea*	M	M	- -	M	M	- -	B, M	- -	M
Cathartidae										
Turkey Vulture	*Cathartes aura*	Bp, M	Bp, M	M	B, M	B, M	B, M	B, M	Bp, M	Bp, M
Anatidae										
Tundra Swan	*Cygnus columbianus*	M	M	M	M	M	B, M	M	M	M
Mute Swan[c]	*Cygnus olor*	R, W	R, W	B, R, W	R, W	R, W	B, R, W	B, M, R, W	B, R, W	Bp, R, W
Snow Goose	*Chen caerulescens*	M	M	M	M	M	M	M	M	M
Canada Goose	*Branta canadensis*	B, M, R, W	B, M, R, W	B, M, R, W	B, M,R, W	B, M,W, R	B, M, R, W	B, M, R, W	B, M,R, W	B, M, R, W
Wood Duck	*Aix sponsa*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Green-Winged Teal	*Anas crecca*	B, M	B, M	M	M	Bp, M	M	M	M	M
American Black Duck[a]	*Anas rubripes*	M, W	M, W	M, W	M, W	M, W	M, W	B, M, W	B, M, W	M, W
Mallard	*Anas platyrhynchos*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R	B, R	B, R
Nothern Pintaila	*Anas acuta*	M	M	M	Bp, M	M	M	M	M	M

NOTE: The following abbreviations are used in this table:

B = Breeding: Nesting species
Bp = Probable Breeding
M = Migrant: Spring and/or fall transient
W = Wintering: Present January through February
R = Resident: Present Year Round

Appendix E (continued)

Scientific (family) and Common Name	Scientific Name	Fond Du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Anatidae (continued)										
Blue-Winged Teal	*Anas discors*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M
Northern Shoveler	*Anas clypeata*	B, M	B, M	M	B, M	Bp, M	M	B, M	M	B, M
Gadwall	*Anas strepera*	M	B, M	M	Bp, M	B, M	B, M	Bp, M	M	M
American Wigeon[a]	*Anas americana*	M	M	M	M	B, M	M	M	M	M
Canvasback[a]	*Aythya valisineria*	M	M	M	M	M	M	M	M	M
Redhead[a]	*Aythya americana*	B, M	M	M	M	B, M	M	M	M	M
Ring-Necked Duck	*Aythya collaris*	M	M	M	M	M	M	M	M	M
Lesser Scaup[a]	*Aythya affinis*	M	M	M	M	M	M	M, W	M	M
Greater Scaup	*Aythya marila*	M	M	M	M	M	M	M, W	M	M
Oldsquaw	*Clangula hyemalis*	M, W	M, W	M, W	M, W	- -	- -	M, W	M, W	- -
Common Goldeneye[a]	*Bucephala clangula*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Bufflehead	*Bucephala albeola*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Harlequin Duck	*Histrionicus histrionicus*	- -	- -	- -	- -	- -	- -	M, W	- -	- -
Surf Scoter	*Melanitta perspicillata*	M	M	M	M	- -	M	M	- -	- -
White-Winged Scoter	*Melanitta fusca*	M	M	M	M	M	M	M	M	- -
Black Scoter	*Melanitta nigra*	M	M	M	M	- -	- -	M	M	- -
Long-Tailed Duck	*Clangula hyemalis*	- -	- -	- -	- -	- -	- -	M, W	- -	- -
Hooded Merganser	*Lophodytes cucullatus*	B, M	M	B, M	M	M	B, M	B, M	B, M	M
Common Merganser[a]	*Mergus merganser*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Red-Breasted Merganser[a]	*Mergus serrator*	M	M	M	M	M	M	M, W	M	M
Ruddy Duck	*Oxyura jamaicensis*	M, R	M, R	M, R	M, R	B, M, R	B, M, R	B, M, R	B, M, R	M, R
Accipitridae										
Osprey[b]	*Pandion haliaetus*	B, M	B, M	M	M	M	M	M	M	M
Bald Eagle[a,d]	*Haliaeetus leucocephalus*	M	M	M	M	B, M, R	M	M, R	- -	M, R
Cooper's Hawk	*Accipiter cooperii*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R, W	B, R	B, R
Sharp-Shinned Hawk	*Accipiter striatus*	M, R	M, R	M, R	B, M, R	M, R	B, M, R	B, M, R, W	M, R	M, R
Northern Harrier[a]	*Circus cyaneus*	B, R	B, R	R	B, R	B, R, W	B, R	Bp, M, R, W	B, R	R
Broad-Winged Hawk	*Buteo platypterus*	B, M	B, M	M	B, M	M	B, M	B, M	M	M
Red-Tailed Hawk	*Buteo jamaicensis*	B, R	B, R	B, R	B, R	B, R, W	B, R	B, M, R, W	B, R	B, R
Northern Goshwak[a]	*Accipiter gentiles*	R	B, R	R	R	R	R	M, R	R	R
Red-shouldered Hawk[b]	*Buteo lineatus*	B, M, R	M, R	B, M, R	B, M, R	M, R	B, M, R	M, R	M, R	M, R
Rough Legged Hawk	*Buteo lagopus*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Falconidae										
American Kestrel	*Falco sparverius*	B, R	B, R	B, R	B, R	B, R, W	B, R	B, M, R, W	B, R	B, R
Peregrine Falcon[e]	*Falco peregrinus*	M	B, M	M	B, M	M	M	B, M, W	B, M	B, M
Merlin[a]	*Falco columbarius*	M	M	M	M	M	M	M	M	M

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Appendix E (continued)

Scientific (family) and Common Name	Scientific Name	Fond Du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Tetraonidae										
Ruffed Grouse	*Bonasa umbellus*	B, R	R	R	R	R	R	R	- -	- -
Phasianidae										
Wild Turkey	*Meleagris gallopavo*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R, W	B, R	B, R
Grey Partridge[c]	*Perdix perdix*	B, R	B, R	R	B, R	B, R	R	R	- -	R
Ring-Necked Pheasant[c]	*Phasianus colchicus*	B, R	B, R	B, R	B, R	B, R, W	B, R	Bp, M, R, W	B, R	Bp, R
Northern Bobwhite	*Colinus virginianus*	B, M	Bp, M	M	M	M	M	M	B	M
Rallidae										
American Coot	*Fulica americana*	B, M	Bp, M	B, M	B, M	B, M	B, M	B, M, W	B, M	Bp, M
Virginia Rail	*Rallus limicola*	B, M	Bp, M	Bp, M	M	B, M	B, M	B, M	B, M	M
Sora	*Porzana carolina*	B, M	Bp, M	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M
Common Moorhen[a]	*Gallinula chloropus*	B, M	- -	M	M	B, M	B, M	Bp, M	B, M	M
Gruidae										
Sandhill Crane	*Grus canadensis*	B	B	B	B	B	B	Bp, M	B	B
Charadriidae										
American Golden Plover	*Pluvialis dominica*	M	M	M	M	M	M	M	M	M
Black-Bellied Plover	*Pluvialis squatarola*	M	M	M	M	M	M	M	M	M
Semipalmated Plover	*Charadrius semipalmatus*	M	M	M	M	M	M	M	M	M
Piping Plover[c,e,f]	*Charadrius melodus*	- -	- -	- -	- -	- -	- -	M	- -	- -
Killdeer	*Charadrius vociferus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Recurvirostridae										
Black-Necked Stilt	*Himantopus mexicanus*	- -	- -	- -	- -	B	- -	- -	- -	- -
Scolopacidae										
Greater Yellowlegs	*Tringa melanoleuca*	M	M	M	M	M	M	M	M	M
Lesser Yellowlegs	*Tringa flavipes*	M	M	M	M	M	M	M	M	M
Long-Billed Dowitcher	*Limnodromus scolopaceus*	M	M	M	M	M	M	M	M	M
Short-Billed Dowitcher	*Limnodromus griseus*	M	M	M	M	M	M	M	M	M
Solitary Sandpiper	*Tringa solitaria*	M	M	M	M	M	M	M	M	M
Spotted Sandpiper	*Actitis macularia*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Upland Sandpiper[a]	*Bartramia longicauda*	Bp, M	Bp, M	M	B, M	M	M	M	B, M	B, M
Hudsonian Godwit	*Limosa haemastica*	M	- -	- -	M	M	M	M	- -	- -
Marbled Godwit	*Limosa fedoa*	- -	- -	- -	M	M	- -	M	M	M
Willet	*Catoptrophorus semipalmatus*	M	M	M	M	M	- -	M	- -	- -
Common Snipe	*Gallinago gallinago*	Bp, M	Bp, M	M	Bp, M	Bp, M	Bp, M	M	B, M	M
American Woodcock	*Scolopax minor*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	M

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Appendix E (continued)

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Scolopacidae (continued)										
Wilson's Phalarope[a]	*Phalaropus tricolor*	M	- -	M	M	B, M	M	M	M	- -
Ruddy Turnstone	*Arenaria interpres*	M	M	M	M	M	M	M	M	M
Red Knot	*Calidris canutus*	M	M	- -	M	- -	- -	M	- -	- -
Sanderling	*Calidris alba*	M	M	M	M	M	M	M	M	M
Semipalmated Sandpiper	*Calidris pusilla*	M	M	M	M	M	M	M	M	M
Western Sandpiper	*Calidris mauri*	- -	- -	- -	- -	- -	- -	M	- -	- -
Least Sandpiper	*Calidris minutilla*	M	M	M	M	M	M	M	M	M
White-rumped Sandpiper	*Calidris fuscicollis*		M	M	M	M	M	M	M	M
Baird's Sandpiper	*Calidris bairdii*	M	M	M	M	M	M	M	- -	- -
Pectoral Sandpiper	*Calidris melanotos*	M	M	M	M	M	M	M	M	M
Purple Sandpiper	*Calidris maritime*	- -	- -	- -	- -	- -	- -	M, W	B	- -
Stilt Sandpiper	*Calidris himantopus*	M	M	M	M	M	- -	M	M	- -
Whimbrel	*Numenius phaeopus*	- -	- -	- -	- -	- -	- -	M	- -	- -
Dunlin	*Calidris alpine*	M	M	M	M	M	M	M	B, M	M
Laridae										
Bonaparte's Gull[a]	*Larus philadelphia*	M	M	M	M	M	M	M	M	M
Black-Legged Kittiwake	*Rissa tridactyla*	- -	- -	- -	- -	- -	- -	M, W	- -	- -
Ring-Billed Gull	*Larus delawarensis*	R	R	R	R	M, R	R	B, M, R	R	R
Herring Gull	*Larus argentatus*	B, R	R	R	R	M, R	R	B, M, R, W	B, R	R
Thayer's Gull	*Larus thayeri*	- -	- -	- -	- -	- -	- -	M, W	- -	- -
Glaucous Gull	*Larus hyperboreus*	- -	M, W	- -	M, W	- -	- -	M, W	- -	- -
Franklin's Gull	*Larus pipixcan*	M	M	M	M	- -	M	M	- -	- -
Great Black-Backed Gull[a]	*Larus marinus*	- -	- -	- -	- -	- -	- -	M, W	- -	- -
Lesser Black-Backed Gull	*Larus fuscus*	- -	- -	- -	- -	- -	- -	M, W	- -	- -
Caspian Tern[e]	*Sterna caspia*	M	M	M	M	M	M	M	Bp, M	M
Common Tern[e]	*Sterna hirundo*	B, M	M	- -	M	M	M	M	M	M
Forster's Tern[e]	*Sterna forsteri*	M	M	M	M	B, M	B, M	B, M	B, M	M
Black Tern[a]	*Chlidonius niger*	B, M	M	B, M	M	B, M	B, M	B, M	B, M	Bp, M
Columbidae										
Rock Dove[c]	*Columba livia*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R	B, R	Bp, R
Mourning Dove	*Zenaida macroura*	B, R	B, R	B, R	B, R	B, R	B, R	B, R	M, R	B, R
Cuculidae										
Black-Billed Cuckoo	*Coccyzus erythropthalmus*	B, M	Bp, M	B, M	B, M	B, M	B, M	B, M	M	M
Yellow-Billed Cuckoo[a]	*Coccyzus americanus*	B, M	Bp, M	B, M	B, M	B, M	B, M	B, M	M	M

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Appendix E (continued)

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Strigidae										
Barn Owl[e]	*Tyto alba*	- -	- -	- -	- -	- -	Bp	- -	- -	- -
Eastern Screech Owl	*Otus asio*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R	B, R	R
Great Horned Owl	*Bubo virginianus*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R	B, R	B, R
Snowy Owl	*Nyctea scandiaca*	W, M	W, M	- -	W, M	W, M	W, M	W, M	W, M	W, M
Barred Owl	*Strix varia*	B, R	Bp, R	B, R	B, R	Bp, R	B, R	M, R	R	R
Long-Eared Owl[a]	*Asio otus*	R	R	R	B, R	- -	R	M, R, W	- -	- -
Short-Eared Owl[a]	*Asio flammeus*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Northern Saw-Whet Owl	*Aegolius acadicus*	M, R	M, R	M, R	M, R	M, R	Bp, M, R	M, R, W	M, R	M, R
Caprimulgidae										
Common Nighthawk	*Chordeiles minor*	Bp, M	M	B, M	M	B, M	B, M	B, M	B, M	M
Whip-Poor-Will	*Caprimulgus vociferus*	Bp, M	M	M	Bp, M	- -	Bp, M	M	M	M
Apodidae										
Chimney Swift	*Chaetura pelagica*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Trochilidae										
Ruby-Throated Hummingbird	*Archilochus colubris*	B, M	Bp, M	B, M	B, M	B, M	B, M	B, M	B, M	M
Alcedinidae										
Belted Kingfisher	*Ceryle alcyon*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Picidae										
Red Bellied Woodpecker	*Melanerpes carolinus*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R, W	B, R	B, R
Red-Headed Woodpecker[a]	*Melanerpes erythrocephalus*	B, R, M	B, R, M	B, R, M	Bp, R, M	B, R, M	B, M, R	B, M, R	B, R, M	Bp, R, M
Yellow-Bellied Sapsucker	*Sphyrapicus varius*	M	M	Bp, M	M	M	M	M	M	M
Downy Woodpecker	*Picoides pubescens*	B, R	B, R	B, R	B, R	B, R	B, R	B, R	B, R	B, R
Hairy Woodpecker	*Picoides villosus*	B, R	B, R	B, R	B, R	B, R	B, R	B, R, W	B, R	
Pileated Woodpecker	*Dryocopus pileatus*	B, R	Bp, R	R	B, R	R	B, R	R	- -	R
Northern Flicker	*Colaptes auratus*	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R
Tyrannidae										
Olive-Sided Flycatcher	*Contopus cooperi*	M	M	M	M	M	M	M	M	M
Eastern Wood-Pewee	*Contopus virens*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Yellow-Bellied Flycatcher	*Empidonax flaviventris*	M	M	M	M	M	- -	M	M	M
Acadian Flycatcher[b]	*Empidonax virescens*	B, M	M	B, M	B, M	Bp, M	B, M	M	Bp	- -
Alder Flycatcher	*Empidonax alnorum*	B, M	Bp, M	Bp, M	B, M	M	Bp, M	M	- -	M
Willow Flycatcher	*Empidonax traillii*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Least Flycatcher	*Empidonax minimus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M
Eastern Phoebe	*Sayornis phoebe*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Great Crested Flycatcher	*Myiarchus crinitus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Eastern Kingbird	*Tyrannus tyrannus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Western Kingbird	*Tyrannus verticalis*	- -	- -	- -	- -	- -	- -	M	- -	- -

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Appendix E (continued)

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Alaudidae										
Horned Lark	*Eremophila alpestris*	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R	Bp, M, R	B, M, R	B, M, R	B, M, R
Hirundinidae										
Purple Martin	*Progne subis*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Tree Swallow	*Tachycineta bicolor*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Northern Rough-Winged Swallow	*Stelgidopteryx serripennis*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Bank Swallow	*Riparia riparia*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Cliff Swallow	*Petrochelidon pyrrhonota*	B, M	B, M	M	B, M	B, M	B, M	B, M	B, M	B, M
Barn Swallow	*Hirundo rustica*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Corvidae										
Blue Jay	*Cyanocitta cristata*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R, W	B, R	B, R
American Crow	*Corvus brachyrhynchos*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R, W	B, R	B, R
Common Raven	*Corvus corax*	R	R	- -	- -	- -	R	M, R	- -	R
Paridae										
Tufted Titmouse	*Baeolophus bicolor*	R	- -	R	- -	- -	B, R	B, M, R, W	B, R	- -
Black-Capped Chickadee	*Parus atricapillus*	B, R	B, R	B, R	B, R	B, R, W	B, R	B, M, R, W	B, R	B, R
Sittidae										
Red-Breasted Nuthatch	*Sitta canadensis*	B, M	B, R	R	R	R	B, R	B, M, R, W	M	R
White-Breasted Nuthatch	*Sitta carolinensis*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R, W	B, R	B, R
Certhiidae										
Brown Creeper	*Certhia americana*	B, R, M	Bp, M	B, R, M	B, R, M	B, M, W	B, M	Bp, M, R, W	R, M	R, M
Troglodytidae										
Bewick's Wren	*Thryothorus bewickii*	- -	- -	- -	- -	- -	- -	M	- -	- -
Carolina Wren	*Thryothorus ludovicianus*	- -	- -	- -	- -	- -	- -	Bp, M, W	Bp	- -
House Wren	*Troglodytes aedon*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Winter Wren	*Troglodytes troglodytes*	Bp, M	M	B, M	B, M	M	M	M	M	M
Sedge Wren	*Cistothorus platensis*	B, M	B, M	Bp, M	Bp, M	B, M	B, M	B, M	B	Bp, M
Marsh Wren	*Cistothorus palustris*	B, M	Bp, M	Bp, M	B, M	B, M	B, M	Bp, M	B, M	Bp, M
Regulidae										
Golden-Crowned Kinglet	*Regulus satrapa*	B, M	M	M	B, M	M	Bp, M	M, W	M	M
Ruby-Crowned Kinglet	*Regulus calendula*	M	M	M	M	M	M	M	M	M
Sylviidae										
Blue-Gray Gnatcatcher	*Polioptila caerulea*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M

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Appendix E (continued)

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Turidae										
Eastern Bluebird	*Sialia sialis*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Veery	*Catharus fuscescens*	B, M	B, M	B, M	B, M	Bp, M	B, M	B, M	M	M
Gray-Cheeked Thrush	*Catharus minimus*	M	M	M	M	M	M	M	M	M
Swainson's Thrush[a]	*Catharus ustulatus*	M	M	M	M	M	M	M	M	M
Hermit Thrush	*Catharus guttatus*	M	M	M	M	M	M	M, W	M	M
Townsend's Solitaire	*Myadestes townsendi*	- -	- -	- -	- -	- -	- -	M	- -	- -
Wood Thrush	*Hylocichla mustelina*	B, M	Bp, M	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M
American Robin	*Turdus migratorius*	B, M	B, M	B, M	B, M	B, M	B, M	B, M, W	B, M	B, M
Mimidae										
Gray Catbird	*Dumetella carolinensis*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Northern Mockingbird	*Mimus polyglottos*	M	M	- -	M	- -	M	M	M	- -
Brown Thrasher	*Toxostoma rufum*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Motacillidae										
Water Pipit	*Anthus spinoletta*	M	M	M	M	M	M	M	M	- -
American Pipit	*Anthus rubescens*	- -	- -	- -	- -	- -	- -	M	- -	- -
Bombycillidae										
Bohemian Waxwing	*Bombycilla garrulus*	M, W	M, W	- -	M, W	- -	- -	M, W	- -	- -
Cedar Waxwing	*Bombycilla cedrorum*	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R, W	B, M, R	B, M, R
Lanniidae										
Northern Shrike	*Lanius excubitor*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Loggerhead Shrike[e]	*Lanius ludovicianus*	B, M	- -	- -	B, M	- -	M	M	- -	M
Sturnidae										
European Starling[c]	*Sturnus vulgaris*	B, R	B, R	B, R	B, R	B, R	B, R	B, M, R	B, R	B, R
Vireonidae										
Bell's Vireo[b]	*Vireo bellii*	- -	- -	- -	M	M	M	Bp, M	- -	B
White-Eyed Vireo[a]	*Vireo griseus*	- -	- -	- -	- -	- -	Bp	Bp, M	- -	- -
Solitary Vireo	*Vireo solitarius*	M	M	M	M	M	M	M	M	M
Yellow-Throated Vireo	*Vireo flavifrons*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M
Blue-Headed Vireo	*Vireo solitarius*	Bp	- -	- -	- -	- -	B	- -	- -	- -
Warbling Vireo	*Vireo gilvus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Red-Eyed Vireo	*Vireo olivaceus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M
Philadelphia Vireo	*Viero philadelphicus*	M	M	M	M	M	M	M	- -	M
Parulidae										
Blue-Winged Warbler	*Vermivora pinus*	B	Bp	B	B	- -	B	Bp, M	B	Bp
Golden-Winged Warbler	*Vermivora chrysoptera*	Bp, M	M	M	B, M	M	Bp, M	B, M	M	M
Tennessee Warbler[a]	*Vermivora peregrina*	M	M	M	M	M	M	M	M	M

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Parulidae (continued)										
Orange-Crowned Warbler	*Vermivora celata*	M	M	M	M	M	M	M	M	M
Nashville Warbler	*Vermivora ruficapilla*	Bp, M	M	M	B, M	M	M	M	M	M
Northern Parula	*Parula americana*	M	M	M	M	M	M	M	M	M
Yellow Warbler	*Dendroica petechia*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Chestnut-Sided Warbler	*Dendroica pensylvanica*	B, M	B, M	B, M	Bp, M	Bp, M	B, M	Bp, M	Bp, M	M
Magnolia Warbler	*Dendroica magnolia*	M	M	M	M	M	M	M	M	M
Cape May Warbler[a]	*Dendroica tigrina*	M	M	M	M	M	M	M	M	M
Black-Throated Blue Warbler[a]	*Dendroica caerulescens*	M	M	M	M	M	M	M	M	M
Yellow-Rumped Warbler	*Dendroica coronata*	M	M	M	M	M	M	M	M	M
Black-Throated Green Warbler	*Dendroica virens*	Bp, M	M	Bp, M	Bp, M	M	B, M	M	M	M
Blackburnian Warbler	*Dendroica fusca*	M	M	M	M	M	Bp, M	M	M	M
Palm Warbler	*Dendroica palmarum*	M	M	M	M	M	M	M	M	M
Prairie Warbler	*Dendroica discolor*	- -	- -	- -	- -	- -	- -	Bp, M	- -	- -
Pine Warbler	*Dendroica pinus*	B, M	B, M	M	M	M	Bp, M	M	M	M
Bay-Breasted Warbler	*Dendroica castanea*	M	M	M	M	M	M	M	M	M
Blackpoll Warbler	*Dendroica striata*	M	M	M	M	M	M	M	M	M
Cerulean Warbler[b]	*Dendroica cerulea*	B, M	M	B, M	M	M	B, M	Bp, M	- -	- -
Black-and-White Warbler	*Mniotilta varia*	B, M	Bp, M	B, M	B, M	M	Bp, M	M	M	M
Worm-Eating Warbler[e]	*Helmitheros vermivorus*	- -	- -	- -	- -	- -	Bp	M	- -	- -
American Redstart	*Setophaga ruticilla*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	M
Prothonotary Warbler[a]	*Protonotaria citrea*	B, M	- -	M	M	B, M	Bp, M	M	- -	M
Ovenbird	*Seiurus aurocapillus*	B, M	B, M	B, M	B, M	Bp, M	B, M	Bp, M	B, M	M
Northern Waterthrush	*Seiurus noveboracensis*	B, M	B, M	B, M	B, M	B, M	Bp, M	M	M	M
Louisiana Waterthrush[a]	*Seiurus motacilla*	B, M	Bp	B, M	M	M	B, M	M	M	M
Common Yellowthroat	*Geothlypis trichas*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Connecticut Warbler[a]	*Oporornis agilis*	M	M	M	M	M	M	M	M	- -
Wilson's Warbler	*Wilsonia pusilla*	M	M	M	M	M	M	M	M	M
Mourning Warbler	*Oporornis philadelphia*	B, M	M	B, M	B, M	Bp, M	M	Bp, M	Bp, M	M
Kentucky Warbler[b]	*Oporornis formosus*	M	M	- -	M	M	Bp, M	M	M	- -
Canada Warbler	*Wilsonia canadensis*	B, M	Bp, M	B, M	B, M	M	M	B, M	M	M
Yellow-breasted Chat[a]	*Icteria virens*	M	M	M	Bp, M	M	M	M	Bp, M	M
Yellow Throated Warbler[e]	*Dendroica dominica*	- -	- -	- -	- -	- -	- -	M	- -	- -
Hooded Warbler[b]	*Wilsonia citrine*	B, M	Bp, M	Bp, M	M	- -	B, M	Bp, M	Bp, M	M
Thraupidae										
Scarlet Tanager	*Piranga olivacea*	B, M	B, M	B, M	B, M	Bp, M	B, M	B, M	Bp, M	Bp, M
Western Tanager	*Piranga ludoviciana*	- -	- -	- -	- -	- -	- -	M	- -	- -

NOTE: The following abbreviations are used in this table:

B = Breeding: Nesting species
Bp = Probable Breeding
M = Migrant: Spring and/or fall transient
W = Wintering: Present January through February
R = Resident: Present Year Round

Appendix E (continued)

Scientific (family) and Common Name	Scientific Name	Fond Du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Cardinalidae										
Dickcissel[a]	*Spiza americana*	B, M	B, M	Bp, M	B, M	B, M	B, M	B, M	B	Bp, M
Northern Cardinal	*Cardinalis cardinalis*	B, R	B, R	B, R	B, R	B, R, W	B, R	B, R, W	B, R	B, R
Rose-Breasted Grosbeak	*Pheucticus ludovicianus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M
Indigo Bunting	*Passerina cyanea*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Emberizidae										
Eastern Towhee	*Pipilo erythrophthalmus*	B, M	B, M	B, M	B, M	M	B, M	B, M	B, M	B, M
American Tree Sparrow	*Spizella arborea*	M, W	M, W	M, W	M, W	M, W	M, M	M, W	M, W	M, W
Clay-Colored Sparrow	*Spizella pallida*	M	B, M	Bp, M	B, M	Bp, M	M	B, M	B, M	M
Chipping Sparrow	*Spizella passerina*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Field Sparrow	*Spizella pusilla*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Vesper Sparrow	*Pooecetes graminues*	B, M	B, M	B, M	B, M	B, M	B, M	Bp, M	B, M	B, M
Lark Bunting	*Calamospiza melanocorys*	- -	- -	- -	- -	- -	- -	M	- -	- -
Le Conte's Sparrow[a]	*Ammodramus leconteii*	- -	M	- -	M	- -	M	M	- -	M
Savannah Sparrow	*Passerculus sandwichensis*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Harris's Sparrow	*Zonotrichia querula*	M	M	M	M	M	M	M	- -	- -
Grasshopper Sparrow[a]	*Ammodramus savannarum*	B, M	Bp, M	B, M	B, M	B, M	Bp, M	B, M	Bp	Bp, M
Henslow's Sparrow[b]	*Ammodramus henslowii*	B, M	M	M	M	Bp, M	Bp, M	B, M	M	Bp, M
Fox Sparrow	*Passerella iliaca*	M	M	M	M	M	M	M, W	M	M
Song Sparrow	*Melospiza melodia*	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R, W	B, M, R	B, M, R, W	B, M, R	B, M, R
Spotted Towhee	*Pipilo maculates*	- -	- -	- -	- -	- -	- -	M	- -	- -
Lincoln's Sparrow	*Melospiza lincolnii*	M	M	M	M	M	M	M	M	M
Sharp-Tailed Sparrow[a]	*Ammodramus nelsoni*	- -	- -	- -	- -	- -	- -	M	- -	- -
Swamp Sparrow	*Melospiza georgiana*	B, M	B, M	B, M	B, M	B, M, W	B, M	B, M, W	B, M	Bp, M
White-Throated Sparrow	*Zonotrichia albicollis*	B, M, R	M, R	B, M, R	B, M, R	M, R	M, R	M, R, W	M, R	M
White-Crowned Sparrow	*Zonotrichia leucophrys*	M	M	M	M	M	M	M, W	M	M
Lark Sparrow[a]	*Chondestes grammacus*	M	- -	M	- -	M	M	M	- -	M
Dark-Eyed Junco	*Junco hyemalis*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Lapland Longspur	*Calcarius lapponicus*	M, W	- -	M, W	M, W	M, W	M, W	M, W	- -	- -
Snow Bunting	*Plectrophenax nivalis*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Icteridae										
Bobolink	*Dolichonyx oryzivorus*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Red-Winged Blackbird	*Agelaius phoeniceus*	B, M, R	B, M, R	B, M, R	B, M, R	B, R, M, W	B, M, R	B, M, R, W	B, M, R	B, M, R
Eastern Meadowlark	*Sturnella magna*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Western Meadowlark[a]	*Sturnella neglecta*	B, M	Bp M	Bp, M	B, M	Bp, M	M	M	M	M
Rusty Blackbird	*Euphagus carolinus*	M, R	M, R	M, R	M, R	M, R	M, R	M, R, W	M, R	M, R
Brewer's Blackbird	*Euphagus cyanocephalus*	M	M	M	B, M	M	M	M	M	M
Common Grackle	*Quiscalus quiscula*	B, M, R	B, M, R	B, M, R	B, M, R	B, M, R, W	B, M, R	B, M, R, W	B, M, R	B, M, R
Brown-Headed Cowbird	*Molothrus ater*	B, M, R	B, M, R	B, M, R	B, M, R	B, M, RW	B, M, R	B, M, R, W	B, M, R	B, M, R
Orchard Oriole[a]	*Icterus spurius*	M	B, M	B, M	B, M	B, M	Bp, M	B, M	B, M	B, M
Northern (Baltimore) Oriole	*Icterus galbula*	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M	B, M
Yellow-Headed Blackbird	*Xanthocephalus xanthocephalus*	B, M	M	M	M	B, M	B, M	B, M	B, M	M

NOTE: The following abbreviations are used in this table:

B = Breeding: Nesting species
Bp = Probable Breeding
M = Migrant: Spring and/or fall transient
W = Wintering: Present January through February
R = Resident: Present Year Round

Appendix E (continued)

Scientific (family) and Common Name	Scientific Name	Fond Du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Fringillidae										
Pine Grosbeak	*Pinicola enucleator*	M, W	M, W	M, W	M, W	- -	M, W	M, W	- -	- -
Purple Finch	*Carpodacus purpureus*	B, R	R	R	R	R	R	M, R, W	R	R
House Finch	*Carpodacus mexicanus*	B, R	B, R	B, R	B, R	B, R, W	B, R	B, M, R, W	B, R	B, R
Common Redpoll	*Carduelis flammea*	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W	M, W
Hoary Redpoll	*Carduelis hornemanni*	- -	- -	- -	- -	- -	- -	W	- -	- -
Pine Siskin[a]	*Carduelis pinus*	Bp, M, R, W	M, R, W	Bp, M, R, W	M, R, W	M, R, W	B, M, R, W	Bp, M, R, W	B, M, W	M, R, W
American Goldfinch	*Carduelis tristis*	B, R, W	B, R, W	B, R, W	B, R, W	B, R, W	B, R, W	B, M, R, W	B, R, W	B, R, W
Evening Grosbeak[a]	*Coccothraustes vespertinus*	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W
Red Crossbill	*Loxia curvirostra*	M, R	M, R	M, R	M, R	M, R	M, R	M, R, W	- -	- -
White-Winged Crossbill	*Loxia leucoptera*	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W	M, R, W	- -	M, R, W
Passeridae										
House Sparrow[c]	*Passer domesticus*	B, R, W	B, R, W	B, R, W	B, R, W	B, W, R	B, R, W	B, M, R, W	B, R, W	B, R, W

NOTES: Total number of bird species: 289

The following abbreviations are used in this table:

B = Breeding: Nesting species
Bp = Probable Breeding
M = Migrant: Spring and/or fall transient
W = Wintering: Present January through February
R = Resident: Present Year Round

[a] *State-designated species of special concern. Fully protected Federal and State laws under the Migratory Bird Act.*

[b] *State-designated threatened species.*

[c] *Alien, or nonnative, bird species.*

[d] *Federally designated threatened species.*

[e] *State-designated endangered species.*

[f] *Federally listed Endangered.*

Source: Samuel D. Robbins, Jr., Wisconsin Birdlife, Population & Distribution, Past and Present, 1991; John E. Bielefeldt, Racine County Naturalist; Wisconsin Department of Natural Resources; National Audubon Society; Wisconsin Breeding Bird Atlas; Stanley Temple, John Cary and Robert Rolley, Wisconsin Birds, A Seasonal and Geographical Guide Second Edition, 1997; Tory Peterson, Peterson Field Guides, Eastern Birds, 1980; and SEWRPC.

Appendix F

AMPHIBIANS AND REPTILES IN THE SOUTHEASTERN WISCONSIN AREA

Scientific (family) and Common Name	Scientific Name	Fond du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Amphibians										
Proteidae										
Mudpuppy	*Necturus maculosus maculosus*	X	X	X	X	X	X	X	X	X
Ambystomatidae										
Blue-Spotted Salamander	*Ambystoma laterale*	X	X	X	X	X	X	X	X	X
Spotted Salamander	*Ambystoma maculatum*	X	X	X	X	- -	X	X		- -
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*	X	X	X	X	X	X	X	X	X
Salamandridae										
Central Newt	*Notophthalmus viridescens louisianensi*	X	X	X	X	X	X	X	X	X
Plethodontidae										
Four-Toed Salamander[a]	*Hemidactylium scutatum*	X	X	X	X	X	X	X	X	X
Redback Salamander	*Plethodon cinereus*	X	X	- -	- -	- -	- -	- -	- -	- -
Bufonidae										
American Toad	*Bufo americanus americanus*	X	X	X	X	X	X	X	X	X
Hylidae										
Western Chorus Frog	*Pseudacris triseriata triseriata*	X	X	X	X	X	X	X	X	X
Blanchard's Cricket Frog[b]	*Acris crepitans blanchardi*	X[d]		X[d]	- -	X[d]	X[d]	X[d]	X[d]	X[d]
Northern Spring Peeper	*Hyla crucifer crucifer*	X	X	X	X	X	X	X	X	X
Gray Tree Frog	*Hyla versicolor*	X	X	X	X	X	X	X	X	X
Cope's Gray Treefrog	*Hyla chrysoscelis*	X	X	X	X	X	X	X	X	X
Ranidae										
Bull Frog[a]	*Rana catesbeiana*	X	X	X	X	X	X	X	X	X
Green Frog	*Rana clamitans melanota*	X	X	X	X	X	X	X	X	X
Northern Leopard Frog	*Rana pipiens*	X	X	X	X	X	X	X	X	X
Pickerel Frog[a]	*Rana palustris*	X	X	X	X	X	X	X	X	X
Wood Frog	*Rana slyvatica*	X	X	X	X	X	X	X	X	X
Reptiles										
Chelydridae										
Common Snapping Turtle	*Chelydra serpentina serpentine*	X	X	X	X	X	X	X	X	X
Kinosternidae										
Musk Turtle (stinkpot)	*Sternotherus odoratus*	X	- -	X	X	X	X	X	X	X

Appendix F (continued)

Scientific (family) and Common Name	Scientific Name	Fond du Lac County	Sheboygan County	Washington County	Ozaukee County	Dodge County	Waukesha County	Milwaukee County	Racine County	Kenosha County
Reptiles (continued)										
Emydidae										
Western Painted Turtle	*Chrysemys picta belli*	X	X	X	X	X	X	X	X	X
Midland Painted Turtle	*Chrysemys picta marginata*	X	X	X	X	X	X	X	X	X
Blanding's Turtle[c]	*Emydoidea blandingii*	X	X	X	X	X	X	X	X	X
Trionychidea										
Smooth Softshell Turtle	*Apalone mutica mutica*	- -	- -	- -	- -	- -	- -	X	- -	- -
Eastern Spiny Softshell	*Trionyx spiniferus spiniferus*	X	- -	X	- -	X	X	X	X	X
Western Spiny Softshell	*Apalone spinifera hartwegi*	X	- -	- -	- -	- -	X	X	X	- -
Colubridae										
Northern Ringneck Snake	*Diadophis punctatus edwardsii*	X	X	X	X	- -	X	X[d]	- -	- -
Western Fox Snake	*Elaphe vulpine vulpine*	X	X	X	X	X	X	X	X	X
Northern Water Snake	*Nerodia sipedon sipedon*	X	X	X	X	X	X	X	X	X
Midland Brown Snake	*Storeria dekayi wrightorum*	X	X	X	X	X	X	X	X	X
Northern Red-Bellied Snake	*Storeria occipitomaculata occipitomaculata*	X	X	X	X	X	X	X	X	X
Queen Snake[b]	*Regina septemvittata*	- -	- -	X	X[d]	- -	X[d]	X[d]	X[d]	X
Chicago Garter Snake	*Thamnophis sirtalis semifasciata*	- -	- -	- -	- -	- -	- -	X		- -
Butler's Garter Snake[c]	*Thamnophis butleri*	X	X	X	X	- -	X	X	X	- -
Eastern Plains Garter Snake	*Thamnophis radix radix*	- -	- -	- -	- -	X	X	X	X	X
Western Ribbon Snake[b]	*Thamnophis proximus proximus*	- -	- -	- -	- -	- -	- -	- -	X	- -
Northern Ribbon Snake[b]	*Thamnophis sauritus septentrionalis*	- -	X	X	- -	- -	- -	X[d]	- -	- -
Eastern Garter Snake	*Thamnophis sirtalis sirtalis*	X	X	X	X	X	X	X	X	X
Chicago Garter Snake	*Thamnophis sirtalis semifasciata*	X	X	X	X	X	X	X	X	X
Eastern Hognose Snake	*Heterodon platyrhinos*	X	- -	X	- -	X	X	- -	X	X
Smooth Green Snake	*Opheodrys vernalis vernalis*	X	- -	X	- -	X	X	X	X	X
Eastern Milk Snake	*Lampropeltis triangulum triangulum*	X	X	X	X	X	X	X	X	X

[a] *Identified as a special concern species in Wisconsin.*

[b] *Identified as endangered in Wisconsin.*

[c] *Identified as threatened in Wisconsin.*

[d] *Likely to be extirpated from the County.*

Source: *Gary S. Casper,* Geographical Distribution of the Amphibians and Reptiles of Wisconsin*, 1996; Wisconsin Department of Natural Resources; Christoffel, Hay, and Ramirez,* Snakes of Wisconsin*, 2000; Wisconsin Department of Natural Resources, Bureau of Endangered Species; and SEWRPC.*

Appendix G

WPDES PERMITTED STORMWATER FACILITIES

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Table G-1

WPDES PERMITTED STORMWATER FACILITIES IN THE KINNICKINNIC RIVER WATERSHED: FEBRUARY 2003

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Municipal Stormwater Permit[a]	Milwaukee County[b]	Countywide	County	S050113	- -	- -
	City of Cudahy[b]	Citywide	Cudahy	S049875-2	241206790	15778
	City of Greenfield[b]	Citywide	Greenfield	S050059-1	- -	- -
	City of Milwaukee	Citywide	Milwaukee	S049018-3	241003730	6159
	City of St. Francis[b]	Citywide	St. Francis	S049883-1	241208990	15775
	City of West Allis[b]	Citywide	West Allis	S049913-1	341073810	29417
	Village of West Milwaukee[b]	Villagewide	West Milwaukee	S050059-1	- -	- -
Stormwater Auto Parts Recycling	Ace Auto Salvage	2393 S. 43rd Street	Milwaukee	S059145	241484980	13233
	Auto Paradise Imports, Inc.	4905 W. Burnham Street	Milwaukee	S059145	241779010	2707
	Burnham Auto Salvage, Inc.	4901 W. Burnham Street	Milwaukee	S059145	241788580	596
	KK Auto Salvage, Inc.	2003 S. Kinnickinnic Avenue	Milwaukee	S059145	241783850	13738
	South Side Auto Salvage, Inc.	2108 W. Holt Avenue	Milwaukee	S059145	241540310	2704
Stormwater Construction Site	Cherokee Point	41st Street and Morgan Avenue	Milwaukee	S067831	- -	14373
	Electric Avenue Business Development	Electric Avenue	West Milwaukee	S067831	- -	18235
	General Mitchell International Airport Parking Structure Addition	Within airport grounds-north of existing parking structure	Milwaukee	S067831	- -	18498
	Loomis Center	3545-3555 S. 27th St. and 2901 W. Morgan Avenue	Milwaukee	S067831	- -	18970
	Southgate Shopping Center	3333 S. 27th Street	Milwaukee	S067831	- -	15404
	St. Lukes Medical Center	2900 W. Oklahoma Avenue	Milwaukee	S067831	- -	16434
Stormwater Industrial Tier 1	Aelco Foundries	1930 S. 4th Street	Milwaukee	S067849	241027820	762
	Becker & Keller, Inc.	4333 W. Lincoln Avenue	Milwaukee	S067849	241998790	3234
	John Novak	1960 S. 67th Place	West Allis	S067849	241299116	16514
	Maynard Steel Casting Company	2856 S. 27th Street	Milwaukee	S067849	241005710	8076
	McCann Barrel	5311 S. 9th Street	Milwaukee	S067857	241234840	12484
	Milport Enterprises, Inc.	2829 S. 5th Court	Milwaukee	S067849	241213830	8264
	Milwaukee Bulk Terminals Coal	401 W. Greenfield Avenue	Milwaukee	S067849	241335160	3361
	Milwaukee Ductile Iron, Inc.	1706 S. 68th Street	West Allis	S067849	241006260	5580
	Milwaukee Malleable & Grey Iron Works	2776 S. 29th Street	Milwaukee	S067849	241031780	7958
	Reliable Plating Works, Inc.	5320 S. 13th Street	Milwaukee	S067849	241288520	12466
Stormwater Industrial Tier 2	Acme Galvanizing, Inc.	2730 S. 19th Street	Milwaukee	S067857	241036950	189
	Advance Boiler & Tank Company	1711 S. Carferry Drive	Milwaukee	S067857	241015830	493
	Associated Spring	434 W. Edgerton Avenue	Milwaukee	S067857	241054880	3702
	Badger Die Casting Corporation	201 W. Oklahoma Avenue	Milwaukee	S067857	241022100	6699
	Brown-Wilbert Vault Company	3900 S. 13th Street	Milwaukee	S067857	241314920	7967
	Cargill International-Salt Division	1835 S. Carferry Drive	Milwaukee	S067857	241949070	11678
	Castech, Inc.	6325 W. National Avenue	Milwaukee	S067857	241896380	14387
	Dynamic Color Solutions, Inc.	2024 S. Lenox Street	Milwaukee	S067857	241258820	655
	Edward E. Gillen	1801 S. Carferry Drive	Milwaukee	S067857	241949950	11720
	Federal Express	5375 S. Third Street	Milwaukee	S067857	241382790	9192
	Froedtert Malt	2100 S. 43rd Street	Milwaukee	S067857	241013960	2149
	Froedtert Malt	3030 W. Grant Street	Milwaukee	S067857	241011100	6127
	General Mills/Gardetto's	4624 S. 6th Street	Milwaukee	S067857	241956110	1726
	Grover Piston Ring, Inc.	2759 S. 28th Street	Milwaukee	S067857	241544710	1396
	Joy Mark, Inc.	2121 E. Norse Avenue	Cudahy	S067857	241879550	11727
	Kempsmith Machine Company	1819 S. 71st Street	West Allis	S067857	241334500	1454

Table G-1 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	Ladish Company, Inc.	5481 S. Packard Avenue	Cudahy	S067857	241006920	5595
	Laidlaw Transit, Inc.	4524 S. 13th Street	Milwaukee	S067857	241635020	13263
	Mayfield Truck & Trailer Leasing	1011A W. Layton Avenue	Milwaukee	S067857	241748870	9903
	Milwaukee Bus, Inc.	2761 S. Chase Avenue	Milwaukee	S067857	S241424810	9197
	Milwaukee Cylinder	5877 S. Pennsylvania Avenue	Cudahy	S067857	241191170	3705
	Milwaukee General Construction Company, Inc.	4580 S. 13th Street	Milwaukee	S067857	241910570	14635
	Milwaukee Steel Treating	4669 W. Electric Avenue	Milwaukee	S067857	241406990	15343
	Milwaukee Valve Company	2375 S. Burrell Street	Milwaukee	S067857	241034090	8666
	Minergy Products, LLC	1975 S. Carferry Drive	Milwaukee	S067857	341005280	16098
	National Recycling, Inc.	4244 S. 13th Street	Milwaukee	S067857	241048500	2548
	National Tank Service of Wisconsin, Inc.	1813 S. 73rd Street	West Allis	S067857	241214820	3333
	Nordberg, Inc.-Milwaukee	3073 S. Chase Avenue	Milwaukee	S067857	241008570	2437
	Patrick Cudahy, Inc.	4801 S. Kingan Avenue	Cudahy	S067857	241009670	5646
	Piper Metal Fabrication Corporation	2025 E. Birchwood Avenue	Milwaukee	S067857	241254640	2252
	Plating Engineering Company	1928 S. 62nd Street	West Allis	S067857	241040800	413
	Pressed Steel Tank Company, Inc.	1445 S. 66th Street	West Allis	S067857	241037940	6847
	Product Service & Manufacturing Corporation	4530 W. Burnham Street	West Milwaukee	S067857	241777800	930
	Regent Die & Tool Company	730 W. Armour Avenue	Milwaukee	S067857	241195130	19908
	Rexworks, Inc.	445 W. Oklahoma Avenue	Milwaukee	S067857	241009560	669
	Rite-Hite Corporation	5935 S. Pennsylvania Avenue	Cudahy	S067857	241252660	651
	Roadrunner Freight Systems, Inc.	4850 S Pennsylvania Avenue	Cudahy	S067857	241359800	1929
	Sherwin Industries, Inc.	2129 W. Morgan Avenue	Milwaukee	S067857	241031450	441
	So Lite Neon Sign Company, Inc.	1100 S. 5th Street	Milwaukee	S067857	241814100	946
	Southeastern Wisconsin Products Company-Milwaukee	500 W. Edgerton Avenue	Milwaukee	S067857	241052680	2035
	Tandem Transport, Inc.	2607 S. 5th Street	Milwaukee	S067857	241355180	2290
	Tax Air Freight	5975 S. Howell Avenue	Milwaukee	S067857	241366510	11968
	Unit Drop Forge Company, Inc.	1903 S. 70th Street	West Allis	S067857	241011760	6138
	West Allis Machine Company, Inc.	1900 S, 70th Street	West Allis	S067857	241814210	403
	Wisconsin Air National Guard 128th Air Refueling Group	1919 E. Grange Avenue	Milwaukee	S067857	241862390	3412
Stormwater Industrial Tier 3	Brelie Gear Company, Inc.	2715 S. Gladstone Place	Milwaukee	S049158	241729510	1461
	Cemex	2006 S. Kinnickinnic Avenue	Milwaukee	S049158	241096680	1352
	Central Cartage	200 W. Oklahoma Avenue	Milwaukee	S049158	241817730	1020
	Commercial Heat Treating, Inc.	1952 S. 1st Street	Milwaukee	S049158	241223620	366
	Elite Finishing	3270 S. 3rd Street	Milwaukee	S049158	241243310	1952
	General Electric Medical Systems-Digital Branch	430 W. Grange Avenue	Milwaukee	S049158	241202500	1662
	Grebes Bakery	5132 W. Lincoln Avenue	West Allis	S049158	241063240	1302
	Klement Sausage Company, Inc.	2650 S. Chase Avenue	Milwaukee	S049158	241951600	3219
	Oilgear Company	2300 S. 51st Street	Milwaukee	S049158	241256730	5556
	Overnite Transportation Company	4924 S. 13th Street	Milwaukee	S049158	241119670	9312
	Spinweld, Inc.	6623 W. Mitchell Street	West Allis	S049158	241989990	3391
Stormwater Scrap Recycling	A1 Recycling	2101 W. Morgan Avenue	Milwaukee	S058831	241640190	8002
	Miller Compressing Company	900 S. Water Street	Milwaukee	S058831	241495870	8562
	National Salvage, Ltd.	6709-37 W. National Avenue	West Allis	S058831	241638430	7965

[a]*Each Municipal Stormwater Permit applies to the entire community and encompasses all the watersheds in the community.*

[b]*These communities received their permits after February 2003.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table G-2

WPDES PERMITTED STORMWATER FACILITIES IN THE MENOMONEE RIVER WATERSHED: FEBRUARY 2003

Permit Type	Facility	Address	Municipality	Permit Number	Facility Identification	Facility Identification Number
Municipal Stormwater Permit[a]	Milwaukee County[b]	Countywide	County	S050113	- -	- -
	Ozaukee County[b]	Countywide	County	S050075	- -	- -
	Washington County[b]	Countywide	County	S050075-1	- -	- -
	Waukesha County[b]	Countywide	County	S050075	- -	- -
	City of Brookfield[b]	Citywide	Brookfield	S050130-1	- -	- -
	City of Greenfield[b]	Citywide	Greenfield	S050130-1	- -	- -
	City of Mequon[b]	Citywide	Mequon	S050091-1	246000920	16125
	City of Milwaukee	Citywide	Milwaukee	S049018-3	241003730	6159
	City of New Berlin[b]	Citywide	New Berlin	S050059-1	- -	- -
	City of Wauwatosa[b]	Citywide	Wauwatosa	S050130-1	- -	- -
	City of West Allis[b]	Citywide	West Allis	S049913-1	341073810	29417
	Village of Butler[b]	Villagewide	Butler	S050130-1	- -	- -
	Village of Elm Grove[b]	Villagewide	Elm Grove	S050130-1	- -	- -
	Village of Germantown[b]	Villagewide	Germantown	S050130-1	- -	- -
	Village of Greendale[b]	Villagewide	Greendale	S050059-1	- -	- -
	Village of Menomonee Falls[b]	Villagewide	Menomonee Falls	S050130-1	- -	- -
	Village of West Milwaukee[b]	Villagewide	West Milwaukee	S050130-1	- -	- -
	Town of Brookfield[b]	Townwide	Brookfield	S050105-1	- -	- -
	Town of Lisbon[b]	Townwide	Lisbon	S050105-1	- -	- -
	Town of Richfield[b]	Townwide	Richfield	S050075	- -	- -
Stormwater Auto Parts Recycling	A Auto, Inc	5140 N. 124th Street	Milwaukee	S059145	241672640	14338
	A & D Truck and Auto Parts	450 S. 11th Street	Milwaukee	S059145	241540530	2757
	Advantage Auto Parts	11840 W. Hampton Avenue	Milwaukee	S059145	241941480	14440
	Allis Auto Parts	682 S. 76th Street	Milwaukee	S059145	241485090	13231
	Al's Auto Sales & Salvage	12300 W. Rohr Avenue	Milwaukee	S059145	341018370	13984
	Brand Auto Parts	1144 W. Bruce Street	Milwaukee	S059145	241933230	13811
	Calumet Auto Parts, Inc.	8501 W. Calumet Road	Milwaukee	S059145	241320860	2764
	Dave's Services	641 S. 29th Street	Milwaukee	S059145	241928170	14336
	J & J Salvage Auto Wrecking Parts, Inc.	6780 N. Industrial Road	Milwaukee	S059145	241931580	13351
	Northwest Truck Parts, Inc.	8550 N. Granville Road	Milwaukee	S059145	241739300	13817
	Ron's Service & Auto Parts	W124 N9391 Boundary Road	Menomonee Falls	S059145	368007750	13819
Stormwater Industrial Tier 1	Aldrich Chemical Company, Inc.-Emmber	230 S. Emmber Lane	Milwaukee	S067849	241222410	2516
	Aldrich Chemical Company Inc.-St. Paul Avenue	940 St. Paul Avenue	Milwaukee	S067849	241046410	5378
	Ampco Metal Manufacturing, Inc.	1745 S. 38th Street	Milwaukee	S067849	241031670	8000
	Badger Alloys, Inc.	5120 W. State Street	Milwaukee	S067849	241372120	1574
	D. R. Diedrich & Company, Ltd.	2615 W. Greves Street	Milwaukee	S067849	241038490	7994
	Frantz Company, Inc.	12314 W. Silver Spring	Milwaukee	S067849	241472770	8244
	Grede Foundries, Inc.-Liberty Foundry	6432 W. State Street	Wauwatosa	S067849	241012310	8014
	Milwaukee Gray Iron, LLC	1501 S. 83rd Street	West Allis	S067849	241006370	5581
	Motor Castings Co.-Plant 1 West Allis	1323 S. 65th Street	West Allis	S067849	241008680	5636
	Rheocast Company	N114 W19250 Clinton Drive	Germantown	S067849	267078240	8098
	Thiele Tanning Company	123 N. 27th Street	Milwaukee	S067849	241042670	7990
	Victoria, Inc.	W140 N5985 Lilly Road	Menomonee Falls	S067849	268374040	16544

Table G-2 (continued)

Permit Type	Facility	Address	Municipality	Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2	ABF Freight System, Inc.	11307 W. Rogers Street	West Allis	S067857	241396320	18469
	A-C Equipment Services, Inc.	6623 W. Washington Avenue	West Allis	S067857	241946320	14246
	A C Tool & Mach Company, Inc.	W185 N11424 Whitney Drive	Germantown	S067857	267166240	312
	Accents Unlimited	1640 S. 83rd Street	West Allis	S067857	241318220	1639
	ADM Cocoa	12500 W. Carmen Avenue	Milwaukee	S067857	268257220	23659
	Advance Boiler & Tank	6600 W. Washington St., Suite 700	West Allis	S067857	341043780	19625
	Advanced Metal Treating, Inc.	4501 N. 127th Street	Butler	S067857	268086500	2158
	Ajax Industries, Ltd.	5830 N. 95th Court	Milwaukee	S067857	241308430	2153
	Alliant Food Service Corporation	W137 N9245 Hwy. 145	Menomonee Falls	S067857	268089690	7866
	Allis Tool & Machine Corporation-A T M 94th Place	647 S. 94th Place	Milwaukee	S067857	241307440	1410
	American Concrete Pipe Company-Milwaukee	5000 N. 124th Street	Milwaukee	S067857	241063020	8072
	Amtrak Passenger Station	433 W. St. Paul Avenue	Milwaukee	S067857	241194770	10000
	Arc Ron, Ltd.	W141 N9501 Fountain Boulevard	Menomonee Falls	S067857	268234340	676
	Argo Industries	4430 N. 127th Street	Brookfield	S067857	268552350	12593
	Arrow Tool & Stamping Company, Inc.	4548 W. Mitchell Street	West Milwaukee	S067857	241183140	8663
	A S I Technologies, Inc.	5848 N. 95th Court	Milwaukee	S067857	241536350	1871
	Atwater-General Corporation	N57 W13636 Carmen Avenue	Menomonee Falls	S067857	268560380	13153
	BDT Engineering	4810 N. 124th Street	Milwaukee	S067857	241195460	15436
	Becker Machine Company	N51 W13270 Brahm Court	Menomonee Falls	S067857	268280540	10872
	Best Block Company	W140 N5870 Lilly Road	Menomonee Falls	S067857	268009610	2426
	B & N Trucking	N56 W13180 Silver Spring Road	Menomonee Falls	S067857	268542780	11093
	Bohr Precision Machining	W194 N11160 Kleinmann Drive	Germantown	S067857	267172510	14721
	Bonsal American	N91 W13906 Warren Street	Menomonee Falls	S067857	268544980	11097
	Bradley Corporation	W142 N9101 Fountain Boulevard	Menomonee Falls	S067857	268011260	6704
	Brenntag Great Lakes	W14765 Bobolink Avenue	Menomonee Falls	S067857	999986020	1951
	Briggs Stratton Corp.-Wauwatosa	3300 N. 124th Street	Wauwatosa	S067857	241011870	6140
	Build All Corporation	N59 W14508 Bobolink Avenue	Menomonee Falls	S067857	268441360	10852
	Canadian Pacific Railway	504 S. Layton Boulevard	Milwaukee	S067857	241441750	8584
	Centerline Truck Repair, Inc.	9718 W. Flagg Avenue	Milwaukee	S067857	241296110	1088
	Central Ready Mix LP	5013 W. State Street	Milwaukee	S067857	241519410	8219
	CHR Hansen, Inc.	9015 W. Maple Street	West Allis	S067857	241013080	1345
	Citation Corporation-Plant 1	W139 N5470 Oak Lane	Menomonee Falls	S067857	268222240	14054
	Citation Corporation-Plant 2	W140 N5516 Lilly Road	Menomonee Falls	S067857	268439050	14052
	Citation Corporation-Plant 3	W137 N5500 Williams Place	Menomonee Falls	S067857	268358530	14050
	Citation Corporation-Plant 6	W137 N5427 Williams Place	Menomonee Falls	S067857	268438940	14053
	Coca-Cola Bottling Company of Wisconsin	11800 W. Brown Deer Road	Milwaukee	S067857	241045420	21892
	Construction Supply & Erection, Inc.	N112 W19515 Mequon Road	Germantown	S067857	267075380	7947
	Contemporary Products, Inc.-Plants 2,3,4	N57 W13282 Carmen Avenue	Menomonee Falls	S067857	268177360	9494
	Coreco	N116 W16800 Main Street	Germantown	S067857	267087150	663
	Crestwood Bakery	1710 S. 108th Street	West Allis	S067857	241078750	2313
	Custom Fleet Maintenance	9120 N. 107th Street	Milwaukee	S067857	241309860	2127
	Custom Machining Industries	N57 W13636 Carmen Avenue	Menomonee Falls	S067857	268561810	13296
	Custom Pak Products	N115 W19150 Edison Drive	Germantown	S067857	267065370	7971
	Custom Production Grinding	N56 W13500 Silver Spring Road	Menomonee Falls	S067857	268575340	11947
	DANA Victor Products Division	11500 W. Brown Deer Road	Milwaukee	S067857	241245180	364
	Derco Repair Service	8065 W. Fairlane Avenue	Milwaukee	S067857	241906390	20024
	Diecraft Tool, Inc.	N115 W19395 Edison Drive	Germantown	S067857	267171850	14327
	Dielectric Corporation	W141 N9230-40-50 Fountain Blvd.	Menomonee Falls	S067857	268284500	1343
	DST Inc.	805 S. 72nd Street	West Allis	S067857	241386420	1196

Table G-2 (continued)

Permit Type	Facility	Address	Municipality	Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	Duwe Metal Products, Inc.	N57 W13500 Carmen Avenue	Menomonee Falls	S067857	268560270	13154
	E G A Products, Inc.	4275 N. 127th Street	Brookfield	S067857	268017640	290
	Efco Finishing Corporation	5139 N. 124th Street	Butler	S067857	268164820	14719
	Ellsworth Adhesives	W186 N11687 Morse Drive	Germantown	S067857	267143250	10953
	Emmber Foods	1915 W. Canal Street	Milwaukee	S067857	241029140	10828
	Emmber Foods	200 S. Emmber Lane	Milwaukee	S067857	241255740	23056
	Entrust Tool & Design Company	N58 W14630 Shawn Circle	Menomonee Falls	S067857	268226420	11026
	Euro Machinery Specialists, Inc.	N59 W14272 Bobolink Avenue	Menomonee Falls	S067857	268563240	13294
	Fabricated Metal Products Company, Inc.	12510 W. Lisbon Road	Brookfield	S067857	268137760	1826
	Falk Corporation	3001 W. Canal Street	Milwaukee	S067857	241008240	5621
	Falk Corporation-Plant 2	12001 W. Capitol Drive	Milwaukee	S067857	241018140	2034
	Faustel, Inc.	W194 N11301 McCormick Drive	Germantown	S067857	267148640	1774
	Federal Express Milwaukee	11101 W. Plank Court	Wauwatosa	S067857	241382900	9191
	Federal/Whalen Moving & Storage LLC	W140 N9000 Lilly Road	Menomonee Falls	S067857	268548060	10806
	F P M Heat Treating	11200 Heather Avenue	Milwaukee	S067857	341024420	16557
	Galland Henning Nopak, Inc.	1025 S. 40th Street	Milwaukee	S067857	241237040	428
	Ganos Trucking/Trueline CNC	4155 N. 124th Street	Brookfield	S067857	998023180	15342
	Gehl Guernsey Farms, Inc.	N116 W15970 Main Street	Germantown	S067857	267005090	6454
	General Pattern, Inc.	4712 N. 125th Street	Butler	S067857	268197270	11040
	GKN Sinter Metals	N112 W18700 Mequon Road	Germantown	S067857	268013790	13247
	Great Lakes Aluminum, Inc.	119 S. 116th Street	West Allis	S067857	241454070	3606
	Gromax Precision Die & Manufacturing, Inc.	W185 N 11474 Whitney Drive	Germantown	S067857	267146770	1304
	Handschy Industries	N57 W13640 Reichert Avenue	Menomonee Falls	S067857	268009170	3691
	Harley-Davidson Motor Co. Operations, Inc.	11700 Capitol Drive	Wauwatosa	S067857	241005600	3448
	Harnischfeger Corporation-Milwaukee	4107 W. Orchard Street	Milwaukee	S067857	241043880	1881
	Helwig Carbon Products, Inc.	8900 W. Tower Avenue	Milwaukee	S067857	241370140	7116
	Hentzen Coatings, Inc.-Milwaukee	6937 W. Mill Road	Milwaukee	S067857	241017590	3330
	Huf North American	N113 W18950 Carnegie Drive	Germantown	S067857	267095400	354
	IDC Aerospace, LLC	8050 W. Fairlane Avenue	Milwaukee	S067857	341053680	21587
	Inland GM Diesel Manufacturing	13015 W. Custer Avenue	Butler	S067857	268462370	10886
	Innovative Packaging Corporation	9400 W. Heather Avenue	Milwaukee	S067857	241051470	15437
	International Concrete Products, Inc.	N104 W13561 Donges Bay Road	Germantown	S067857	267173940	15654
	International Food Solutions	N113 W18900 Carnegie Drive	Germantown	S067857	267057010	14535
	International Thermal Systems, LLC	4697 W. Greenfield Avenue	West Milwaukee	S067857	241473650	9444
	Johnson School Bus Service, Inc.	N87 W17391 Main Street	Menomonee Falls	S067857	268506480	11100
	Joy Farm Transportation, Inc.	7007 N. 115th Street	Milwaukee	S067857	241489270	16745
	J W Speaker Corporation	W185 N11315 Whitney Way	Germantown	S067857	267080330	2563
	Key Products, Inc.	10600 W. Glenbrook Court	Milwaukee	S067857	241263770	15156
	Krueger Bearings, Inc.	N54 W13667 Woodale Drive	Menomonee Falls	S067857	268358970	15439
	K S M Industries, Inc.	N115 W19025 Edison Drive	Germantown	S067857	267007510	875
	Laidlaw Transit, Inc.-Milwaukee	4150 W. Mitchell Street	Milwaukee	S067857	241896160	13065
	Laidlaw Transit-West Allis	7741 W. National Avenue	West Allis	S067857	241301170	13064
	Lake Shore Burial Vault Co., Inc.-Brookfield	12780 W. Lisbon Road	Brookfield	S067857	268479420	8206
	Lakeside Buses of Wisconsin, Inc.	7300 W. Green Tree Road	Milwaukee	S067857	241729070	9162
	Lesaffre Yeast Corporation	2702 W. Greves Street	Milwaukee	S067857	241031340	11541
	Lippert Corporation	W142 N8999 Fountain Boulevard	Menomonee Falls	S067857	268165150	8638
	Ludell Manufacturing. Company	5200 W. State Street	Milwaukee	S067857	241415460	396
	Mac Metal Products of Wis., Inc.-Germantown	W190 N11225 Carnegie Drive	Germantown	S067857	267057670	3341
	Mahuta Tool Corporation	N118 W19137 Bunsen Drive	Germantown	S067857	267170970	11149

Table G-2 (continued)

Permit Type	Facility	Address	Municipality	Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	Marathon Ashland Petroleum, LLC-Milwaukee	9125 N. 127th Street	Milwaukee	S067857	241078640	3620
	Marker Machine, Inc.	5240 N. 124th Street	Milwaukee	S067857	241318440	15758
	Marlow & Sons Machining, Inc.	N114 W18548 Clinton Drive	Germantown	S067857	267173280	14908
	Master Machine Company	8900 W. Schlinger Avenue	Milwaukee	S067857	241190510	352
	Masterson Company	4023 W. National Avenue	Milwaukee	S067857	241341650	7220
	Maull Baker Box Company, Inc.	5900 N. 94th Street	Milwaukee	S067857	241881310	8568
	Maysteel Corporation-Menomonee Falls Div.	N89 W14700 Patritia Drive	Menomonee Falls	S067857	268144250	1090
	Meyer Material Company	633 S. 84th Street	Milwaukee	S067857	999820910	8208
	Middle West Manufacturing Corporation	N93 W16591 Water Street	Menomonee Falls	S067857	268011040	9630
	Midwest Grinding Wheels, Inc.	7725 W. Tower Avenue	Milwaukee	S067857	241953910	149
	Midwest Products and Engineering ,Inc.	10597 W. Glenbrook Court	Milwaukee	S067857	241688040	9188
	Miller Brewing	4000 W. State Street	Milwaukee	S067857	241007030	5597
	Milwaukee County Institutions Power Plant	9250 Watertown Plank Road	Milwaukee	S067857	241027050	6633
	Milwaukee Electric Tool Corporation	13135 W. Lisbon Road	Brookfield	S067857	268016540	1238
	Milwaukee Machine Works, Inc.	404 S. 116th Street	West Allis	S067857	241477720	15711
	Molded Rubber & Plastic Corporation	13161 W. Glendale Avenue	Butler	S049158	268007410	359
	Monarch Corporation	7050 N. 76th Street	Milwaukee	S067857	241316900	1296
	M & R Machining, Inc.	N115 W18835 Edison Drive	Germantown	S067857	267173720	15806
	NTW, Inc. doing business as Pho-Tronics	8701 W. Bradley Road	Milwaukee	S067857	241169500	1219
	Onyx Waste Services Midwest, Inc.	N104 W13075 Donges Bay Road	Germantown	S067857	267058880	24455
	Perlick Corporation	8300 W. Good Hope Road	Milwaukee	S067857	241017370	245
	P & H Mining Equipment	4400 W. National Avenue	Milwaukee	S067857	241010990	6103
	Poblocki & Sons, LLC	922 S. 70th Street	West Allis	S067857	241794080	14217
	Power Test, Inc.	N60 W14630 Kaul Avenue	Menomonee Falls	S067857	268557850	12981
	Production Tool Corporation	12726 W. Arden Place	Butler	S067857	268166910	2369
	P & W Machine Division of Waukesha Foundry Co., Inc.	N51 W13333 Brahm Court	Menomonee Falls	S067857	268508460	2365
	Raabe Corporation	N92 W14701 Anthony Avenue	Menomonee Falls	S067857	268203430	2023
	Radio Oil Company, Inc.	435 S. 116th Street	West Allis	S067857	241174670	1468
	R B Tool Corporation	N92 W16062 Megal Drive	Menomonee Falls	S067857	268570280	14633
	R B P Chemical Corporation	150 S. 118th Street	West Allis	S067857	241253540	770
	Rexord Corporation-West Milwaukee Facility	4701 W. Greenfield Avenue	Milwaukee	S067857	241012200	6145
	Richards Manufacturing Company, Inc.	5127 N. 125th Street	Butler	S067857	268209480	52
	Riebau's Cabinets, Inc.	W186 N11676 Morse Drive	Germantown	S067857	267086050	14335
	Roband Corporation	N92 W15966 Megal Drive	Menomonee Falls	S067857	268401870	2152
	Scan Pac Manufacturing, Inc.	N84 W13510 Leon Road	Menomonee Falls	S067857	268013350	1833
	Schmitz Ready Mix-Milwaukee 124th Street	5400 N. 124th Street	Milwaukee	S067857	241967880	12433
	SCS of Wisconsin, Inc.	N59 W14200 Bobolink Avenue	Menomonee Falls	S067857	268125880	15613
	Select Machining Corporation	N60 W14752 Kaul Avenue	Menomonee Falls	S067857	268575670	15614
	Service Continuous, Inc.	10536 W. Glenbrook Court	Milwaukee	S067857	241003180	17584
	Service Heat Treating, Inc.	9320 N. 107th Street	Milwaukee	S067857	241042010	2363
	Share Corporation	7855 and 7821 N. Faulkner Road	Milwaukee	S067857	241325700	16464
	Singer Tool & Die, Inc.	4559 N. 128th Street	Butler	S067857	268262390	14552
	S K W Biosystems, Inc.-Germantown	W194 N11411 McCormick Drive	Germantown	S067857	267094080	2375
	S K Williams Company	4600 N. 124th Street	Wauwatosa	S067857	241011210	6130
	Smurfit Stone Container Corporation	11900 N. River Lane	Germantown	S067857	267085830	8346
	Snap On Tools Corporation-Milwaukee	7939 N. Faulkner Road	Milwaukee	S067857	241168070	1725
	Solvox Manufacturing Company	11725 W. Fairview Avenue	Milwaukee	S067857	241249470	7322
	Sonag Ready Mix, LLC	N59 W14909 Bobolink Avenue	Menomonee Falls	S067857	268450380	15902
	Stonecast Products, Inc.	N112 W14343 Mequon Road	Germantown	S067857	267147870	456

Table G-2 (continued)

Permit Type	Facility	Address	Municipality	Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	Stork Cellramic, Inc.	8399 N. 87th Street	Milwaukee	S067857	241355620	89
	Stroh Die Casting Company, Inc.	11123 W. Burleigh Street	Milwaukee	S067857	241051580	6728
	Sun Chemical	2176 S. 116th Street	West Allis	S067857	241394010	8338
	Sunlite Plastics, Inc.	W194 N11340 McCormick Drive	Germantown	S067857	267082640	5060
	Super Excavators, Inc. & Trucking, Inc.	N59 W14601 Bobolink Avenue	Menomonee Falls	S067857	268177910	711
	Super Steel Products Corporation	7900 W. Tower Avenue	Milwaukee	S067857	241026500	3212
	Tank Transport, Inc.	9202 N. 107th Street	Milwaukee	S067857	241703110	716
	Tapco	800 Wall Street	Elm Grove	S067857	268300890	10882
	T J Hale Company	W139 N9499 Highway 145	Menomonee Falls	S067857	268219490	727
	Trackside Services, Inc.	5888 N. 91st Street	Milwaukee	S067857	241251230	14244
	Traditional Concrete Products	W142 N9110 Fountain Boulevard	Menomonee Falls	S067857	268028310	6763
	Trombetta Corporation	N88 W13901 Main Street	Menomonee Falls	S067857	268565880	13999
	Twinco Romax	4871 N. 119th Street	Milwaukee	S067857	241052130	10056
	Union Pacific Railroad-Butler Yard	4823 N. 119th Street	Milwaukee	S067857	241012860	14099
	United Parcel Service-Elm Grove	12400 W. Bluemound Road	Elm Grove	S067857	268123790	9287
	United Parcel Service-Germantown	W190 N11350 Carnegie Drive	Germantown	S067857	267074170	9296
	Universal Brixis, Inc.	5880 N. 91st Street	Milwaukee	S067857	241226150	15731
	U-Tech Environmental Mfg. Supply, Inc.	W137 N5560 Williams Place	Menomonee Falls	S067857	268575450	15496
	Van Waters & Rogers, Inc.	1707 S. 101st Street	West Allis	S067857	241213170	10661
	Victory Steel Supply Company	679 S. 76th Street	Milwaukee	S067857	241032440	8579
	Vulcan Industries Corporation	N113 W18830 Carnegie Drive	Germantown	S067857	267090340	14334
	Wacker Corporation	N92 W15000 Anthony Avenue	Menomonee Falls	S067857	268237970	1163
	Waste Management of Wisconsin, Inc.	W124 N8925 Boundary Road	Menomonee Falls	S067857	268361280	16651
	Western Metal Specialty Division	1211 N. 62nd Street	Wauwatosa	S067857	241662410	1666
	Wisconsin Electric Power Company-Valley Power Plant	1035 W. Canal Street	Milwaukee	S067857	241007800	5609
	Wisconsin Hardcoat	N56 W 13460 W. Silver Spring Road	Menomonee Falls	S067857	268563790	13963
	Wisconsin Machine Tool Corporation	445 S. Curtis Road	West Allis	S067857	241244190	15655
	Wis-Pak Foods, Inc.	4700 N. 132nd Street	Butler	S067857	268016430	10858
	Wrico Stamping Company of Wisconsin	W50 N13471 Overview Drive	Menomonee Falls	S067857	268316290	56
	Yellow Freight Systems, Inc. of West Allis	11406 W. Rodgers Street	West Allis	S067857	241276640	9258
	Zignego Ready Mix West-Plant 2	551 S. Curtis Road	West Allis	S067857	241322070	7097
	Zuelzke Tool & Engineering Company, Inc.	8811 W. Dean Road	Milwaukee	S067857	241814320	188
Stormwater Industrial Tier 3	A Plus Machine Products Inc.	5285 N. 124th Street	Butler	S049158	268547840	11008
	Ace Chemical Products, Inc.	8415 N. 87th Street	Milwaukee	S049158	241390050	2776
	Ace Precision Machining Corporation	W146 N5714 Enterprise Avenue	Menomonee Falls	S049158	268249410	42
	Alto-Shaam, Inc.	W164 N9221 Water Street	Menomonee Falls	S049158	268128960	15659
	Amera Gear Company, Inc.	8828 W. Dean Road	Milwaukee	S049158	241975580	260
	Amglga Composites, Inc.	10600 W. Mitchell Street	West Allis	S049158	241224390	3665
	Arandell Corporation	N82 W13118 Leon Road	Menomonee Falls	S049158	268012360	1242
	Benz Metal Products Inc.	N58 W14789 Shawn Circle	Menomonee Falls	S049158	268266460	11016
	Berenz Packaging Corporation	N93 W16214 Megal Drive	Menomonee Falls	S049158	268156460	7941
	Butler Tool, Inc.	4731 N. 125th Street	Butler	S049158	268189460	14564
	Butler Wire & Metal Products	N60 W15288 Bobolink Avenue	Menomonee Falls	S049158	268575120	16011
	Carlisle Tire & Wheel Company-Midwest Div.	8480 N. 87th Street	Milwaukee	S049158	241381580	1561
	Contemporary Products, Inc.-Plant 1	N57 W15264 Reichert Avenue	Menomonee Falls	S049158	268276800	1684
	Desert Aire Corporation	8300 W. Sleske Court	Milwaukee	S049158	241954130	2241
	Dricken Development, Inc.	4430 N. 127th Street-Site A	Brookfield	S049158	268575010	15411

Table G-2 (continued)

Permit Type	Facility	Address	Municipality	Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 3 (continued)	Faust Woodworking, Inc.	5204 N. 126th Street	Butler	S049158	268128520	14565
	Fibreform Containers, Inc.	N115 W19255 Edison Drive	Germantown	S049158	267116080	9736
	Findley Adhesives, Inc.-Wauwatosa	11320 Watertown Plank Road	Wauwatosa	S049158	241275760	8032
	Gerett Products	W156 N9073 Pilgrim Road	Menomonee Falls	S049158	268007740	1667
	GKN Sinter Metals	N117 W18880 Fulton Drive	Germantown	S049158	267153150	14326
	GKN Sinter Metals	W160 N9359 Industrial Avenue	Menomonee Falls	S049158	268228620	267
	GKN Sinter Metals	N92 W15800 Megal Drive	Menomonee Falls	S049158	268230490	16495
	GKN Sinter Metals	W156 N9305 Tipp Street	Menomonee Falls	S049158	268225100	12049
	Glenroy, Inc.	W158 N9332 Nor-X-Way Avenue	Menomonee Falls	S049158	368009840	673
	Great Lakes Packaging Corporation	N112 W18810 Mequon Road	Germantown	S049158	267146990	1499
	Great Lakes Packaging Corporation	W190 N11260 Carnegie Drive	Germantown	S049158	267132030	20103
	Great Lakes Packaging Corp.-Germantown	W190 N11393 Carnegie Drive	Germantown	S049158	267094850	1715
	Hansen Storage Company-112th Street	2888 N. 112th Street	Milwaukee	S049158	241642830	1446
	Harley-Davidson Motor Co. Operations, Inc.	W156 N9000 Pilgrim Road	Menomonee Falls	S049158	268523790	1570
	Henri's Food Products Company, Inc.	8622 N. 87th Street	Milwaukee	S049158	241972390	12481
	Infatrol Manufacturing Corporation	6600 W. Washington Street, Bldg. 400	West Allis	S049158	341035640	19966
	Johanning	8742 W. Kaul Avenue	Milwaukee	S049158	241963920	304
	Journal/Sentinel, Inc.	4041 W. Burnham Street	Milwaukee	S049158	341055880	21787
	Koch Pipeline Company LP	9343 N. 107th Street	Milwaukee	S049158	241016160	1866
	Krete Industries, Inc.	3425 N. 124th Street	Brookfield	S049158	268462150	2115
	Lamers Bus Lines, Inc.	12800 W. Custer Avenue	Butler	S049158	268548170	10910
	Lone Star Industries, Inc.	745 W. Canal Street	Milwaukee	S049158	241903530	10052
	Luitink Manufacturing Company	W140 N8700 Lilly Road	Menomonee Falls	S049158	268139410	12959
	Mercury Marine-Plant 11	4240 N. 127th Street	Brookfield	S049158	268285600	1925
	Metal Improvement Company, Inc.	8201 N. 87th Street	Milwaukee	S049158	241482560	850
	M P Iding Company, Inc.	3420 W. Pierce Street	Milwaukee	S049158	241776150	2151
	Peacock Colors, Inc.	4514 N. 127th Street	Butler	S049158	268166360	1557
	Pepsi-Cola General Bottlers	5500 N. Lovers Lane Road	Milwaukee	S049158	241356280	9268
	Perfect Screw Products Corporation	6751 N. National Avenue	West Allis	S049158	241317890	881
	Precision Fabricators & Engineering, Inc.	W164 N9138 Water Street	Menomonee Falls	S049158	268526170	10860
	Quad/Graphics, Inc.	555 S. 108th Street	West Allis	S049158	241757340	6450
	R & B Wagner, Inc.	10600 W. Brown Deer Road	Milwaukee	S049158	241717960	14333
	Riteway Bus Service, Inc.-Richfield	W201 N13900 Fond du Lac Avenue	Germantown	S049158	267038200	779
	Silgan Containers Manufacturing Corporation	N90 W14600 Commerce Drive	Menomonee Falls	S049158	268008400	12688
	Smith & Nephew Rolyan-Rehabilitation Div.	N104 W13464 Donges Bay Road	Germantown	S049158	267129280	3382
	Tompa Woodwork	N60 W14708 Kaul Avenue	Menomonee Falls	S049158	268559500	13150
	Trans-Coil, Inc.	7878 N. 86th Street	Milwaukee	S049158	241990100	12209
	U.S. Postal Service-Milwaukee Distribution Center	345 W. St. Paul Avenue	Milwaukee	S049158	241371350	8586
	United Tool, Inc.	8219 W. Bradley Road	Milwaukee	S049158	241989880	347
	Winters Grinding Service, Inc.	W166 N5925 Greenway Circle	Menomonee Falls	S049158	268563020	27
	Wood Specialties, Inc.	N94 W14555 Garwin Mace Drive	Menomonee Falls	S049158	268462040	477
Stormwater Scrap Recycling	AMG Resources Midwest Corporation	11000 W. Brown Deer Place	Milwaukee	S058831	241828840	8566
	H & R Scrap Metal Company, Inc.	9000 W. Fond du Lac Avenue	Milwaukee	S058831	241396650	13032
	Industrial Recyclers	9400 N. 124th Street	Milwaukee	S058831	241047180	14757
	Miller Compressing Company-Mainyard	1640 Bruce Street	Milwaukee	S058831	241213720	8561
	Peter Wolin Company, Inc.	8520 W. Kaul Avenue	Milwaukee	S058831	241220980	2740
	Peltzl Menomonee Falls, Recycle America Alliance	N60 W16280 Kohler Lane	Menomonee Falls	S058831	268199360	24532
	Stimac Brothers Corporation	600 S. 44th Street	Milwaukee	S058831	241517870	12692
	West Allis Salvage Company, Inc.	1911 S. 80th Street	West Allis	S058831	241820150	13039

[a]*Each Municipal Stormwater Permit applies to the entire community and encompasses all the watersheds in the community.*

[b]*These communities received their permits after February 2003.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table G-3

WPDES PERMITTED STORMWATER FACILITIES IN THE MILWAUKEE RIVER WATERSHED: FEBRUARY 2003

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Municipal Stormwater Permit[a]	Fond du Lac County[b]	Countywide	County	S050075	- -	33771
	Milwaukee County[b]	Countywide	County	S050113	- -	- -
	Ozaukee County[b]	Countywide	County	S050075	- -	- -
	Sheboygan County[b]	Countywide	County	S050075	- -	33639
	Washington County[b]	Countywide	County	S050075-1	- -	- -
	City of Cedarburg	Citywide	Cedarburg	S049972	246053940	- -
	City of Glendale	Citywide	Glendale	S061565	341073150	- -
	City of Mequon[b]	Citywide	Mequon	S050091-1	246000920	16125
	City of Milwaukee	Citywide	Milwaukee	S049018	241003730	6159
	Village of Bayside	Villagewide	Bayside	S061565	341073040	- -
	Village of Brown Deer	Villagewide	Brown Deer	S061565	341073260	- -
	Village of Fox Point	Villagewide	Fox Point	S061565	241034430	- -
	Village of Germantown[b]	Villagewide	Germantown	S050059-1	- -	- -
	Village of Grafton[b]	Villagewide	Grafton	S050008	246055700	- -
	Village of River Hills	Villagewide	River Hills	S061565	341074140	- -
	Village of Saukville[b]	Villagewide	Saukville	S050075	- -	- -
	Village of Shorewood	Villagewide	Shorewood	S061565	341073590	- -
	Village of Thiensville	Villagewide	Thiensville	S061557	246055920	- -
	Village of Whitefish Bay	Villagewide	Whitefish Bay	S061565	341074250	- -
	Town of Cedarburg[b]	Townwide	Cedarburg	S050075	- -	- -
	Town of Grafton[b]	Townwide	Grafton	S050008	246054930	- -
	Town of Richfield[b]	Townwide	Richfield	S050075	- -	- -
Stormwater Auto Parts Recycling	Affordable Auto Salvage, Inc.	3384 N. Green Bay Avenue	Milwaukee	S059145	241763500	2706
	Auto Parts & Recycling, Inc.	W4726 Hwy A	Fredonia	S059145	246128520	13975
	Bartel Recycling	3640 CTH C	Polk	S059145	267162280	21916
	Bath Salvage	8715 Oak Drive	Kewaskum	S059145	267146110	13241
	C&C Weddie Auto Company, Inc.	4030 W. Douglas Avenue	Milwaukee	S059145	241707620	14370
	Dave's Auto Recycling, Inc.	2026 CTH A	Farmington	S059145	267116850	21060
	Don's Auto Salvage	3382 E. Moraine Drive	Kewaskum	S059145	267055580	13812
	Kaiser Wrecking	W6408 S. Hwy A	Sherman	S059145	460001520	13976
	Kirchhayn Auto Parts	1199 Western Avenue	Cedarburg	S059145	246082870	13815
	Mikis Auto Salvage, Inc.	4384 N. Green Bay Avenue	Milwaukee	S059145	341018260	13959
	Milwaukee Cycle Salvage, Inc.	5754 N. Teutonia	Milwaukee	S059145	341018150	13958
	Seven Stars Auto	3626 W. Mill Road	Milwaukee	S059145	241783960	13987
	Sowin Salvage	N1524 Hwy I	Sherman	S059145	460028910	21915
Stormwater Construction Site	Aster Woods	Northwest Corner of Eastbrook Drive and N. Port Washington Road	Mequon	S067831	- -	19356
	County Breeze Estates	Bonniwell Road at Bonniwell Court	Mequon	S067831	- -	23915
	Dean School Detention Basin	Dean Road and N. 51st Street	Brown Deer	S067831	- -	15783
	Fairbrook Subdivision	Southwest Corner Bonniwell Road and Oriole Lane	Mequon	S067831	- -	22366
	Graceland Cemetery	N. 43rd Street and Mill Road	Milwaukee	S067831	- -	16517
	Green Tree Properties	6767 60th Street	Milwaukee	S067831	- -	14120
	Kilbourn Park	Commerce Street between Holton Street and Bremen Street	Milwaukee	S067831	- -	23188

Table G-3 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Construction Site (continued)	Lincoln Creek-Reach 4	35th Street to Sherman Boulevard	Milwaukee	S067831	- -	16953
	Lincoln Creek-Reach 5	Sherman Boulevard to Hampton Avenue	Milwaukee	S067831	- -	16963
	Lincoln Creek Flood Control-Reach 3	Lincoln Creek between 32nd Street and 35th Street	Milwaukee	S067831	- -	16291
	Riverworks Parcel 2	N. Richards Street and E. Vienna Avenue	Milwaukee	S067831	- -	12937
	School Services & Leasing	6301 W. Mill Road	Milwaukee	S067831	241551200	12445
	The Highlands	North side of Highland Road 1.75 miles west of IH 43	Mequon	S067831	- -	22505
	Trinity Creek Fish Habitat	East of Baehr Road and Trinity Creek	Mequon	S067831	- -	22470
	Trostel Square Apartments	Commerce Drive north of Pleasant Street	Milwaukee	S067831	- -	16647
	Vogel Property	Northeast corner of County Line Road and Baehr Road	Mequon	S067831	- -	22648
	Windsor Estates	South of Mequon Trail Apartments	Mequon	S067831	- -	22376
Stormwater Industrial Tier 1	Amcast Automotive-Cedarburg Plant	N39 W5789 Hamilton Road	Cedarburg	S067849	246003780	5588
	Benz Oil, Inc.	2724 W. Hampton Avenue	Milwaukee	S067849	241335380	7925
	Benz Oil, Inc.-Butler	2724 W. Hampton Avenue	Milwaukee	S067849	268137870	8263
	Charter Steel Division of Charter Manufacturing Co.	1658 Cold Springs Road	Saukville	S067849	269044700	1309
	Cook Composites & Polymers Company	340 Railroad Street	Saukville	S067849	246004330	6198
	Craft Cast Company, Inc.	N160 W19179 Sherman Road	Jackson	S067849	267141710	805
	Delta HA, Inc.	6263 N. Teutonia Avenue	Milwaukee	S067849	241167850	8287
	Dimat, Inc.	7137 Sycamore Drive	Cedarburg	S067849	246074400	1179
	Elementis LTP L.P.	546 S. Water Street	Milwaukee	S067849	241247710	603
	Hercules, Inc.	52228 N. Hopkins Street	Milwaukee	S067849	241041900	2263
	Johnson Brass and Machine Foundry, Inc.	279 N. Mill Street	Saukville	S067849	246005320	6588
	Leggett & Platt, Inc.-Est Mole Creek	420 9th Street	Grafton	S067849	246081660	3662
	Leggett & Platt, Inc.-Est Division	1600 7th Avenue	Grafton	S067849	246099040	3661
	Mid City Foundry United Division	460 N. 9th Avenue	Grafton	S067849	246096290	1839
	Norstar Aluminum Molds, Inc.	W66 N622 Madison Avenue	Cedarburg	S067849	246096290	1839
	PAK Technologies Chemical Special	5024 N. 37th Street	Milwaukee	S067849	241332410	2008
	Sauk Technologies	300 N. Dekora Woods Boulevard	Saukville	S067849	346001480	22736
	Stainless Foundry Engineering, Inc.	5150 N. 35th Street	Milwaukee	S067849	241019350	8416
	Treat All Metals, Inc.	5140 N. Port Washington Road	Milwaukee	S067849	2410104770	518
	Wisconsin Paperboard Corporation	1514 E. Thomas Avenue	Milwaukee	S067849	241032640	7988
Stormwater Industrial Tier 2	Ace Iron & Steel Corporation-Milwaukee	5118 N. 24th Street	Milwaukee	S067857	241080840	836
	ACI Industries, Inc.	851 N. Progress Drive	Saukville	S067857	246142710	15084
	Advance Material Recovery	W5104 Hwy 144	Sherman	S067857	460117460	8170
	Advanced Coatings, Inc.	304 Progress Drive	West Bend	S067857	267077470	1865
	Airsan Corporation	4554 Woolworth Avenue	Milwaukee	S067857	241320200	190
	American Ornamental Iron, Inc.	4330 W. Green Tree Road	Milwaukee	S067857	241956000	21786
	ATACO	6809 Hwy 60	Cedarburg	S067857	246075060	581
	Badger Coating, Inc.	1700 W. Cornell Street	Milwaukee	S067857	241018690	2493
	Badger Meter Company	4545 W. Brown Deer Road	Milwaukee	S067857	241015500	6463
	Barry Trucking, Inc.	120 E. National Avenue	Milwaukee	S067857	241324710	1206
	Barton Products Corporation	4991 Horn Road	West Bend	S067857	267014880	2434
	Bee Bus Line, Inc.	4330 N. 35th Street	Milwaukee	S067857	241997360	17842
	Bentley World Packaging	4080 N. Port Washington Road	Milwaukee	S067857	241942360	15149
	Bison Plating, Inc.	600 Sherman Avenue	Adell	S067857	460040130	1144
	Brady USA, Inc.-Coated Products Division	2230 W. Florist Avenue	Glendale	S067857	241029030	3150

Table G-3 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	Calibre, Inc.	1889 Hwy W	Grafton	S067857	246127640	2087
	Carlson Tool & Manufacturing Corporation	W57 M14386 Doerr Road	Cedarburg	S067857	246067580	800
	CF Ultra Tech	1040 9th Avenue	Grafton	S067857	246127640	2087
	Commerce Industrial Chemicals, Inc.-Woolworth	3420 W. Mill Road	Milwaukee	S067857	241150690	1988
	Cost of Wisconsin	4201 Hwy P	Jackson	S067857	267080110	25920
	Craden Manufacturing Company, Inc.	1961 Hwy 175	Richfield	S067857	267064930	3737
	Dean Derge Ornamental Ironworks, Inc.	7875 Hwy 45	Kewaskum	S067857	267146660	1300
	Dickmann Manufacturing Company, Inc.	606 Beech Street	Grafton	S067857	246091120	168
	Dri-Tech, Inc.	8111 W. Bradley Road	Milwaukee	S067857	241776260	1118
	Elias Grinding Company, Inc.	3713 N. Holton Street	Milwaukee	S067857	241776260	1118
	EOG Environmental	5611 W. Hemlock Street	Milwaukee	S067857	241389170	2370
	ER Wagner	4611 N. 32nd Street	Milwaukee	S067857	241019790	847
	F. Barknow, Inc.	3830 N. Fratney Street	Milwaukee	S067857	241370690	2189
	Forman Metal Company	7500 N. Teutonia Avenue	Milwaukee	S067857	241632050	22342
	Fred Usinger, Inc.	1030 N. Old World Third Street	Milwaukee	S067857	241006040	538
	Gehl Company	143 Water Street	West Bend	S067857	267003880	1171
	General Metalworks Corporation	10245 N. Enterprise Drive	Mequon	S067857	246038650	15960
	George Herrings & Son	219 Heidel Road	Thiensville	S067857	246131600	1615
	Glander Metal, Inc.	1580 Cold Springs Road	Saukville	S067857	246147550	412
	Gossen Corporation	2030 W. Bender Road	Glendale	S067857	241235940	2096
	Hayes Brake, LLC	5800 W. Donges Bay Road	Mequon	S067857	246021270	3617
	IGC Technologies	4039 W. Green Tree Road	Milwaukee	S067857	241770660	21790
	International Paper	N145 W6049 Pioneer Road	Cedarburg	S067857	246010600	8654
	ITW Shakeproof-Milwaukee Plant	3704 N. Palmer Street	Milwaukee	S067857	241043550	7445
	Jackson Concrete, Inc.	605 W. Pleasant Valley Road	Jackson	S067857	267115090	7936
	Jefferson Smurfit Corporation	2800 W. Custer Avenue	Milwaukee	S067857	241025290	7939
	Johnson School Bus Service, Inc.	2151 W. Washington Street	West Bend	S067857	267150180	11481
	Johnson School Bus Service, Inc.	3618 Hwy 28	Kewaskum	S067857	267149850	11485
	Jor Mac Company, Inc.	704 10th Street	Grafton	S067857	246009720	2093
	Kenro, Inc.	200 Industrial Drive	Fredonia	S067857	246078030	1383
	Kettle Moraine Coatings, Inc.	W208 N16969 Center Street	Jackson	S067857	267071970	7455
	Kleen Test Products	8225 W. Parkland Court	Milwaukee	S067857	241169830	21531
	Krier Foods, Inc.	520 Wolf Road	Random Lake	S067857	460146280	10134
	Kruepke Transit, Inc.	2881 Hwy P	Jackson	S067857	267086600	2160
	KW MFG, Inc.	8619 Lynx Avenue	Milwaukee	S067857	241813770	732
	Laidlaw Transit-Glendale	5901 N. Glen Park Road	Glendale	S067857	241934220	13066
	Lake Ellen Stone, Inc.	N2133 Hwy 28	Adell	S067857	460104370	867
	Lakeside Foods, Inc.-Random Lake Plant	709 Allen Street	Random Lake	S067857	460034850	8623
	Level Valley Creamery, Inc.	807 Pleasant Valley Road	West Bend	S067857	267030280	6152
	Liphatech	3101 W. Custer Avenue	Milwaukee	S067857	241050700	14034
	Longview Fibre Company	3832 N. Third Street	Milwaukee	S067857	241751950	7948
	Marigold Foods, Inc.	W55 N155 McKinley Boulevard	Cedarburg	S067857	246010270	12176
	Matenaer Corporation	810 Schoenhaar Drive	West Bend	S067857	267132800	1270
	Maxon Industries, Inc.	3204 W. Mill Road	Milwaukee	S067857	241360900	1081
	Metalcraft of Mayville-West Bend	2600 Metalcraft Road	West Bend	S067857	267076370	23196
	Midcities Tool & Die	2940 Woodford Drive	Barton	S067857	267167560	12092
	Milk Specialties Co., Inc.-Adell Ingredients	627 Maine Street	Adell	S067857	460032760	5623
	Milsco Manufacturing Company	9009 N. 51st Street	Brown Deer	S067857	241026830	2278
	Milwaukee Gear Company, Inc.	51510 N. Port Washington Road	Milwaukee	S067857	241167960	1953
	Milwaukee Precision Corporation	8236 Parkland Court	Milwaukee	S067857	241363650	16313

Table G-3 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	N. Josten & Company, Inc.	4905 N. 32nd Street	Milwaukee	S067857	241234070	301
	N.P. Company, Inc.	4241 Hawthorne Drive	Newburg	S067857	246126870	984
	Nohl Corporation	5901 W. Bender Court	Milwaukee	S067857	341058410	1286
	Nohl Corporation	6360 N. 60th Street	Milwaukee	S067857	241052460	3435
	North America Clutch Corporation	3131 W. Mill Road	Milwaukee	S067857	241257390	3653
	North Side Coal & Oil	104 W. Capitol Drive	Glendale	S067857	241293010	3228
	NRE Wheel Works, Inc.	5300A N. 33rd Street	Milwaukee	S067857	241850290	23788
	Orion Corporation	1111 Cedar Creek Road	Grafton	S067857	246083420	2207
	Pechiney Plastic Packaging, Inc.	6161 N. 64th Street	Milwaukee	S067857	241334060	1046
	Petersen Products Company	421 Wheeler Avenue	Fredonia	S067857	246045030	292
	Phoenix Products	6161 N. 64th Street	Milwaukee	S067857	241334060	24394
	Press Color, Inc.-Glendale	2315 W. Camden Road	Glendale	S067857	241775930	1614
	Production Fabricating, Inc.	2142 Maple Road	Grafton	S067857	246148540	12328
	Production Stamping Corporation	301 E. Vienna Avenue	Milwaukee	S067857	341040590	19047
	Regal Ware, Inc.	- -	Kewaskum	S067857	267003660	5555
	Reliable Pallet, Inc.	4990 Horn Road	West Bend	S067857	267001580	14877
	RES Manufacturing Company	7801 N. 73rd Street	Milwaukee	S067857	241136720	1983
	Reuter-Twohig, Ltd.	W60 N161 Cardinal Avenue	Cedarburg	S067857	246005870	2086
	Rexnord-Stearns Division	120 N. Broadway	Milwaukee	S067857	241256840	12483
	Richards Street Service	4101 N. Richards Street	Glendale	S067857	241460230	14540
	Rose Industries	7044 N. Teutonia Avenue	Milwaukee	S067857	241344620	16957
	Schmitz Ready Mix	2707 Scenic Road	Polk	S067857	267115530	10123
	Schmitz Ready Mix-Grafton	989 Ulao Road	Grafton	S067857	246106740	8027
	Schmitz Ready Mix-Milwaukee	11050 N. Industrial Drive	Mequon	S067857	246090130	7444
	School Services & Leasing	6301 W. Mill Road	Milwaukee	S067857	241551200	12445
	Shady Lady, Inc.	1350 14th Avenue	Grafton	S067857	246127420	1711
	Smurfit Flexible Packaging	7074 W. Packland Court	Milwaukee	S067857	241033430	1611
	Snider Mold Company	6303 W. Industrial Drive	Mequon	S067857	246077480	15712
	SPI Lighting, Inc.	10400 N. Enterprise Drive	Mequon	S067857	246072860	1278
	SPX Dock Products	6720 N. Teutonia Avenue	Milwaukee	S067857	24108390	1422
	Standar Machine Company	301 Progress Drive	Saukville	S067857	246131050	3682
	Standard Tar Products Company, Inc.	6060 W. Douglas Avenue	Greenfield	S067857	241373770	15886
	Sterling, Inc.	5200 W. Clinton Avenue	Milwaukee	S067857	241248700	1257
	Strattec Security Corporation	3333 W. Good Hope Road	Glendale	S067857	241006810	12050
	Super Steel Products Corporation	7100 W. Calumet Road	Milwaukee	S067857	241017040	2562
	Supreme Casting	7901 N. 73rd Street	Milwaukee	S067857	241989000	12185
	Supreme Cores	5737 W. Mill Road	Milwaukee	S067857	241053010	15727
	Tecumseh Power-Grafton Operations	900 North Street	Grafton	S067857	246009170	2405
	Telsmith, Inc.-Mequon	10910 N. Industrial Drive	Mequon	S067857	246013350	2536
	Thermoset	W208 N16974 Center Street	Jackson	S067857	267137970	17034
	Times Printing Company, Inc.	100 Industrial Drive	Random Lake	S067857	460086990	176
	TJ Brooks Company	2233 W. Mill Road	Milwaukee	S067857	241324820	939
	Tower Automotive Products Company	3533 N. 27th Street	Milwaukee	S067857	241012970	6176
	Twinco Romax Wisconsin Company	3100 W. Mill Road	Milwaukee	S067857	241022760	3478
	USF Logistics	800 Progress Drive	Saukville	S067857	246071870	7490
	Visa Lighting	1717 Civic Drive	Glendale	S067857	241269160	14030
	Vishay Ceramite	1327 6th Avenue	Grafton	S067857	246043820	2417
	Vulcan Lead, Inc.	3111 W. Mill Road	Milwaukee	S067857	241932130	11505
	Vulcan Lean, Inc.	3111 W. Mill Road	Milwaukee	S067857	241932020	11514

Table G-3 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	Waldorf Corporation	1900 W. Cornell Street	Milwaukee	S067857	241017920	8544
	Weasler Engineering, Inc.	7801 Hwy 45 North	Barton	S067857	267019610	1760
	West Bend Municipal Airport	1115 S. Main Street	West Bend	S067857	267096280	3486
	West Bend Transit & Service Company	105 Forest Avenue	West Bend	S067857	267099030	652
	Western Products Division-Douglas Dynamic Inc.	7777 N. 73rd Street	Milwaukee	S067857	241033650	743
	Wisconsin Thermoset Molding, Inc.	900 E. Vienna Avenue	Milwaukee	S067857	241440760	473
	Yahrs Ready Mix	1020 S. Indiana Avenue	West Bend	S067857	267115970	8186
Stormwater Industrial Tier 3	Advanced Die Casting Company-Milwaukee	3760 N. Holton Street	Milwaukee	S049158	241046300	430
	American Woodworking, Inc.	4997 N. 33rd Street	Milwaukee	S049158	241360240	2766
	Banner Tool & Engineering Corporation	7254 N. Teutonia Avenue	Milwaukee	S049158	241241220	362
	Bend Industries	2190 S. Main Street	West Bend	S049158	267141930	7419
	Brady Corporation	727 W. Glendale Avenue	Glendale	S049158	241037720	3149
	Brady Worldwide-Good Hope Road Operations	6555 W. Good Hope Road	Milwaukee	S049158	241480910	3370
	Commerce Industrial Chemicals, Inc.-Milwaukee	5611 W. Woolworth Avenue	Milwaukee	S049158	241325260	1987
	Continental Equipment Corporation	6103 N. 76th Street	Milwaukee	S049158	241015170	811
	Cramer Coil & Transformer Company, Inc.	401 Progress Drive	Saukville	S049158	246060650	63
	Danisco Cultor USA, Inc.	4253 N. Port Washington Road	Glendale	S049158	341033440	16509
	Fredman Bag Company	5801 W. Bender Road	Milwaukee	S049158	241276750	1596
	G. Manufacturing Corporation	4832 N. 125th Street	Butler	S049158	268541350	11975
	G.B. Electrical, Inc., an Applied Power Company	6101 N. Baker Road	Milwaukee	S049158	241363430	383
	Garton Metal Finishing Company	225 N. Milwaukee Street	Fredonia	S049158	246083640	16148
	Hansen Storage Company 1	500 S. Water Street	Milwaukee	S049158	241953250	1447
	Hansen Storage Company-Milwaukee	8100 N. Teutonia Avenue	Brown Deer	S049158	241954240	1426
	Hydro Platers, Inc.	3525 W. Kiehnau Avenue	Milwaukee	S049158	241231760	969
	INX International Ink Company-Milwaukee	5501 W. Mill Road	Milwaukee	S049158	241222850	8101
	Johnson Controls Battery Group, Inc.	5400 N. Teutonia Avenue	Milwaukee	S049158	241033320	12482
	Kleen Test Products	5600 W. Mequon Road	Mequon	S049158	246060970	20082
	Kopfmann Company, Inc.	3142 W. Mill Road	Milwaukee	S049158	241741940	885
	Kracor, Inc.	5625 W. Clinton Avenue	Milwaukee	S049158	241418430	2209
	Lalemand Biochem International	6120 W. Douglas Avenue	Milwaukee	S049158	241316350	16680
	Mainline Pattern Corporation	3424 W. Elm Street	Milwaukee	S049158	241627100	2296
	Modern Metals Division	275 Industrial Drive	Fredonia	S049158	246077370	2015
	Moldcraft Tool & Design Service, Inc.	400 N. Progress Drive	Saukville	S049158	246000700	17179
	Molecular Biology Resources, Inc.	5143 N. 60th Street	Milwaukee	S049158	241294020	660
	North America Clutch Corporation	4360 N. Green Bay Avenue	Milwaukee	S049158	241620060	16708
	Osmonics Autocontrol	5730 N. Glen Park Road	Milwaukee	S049158	241022210	6689
	Packaging Corporation of America	5600 W. Good Hope Road	Milwaukee	S049158	241168510	8482
	Pereles Bros.	5840 N. 60th Street	Milwaukee	S049158	241016490	269
	Phillips Plastics Corporation-Graphic Technologies Div.	600 S. Milwaukee Street	Fredonia	S049158	246066370	723
	Post Printing	201 E. Progress Drive	West Bend	S049158	267131700	11084
	Rexnord Corporation-Plastics Operation	1272 Dakota Drive	Grafton	S049158	246004440	2045
	Riteway Bus Service, Inc.	5873 N. 55th Street	Milwaukee	S049158	241417220	16811
	Riteway Bus Service, Inc.	7166 Sycamore Drive	Cedarburg	S049158	246085070	778
	Riteway Bus Service, Inc.	W201 N13900 Fond du Lac Avenue	Richfield	S049158	267038200	779
	Rods & Walers, Inc.	750 Progress Drive	Saukville	S049158	246127630	405
	Roll Ink Corporation	4010 W. Douglass Avenue	Milwaukee	S049158	241772850	8258
	Roller Fabrics, Inc.	6600 W. Calumet Road	Milwaukee	S049158	241961940	3457
	RPS, Inc.	918 N. Deerbrook Trail	Brown Deer	S049158	341034100	15104
	Russel T. Gilman, Inc.	1230 Cheyenne Avenue	Grafton	S049158	246120050	3657

Table G-3 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 3 (continued)	Serigraph Plant 1	760 Indiana Avenue	West Bend	S049158	267083850	1311
	Serigraph Plant 2	3801 W. Decorah Road	West Bend	S049158	267015210	1573
	Serigraph Plant 3	603 Hi Mount Road	West Bend	S049158	267076810	1310
	Serigraph Plant 4	2220 Stonebridge Circle	West Bend	S049158	267104640	3742
	Sierra Grinding Wheel, Inc.	W208 N16761 Center Street	Jackson	S049158	267010370	8088
	Signicast Corporation-Milwaukee	9000 N. 55th Street	Milwaukee	S049158	241025510	2242
	Team Transit, Inc.	N169 W21110 Tower Drive	Jackson	S049158	267105740	3358
	Waukee Engineering Company, Inc.	5600 W. Florist Avenue	Milwaukee	S049158	241394890	1510
	West Bend Daily News	100 S. Sixth Avenue	West Bend	S049158	267170860	1806
	West Bend Division of Regal Ware, Inc.	1100 Schmidt Road	West Bend	S049158	267067900	23790
	Wisconsin Color Press	5400 W. Good Hope Road	Milwaukee	S049158	241374980	2130
	Wisconsin Metal Cleaning Corporation	111 W. Progress Drive	West Bend	S049158	267000140	16025
Stormwater Scrap Recycling	A & W Iron & Metal, Inc.	7588 Otten Lane	Kewaskum	S058831	267148420	12690
	Auto & Scrap Recyclers, Inc.	3800 W. Mill Road	Milwaukee	S058831	241529970	2705
	Aztak	8300 W. Glorist Avenue	Milwaukee	S058831	241346930	13027
	Lakeland Metal Processing, Inc.	3909 #B Lakeland Road	Saukville	S058831	246129400	13119
	Lynn's Waste Paper Company, Inc.	7651 Otten Drive	Kewaskum	S058831	267171410	12963
	Murre Salvage Company	N1813 Hwy 57	Sherman	S058831	460145510	12592

[a]*Each Municipal Stormwater Permit applies to the entire community and encompasses all the watersheds in the community.*

[b]*These communities received their permits after February 2003.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table G-4

WPDES PERMITTED STORMWATER FACILITIES IN THE OAK CREEK WATERSHED: FEBRUARY 2003

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Municipal Stormwater Permit[a]	Milwaukee County[b]	Countywide	County	S050113	- -	- -
	City of Cudahy[b]	Citywide	Cudahy	S049875-01	241206790	15778
	City of Franklin[b]	Citywide	Franklin	S050059-01	341111430	31265
	City of Greenfield[b]	Citywide	Greenfield	S050059-01	- -	- -
	City of Milwaukee[b]	Citywide	Milwaukee	S049018	241003730	6159
	City of Oak Creek[b]	Citywide	Oak Creek	S049905-01	241899020	15779
	City of South Milwaukee[b]	Citywide	South Milwaukee	S049891-01	241208880	15777
Stormwater Auto Parts Recycling	Auto Paradise, Inc.	6102 S. 13th Street	Milwaukee	S059145	241472880	14270
	Roz Auto Salvage	5848 S. 13th Street	Milwaukee	S059145	241784070	10767
Stormwater Construction Site	J&L Terminals Warehouse	6055 S. 6th Street	Milwaukee	S067831	- -	12944
	128th Air Refueling Wing, Apron Replacement	South half of existing apron on 128th grounds	Milwaukee	S067831	- -	19051
	Flying J Travel Plaza	8650 S. 20th Street	Oak Creek	S067831	- -	26044
Stormwater Industrial Tier 1	EGS Electrical Group-Appleton	2105 5th Avenue	South Milwaukee	S067849	241015390	922
	Henkel Surface Technologies, Inc.	420 W. Marquette Avenue	Oak Creek	S067849	241165210	6917
Stormwater Industrial Tier 2	Ace World Wide & Storage Company, Inc.	1900 E. College Avenue	Cudahy	S067857	241308210	1935
	Bucyrus International, Inc.	1100 Milwaukee Avenue	South Milwaukee	S067857	241008130	5617
	Delphi Automotive Systems	7929 S. Howell Avenue	Oak Creek	S067857	241045750	1367
	James Cape & Sons	S. 6th Street and College Avenue	Milwaukee	S067857	241496750	22727
	Lamers Bus Lines, Inc.	1122 W. Boden Court	Milwaukee	S067857	241975690	9174
	Miltec, Inc.	6870 S. 10th Street	Oak Creek	S067857	241331640	684
	Pelman Iron & Metal Company	5510 S. Whitnall Avenue	Cudahy	S067857	241989440	13300
	Riteway Bus Service, Inc.	7433 S. 10th Street	Oak Creek	S067857	341075020	22628
	United Parcel Service-Oak Creek	6800 S. 6th Street	Oak Creek	S067857	241304910	9291
	US Air Force 440th	300 E. College Avenue	Milwaukee	S067857	241176980	9497
	USF Holland	6161 S. 6th Street	Milwaukee	S067857	341058740	22226
	Watkins Motor Lines	6757 S. 13th Street	Milwaukee	S067857	241462540	23789
Stormwater Industrial Tier 3	Beier Trucking, Inc.	6227 S. Packard Avenue	Cudahy	S049158	241596410	237
	Millwood, Inc.	5831 S. Pennsylvania Avenue	Cudahy	S049158	- -	22223
Stormwater Scrap Recycling	S&M Recycling	1200 Minnesota Avenue	South Milwaukee	S058831	241788470	13307

[a]*Each Municipal Stormwater Permit applies to the entire community and encompasses all the watersheds in the community.*

[b]*These communities received their permits after February 2003.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table G-5

WPDES PERMITTED STORMWATER FACILITIES IN THE ROOT RIVER WATERSHED: FEBRUARY 2003

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Municipal Stormwater Permit[a]	Milwaukee County[b]	Countywide	County	S050113	- -	- -
	Waukesha County[b]	Countywide	County	S050075	- -	- -
	City of Franklin[b]	Citywide	Franklin	S050059-01	341111430	31265
	City of Greenfield[b]	Citywide	Greenfield	S050059-01	- -	- -
	City of Milwaukee	Citywide	Milwaukee	S049018	241003730	6159
	City of Muskego[b]	Citywide	Muskego	S050075	- -	- -
	City of New Berlin[b]	Citywide	New Berlin	S050059	- -	- -
	City of Oak Creek[b]	Citywide	Oak Creek	S049905-01	241899020	15779
	City of Racine[b]	Citywide	Racine	S050059-01	252242100	31164
	City of West Allis[b]	Citywide	West Allis	S049913-1	341073810	29417
	Village of Caledonia[b]	Villagewide	Caledonia	S050059-01	252241880	31160
	Village of Greendale[b]	Villagewide	Greendale	S050059-1	- -	- -
	Village of Hales Corners[b]	Villagewide	Hales Corners	S050059-01	341111760	31272
	Village of Mt. Pleasant[b]	Villagewide	Mt. Pleasant	S050059-01	252241990	31162
	Village of Sturtevant[b]	Villagewide	Sturtevant	S050075	- -	- -
Stormwater Auto Parts Recycling	Durham Auto Savings and Sales, Inc.	10568 S. 124th Street	Franklin	S059145	241791550	13235
	Hwy 45 Auto Salvage	10386 S. 124th Street	Franklin	S059145	241537670	13730
	I-94 Used Auto Parts, LLC	2118 N. Sylvania Avenue	Sturtevant	S059145	252150580	2650
Stormwater Construction Site	124th Street Gas Pipe Replacement	Road right of way at S. 124th St. and Lincoln Ave.	West Allis	S067831	- -	26474
	88 Units Multi Family	9251 S. 51st Street	Franklin	S067831	- -	14312
	Armann Heights Subdivision	W. Oakwood Road and S. 13th Street	Oak Creek	S067831	- -	17901
	Auburn Hills	North of Highway 38 and east of Johnson Memorial Park	Caledonia	S067831	- -	21879
	Autumn Ridge Condominiums	9251 S. 51st Street	Franklin	S067831	- -	15014
	Berkshire	6000 S. 51st Street	Franklin	S067831	- -	19320
	Coury Development	Not provided	Franklin	S067831	- -	15258
	Creekside Corporate Park	9800 Block of S. 13th Street	Oak Creek	S067831	- -	18763
	Diamond Plaza	Between CTH K and Kraut Road in Franksville	Caledonia	S067831	- -	25250
	Eagle Point	Newman Road and Three Mile Road	Caledonia	S067831	- -	16134
	Farmington Hills	Pennsylvania Avenue and Forest Hill Avenue	Oak Creek	S067831	- -	18116
	Forest Hill Highlands	W. Loomis Road and Forest Hill Avenue	Franklin	S067831	- -	17290
	Forest Hill Highlands-Silverwood Heights	W. Loomis Road and Forest Hill Avenue	Franklin	S067831	- -	17290
	Fort Howard Steel	7200 S. 6th Street	Oak Creek	S067831	- -	15690
	Franklin Loop Gas Project	S. 51st Street and W. Puetz Road	Franklin	S067831	- -	18423
	Franklin Square	W. Ryan Road and S. 51st Street	Franklin	S067831	- -	16396
	Franksville Interceptor	Along CTH K right-of-way from Kraut Road to STH 38	Caledonia	S067831	- -	21732
	Fredach Property	11540 W. Coldspring Road	Greenfield	S067831	- -	28649
	Georgetown West	10740 S. Howell Avenue	Oak Creek	S067831	- -	16131
	Jenna Prairie Estates	Hwy 100	Oak Creek	S067831	- -	23666
	Kaitlin Woods Phase II	9300 W. Elm Court	Franklin	S067831	- -	16498
	Le Pine Enterprises, Inc.	9540 S. Pennsylvania Avenue	Oak Creek	S067831	- -	15767

Table G-5 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Construction Site (continued)	Martin Luther King School Athletic Field Additions	5201 S. 76th Street	Greendale	S067831	- -	17906
	Meadow Creek Estates III Subdivision	10408 S. Katie Drive	Oak Creek	S067831	- -	13670
	Meadowmere Village	Puetz Road and Shepard Avenue	Oak Creek	S067831	- -	15562
	North Shore Bike Trail	Drexel to County Line Road	Oak Creek	S067831	- -	19905
	Oak Creek Commerce Center	7400 S. Howell Avenue	Oak Creek	S067831	- -	15848
	Oakwood Lakes Subdivision	Oakwood Road	Oak Creek	S067831	- -	15091
	Princeton Pines Subdivision	Not provided	Franklin	S067831	- -	15144
	Quarry Springs Subdivision	Land north of 4213 Hwy 31	Caledonia	S067831	- -	21690
	Reinders Warehouse	545 W. Ryan Road	Oak Creek	S067831	- -	17745
	Riverview Estates	Not provided	Oak Creek	S067831	- -	16343
	S. 10th Street Reconstruction	Drexel Avenue to Rawson Avenue	Oak Creek	S067831	- -	17138
	Stonehedge Subdivision	Rawson Avenue and Loomis Avenue	Franklin	S067831	- -	16882
	The Chateau Condominiums	Puetz Road and Apple Creek Drive	Oak Creek	S067831	- -	16395
	The Ponds II of Caledonia	South of CTH G, west of CTH V, north of Bell Road, and east of IH 94	Caledonia	S067831	- -	26371
	Tuckaway Pines	8050 S. 76th Street	Franklin	S067831	- -	19169
	Vesta, Inc.	5400 W. Franklin Drive	Franklin	S067831	- -	18767
	Victory Creek Estates	W. Drexel Avenue between S. 31st Street and S. 51st Street	Franklin	S067831	- -	16394
	Village Market	STH 100 and Forest Home Avenue	Hales Corners	S067831	- -	22697
	Wellness Center Development	Loomis Road and St. Martins Road	Franklin	S067831	- -	17905
	Whitnall Grove	Not provided	Franklin	S067831	- -	15752
	Willowbrook	E. Oakwood Road and Chicago Road	Oak Creek	S067831	- -	22986
	Woodland Ridge of Greenfield	South of W. Howard Avenue, west of S. 84th St.	Greenfield	S067831	- -	22776
Stormwater Industrial Tier 1	Dic Imaging Products, USA, Inc.	7300 S. 10th Street	Oak Creek	S067849	241332080	1805
	Mid America Steel Drum Company, Inc.	8570 S. Chicago Road	Oak Creek	S067849	241213500	1458
	Midland Metal Treating, Inc.	5512 W. Airways Avenue	Franklin	S067849	241042340	1508
	Racine Heat Treating Company, Inc.	1215 8th Street	Racine	S067849	- -	1176
	Schmitz Ready Mix, Inc.	3131 W. Elm Street	Oak Creek	S067849	- -	20740
	Sturtevant Auto Salvage	2145 N. East Frontage Road	Sturtevant	S067849	252184790	2726
	Woodmill Products, Inc.	9563 S. 60th Street	Franklin	S067849	241844020	8367
Stormwater Industrial Tier 2	Air Products and Chemicals, Inc.	701 W. Oakwood Road	Oak Creek	S067857	241168290	3453
	American Building Restoration Products	9720 S. 60th Street	Franklin	S067857	- -	10734
	American Freightways	10613 S. 27th Avenue	Franklin	S067857	241319430	20653
	Arrow Millwork	6450 Industrial Loop	Greendale	S067857	- -	562
	Baker and Baker, Inc.	7350 S. 10th Street	Oak Creek	S067857	241022980	1669
	Bay View Industries	7821 S. 10th Street	Oak Creek	S067857	- -	358
	Behrens Moving Company	500 W. Rawson Avenue	Oak Creek	S067857	241815750	2075
	Burmeister Woodwork Company	11025 W. Forest Home Avenue	Hales Corners	S067857	241087440	3237
	Caledonia Crafting and Palleting	11504 Highway G	Caledonia	S067857	252196340	8576
	Carri-Crete Corporation	13360 W. College Avenue	New Berlin	S067857	268352370	12834
	Cemedyme USA, Inc.	7655 S. 6th Street	Oak Creek	S067857	241044320	3338
	Chrometech of Wisconsin, Inc.	10020 S. 54th Street	Franklin	S067857	241321960	3499
	Drewco Corporation	3745 Nicholson Road	Caledonia	S067857	252191940	1076
	General Automotive Manufacturing, LLC	5215 W. Airways Avenue	Franklin	S067857	241961720	17442

Table G-5 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Stormwater Industrial Tier 2 (continued)	Hribar Trucking, Inc.	1521 Waukesha Road	Raymond	S067857	252076880	9303
	Imprex, Inc.	3260 S. 108th Street	Greenfield	S067857	341017930	11458
	In Sink Erator	4700 21st Street	Racine	S067857	252004940	2103
	Jensen Environmental Management, Inc.	W144 S6347 College Court	Muskego	S067857	268486020	13049
	Krones, Inc.	9600 S. 58th Street	Franklin	S067857	241189520	2560
	Laidlaw Transit, Inc.-Muskego	W146 S6365 Tess Corners Road	Muskego	S067857	268208490	13141
	Maybar Manufacturing Company	4403 Basswood Drive	Franklin	S067857	241334610	2112
	Maple Leaf Farms-Main Farm	2319 Raymond Avenue	Yorkville	S067857	252004500	12457
	Merchants Delivery Moving	1215 State Street	Racine	S067857	252197770	858
	Meyer Material-Oak Creek Yard 46	841 Rawson Avenue	Oak Creek	S067857	241323500	19254
	Morris Material Handling, Inc.	315 W. Forest Hill Avenue	Oak Creek	S067857	241230440	1880
	Oak Creek Pallet Company	2730 E. Ryan Road	Oak Creek	S067857	241775490	8302
	PPG Industries, Inc.	10800 S. 13th Street	Oak Creek	S067857	241014620	6269
	Prime Manufacturing Corporation	7730 S. 6th Street	Oak Creek	S067857	241094370	11277
	Printing Developments, Inc.	2010 Indiana Street	Racine	S067857	252007580	989
	Quality Concrete-South	8222 Raynor Avenue	Norway	S067857	252198870	8141
	Racine Heat Treating Company, Inc.	1215 8th Street	Racine	S067857	252014510	1176
	Roadway Express T313	6880 S. Howell Avenue	Oak Creek	S067857	241902870	10917
	Superior Die Set Corporation	900 W. Drexel Avenue	Oak Creek	S067857	- -	860
	Superior Services, Inc.	W144 S6350 College Court	Muskego	S067857	268313540	11307
	Tri Par Tool and Die Company	4239 W. Loomis Road	Greenfield	S067857	- -	2540
	Twin Disc, Inc.-Plant 1	1328 Racine Street	Racine	S067857	252007030	6597
	Wisconsin Plating Works	931 Carroll Street	Racine	S067857	252016050	2243
	Zenar Crane Corporation	730 S. 6th Street	Oak Creek	S067857	241197990	419
	Zierden Company	7355 S. 1st Street	Oak Creek	S067857	241108100	177
Stormwater Industrial Tier 3	5801 W. Airways Avenue	5801 W. Airways Avenue	Franklin	S049158	241679240	10898
	All Glass Aquarium Company, Inc.-Plant 1	9675 S. 60th Street	Franklin	S049158	241413810	2014
	All Glass Aquarium Company, Inc.-Plant 2	5401 W. Oakwood Park Drive	Franklin	- -	241422610	1660
	BandK Transportation, Inc.	2500 W. Southbranch Boulevard	Oak Creek	- -	241815640	3487
	Cast Tools, Inc.-Racine	1010 13th Street	Racine	- -	252091840	7931
	Chocolate House, Inc.-Manufacturing Office	4121 S. 35th Street	Greenfield	- -	241990210	1340
	F. J. Powalka Company	13007 W. Forest Drive	New Berlin	- -	268166030	1824
	Milwaukee Steel Converting Corporation	7200 S. 6th Street	Oak Creek	- -	241279280	1285
	Rexnord Elastomer Products-New Berlin	5555 S. Moorland Road	New Berlin	- -	268546960	11229
	Scott's Topsoil, Inc.	S72 W12453 Tess Corners Drive	Muskego	- -	268090350	10862
	Sumitomo Electric Carbide Manufacturing	5635 S. Westridge Drive	New Berlin	- -	268527380	1810
Stormwater Scrap Recycling	ALS Auto Salvage, Inc.	10942 S. 124th Street	Franklin	- -	241560770	8082

[a]*Each Municipal Stormwater Permit applies to the entire community and encompasses all the watersheds in the community.*

[b]*These communities received their permits after February 2003.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Table G-6

WPDES PERMITTED STORMWATER FACILITIES IN THE LAKE MICHIGAN DIRECT DRAINAGE AREA: FEBRUARY 2003

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Municipal Stormwater Permit[a]	Milwaukee County[b]	Countywide	County	S050113	- -	- -
	Ozaukee County[b]	Countywide	County	S050075	- -	- -
	City of Cudahy[b]	Citywide	Cudahy	S049875-2	241206790	15778
	City of Glendale	Citywide	Glendale	S061565	341073150	- -
	City of Mequon[b]	Citywide	Mequon	S061557	246000920	6125
	City of Milwaukee	Citywide	Milwaukee	S049018-3	241003730	6159
	City of Oak Creek[b]	Citywide	Oak Creek	S049905-01	241899020	15779
	City of Port Washington[b]	Citywide	Port Washington	S050075-1	- -	31430
	City of Racine[b]	Citywide	Racine	S050059-01	252242100	31164
	City of St. Francis[b]	Citywide	St. Francis	S049883-1	241208990	15775
	City of South Milwaukee[b]	Citywide	South Milwaukee	S049891-01	241208880	15777
	Village of Bayside	Villagewide	Bayside	S061565	341073040	- -
	Village of Caledonia[b]	Villagewide	Caledonia	S050059-01	252241880	31160
	Village of Fox Point	Villagewide	Fox Point	S061565	241034430	- -
	Village of Mt. Pleasant[b]	Villagewide	Mt. Pleasant	S050059-01	252241990	31162
	Village of River Hills	Villagewide	River Hills	S061565	341074140	- -
	Village of Shorewood	Villagewide	Shorewood	S061565	341073590	- -
	Village of Whitefish Bay	Villagewide	Whitefish Bay	S061565	341074250	- -
	Village of Wind Point[b]	Villagewide	Wind Point	S050075-1	- -	31166
	Town of Grafton[b]	Townwide	Grafton	S050008	246054930	- -
Storm Water Auto Parts Recycling	Chuck's Sheridan Auto, Inc.	3037 Capitol Avenue	Racine	S059145	252182370	13809
	St. Francis Auto Wreckers, Inc.	4043 S. Pennsylvania Avenue	St. Francis	S059145	252182370	2589
Storm Water Construction Site	Crawford Park	5051 Chester Lane	Caledonia	S067831	- -	19167
	Cudahy Business Park	NW NW 26 T6N R22E	Cudahy	S067831	- -	19741
	E. Howard Avenue Property	E. Howard Avenue and S. Lake Drive	St. Francis	S067831	- -	22369
	Lakeside Estates	West side of Charles Street on the north side of 5 1/2 Mile Road	Caledonia	S067831	- -	20800
	Northwest Interceptor Relief Sewer	North of Layard Avenue and east of Mt. Pleasant, Young Court, Mt. Pleasant	Racine	S067831	- -	22384
	The Parkview	5227 Douglas Avenue	Caledonia	S067831	- -	15434
	Remote Storage Facility	Melvin Street and Mt. Pleasant Street	Racine	S067831	- -	22550
	Supreme Builders Condominium Development	E. Howard Avenue, E. Thompson Avenue, and S. Caufield Avenue	St. Francis	S067831	- -	22344
	Tornoe Estates	Five Mile Road and Middle Road	Caledonia	S067831	- -	18768
	WEPCO former Kansas Avenue-Landfill East Ash site	East of 4100 Block of S. Kansas Avenue	St. Francis	S067831	- -	21040
	WEPCO former Kansas Avenue-Landfill West Ash site	West of 4100 Block of S. Kansas Avenue	St. Francis	S067831	- -	21041
	Wooded Valley Estates	West site of STH 31 one-quarter mile south of 6 Mile Road	Caledonia	S067831	- -	26367
	Woodland Pines	South Side of Stephan Road one-half mile west of Middle Road	Caledonia	S067831	- -	24529

Table G-6 (continued)

Permit Type	Facility	Address	Municipality	WPDES Permit Number	Facility Identification	Facility Identification Number
Storm Water Industrial Tier 1	Case Corporation Foundry	25th Street and Mean Street	Racine	S067849	252011870	7978
	E. C. Styberg Engineering Company	1600 Goold Street	Racine	S067849	252009780	2299
	Met Al, Inc.	1349 23rd Street	Racine	S067849	252011870	7959
	Met Tek, Inc.	1800 Melvin Avenue	Racine	S067849	252189740	2308
	Michaels Machine Company, Inc.	4442 Douglas Avenue	Racine	S067849	252101740	2297
	Premier Aluminum Foundry	3363 S. Memorial Drive	Racine	S067849	285005270	16512
	Shrupac, Inc.	1700 Phillips Avenue	Racine	S067849	- -	2128
	Woodland/Alloy Casting Company, Inc.	1222 18th Street	Racine	S067849	- -	1818
Storm Water Industrial Tier 2	ABF Freight System, Inc.	2301 S. Memorial Drive	Racine	S067857	252171700	18207
	American Metal Technologies	1718 Laylard Avenue	Racine	S067857	- -	28938
	Baker & Baker, Inc.	P.O. Box 67	Oak Creek	S967857	241022980	1669
	Cardinal Fabricating Corporation	3400 S. Hanson Avenue	Milwaukee	S067857	241081720	488
	Cooper Power Systems, Inc.	2800 S. 9th Avenue	South Milwaukee	S067857	241362660	2200
	Crane MFG & Service Corporation	6000 S. Buckhorn Avenue	Cudahy	S067857	241079410	609
	Cudahy Tanning Corporation	5043 S. Packard Avenue	Cudahy	S067857	241028920	2232
	Everbrite, Inc.	315 Marion Avenue	South Milwaukee	S067857	241094700	13143
	Federal Marine Terminals	1200 S. Lincoln Memorial Drive	Milwaukee	S067857	241816630	7782
	Fred Knapp Engraving Company, Inc.	5102 Douglas Avenue	Caledonia	S067857	252067860	1797
	Hi Standard Machining Company, Inc.	2621 Eaton Lane	Racine	S067857	- -	746
	James Cape & Sons Company	6422 N. Highway 31	Racine	S067857	252182150	2253
	John H. Batten Airport	3239 N. Green Bay Road	Racine	S067857	- -	9181
	Kitzinger Cooperage Corporation	2529 E. Norwich Avenue	St. Francis	S067857	241063570	579
	Lenard Tool & Machine, Inc.	3125 E. Allerton Avenue	St. Francis	S067857	241951820	1303
	L-W Machine Products, Inc.	1780 E. Bolivar Avenue	St. Francis	S067857	241980530	12673
	Mar San Screw Products, Inc.-Gel Partnership	1341 23rd Street	Racine	S067857	- -	858
	Mid-State Plastics, Inc.	3674 E. Adams Avenue	Cudahy	S067857	241480690	12689
	Milwaukee Bulk Terminals	1900 S. Harbor Drive	Milwaukee	S067857	241961170	3354
	Milwaukee Bulk Terminals-Carferry	1601 S. Carferry Drive	Milwaukee	S067857	241961060	3360
	Modine Manufacturing Company	1500 DeKoven Avenue	Racine	S067857	252012090	9116
	Nelson Brothers and Strom Company, Inc.	1620 Racine Street	Racine	S067857	- -	23
	S. C. Johnson Wax Aviation Department	3450 Mt. Pleasant Avenue	Racine	S067857	252114500	11003
	Shur-line	4051 S. Iowa Avenue	Milwaukee	S067857	241015280	13392
	Twin Disc, Inc.-Plant 3	4601 21st Street	Racine	S067857	252007140	2515
	United Welding & MFG Company, Inc.	3665 E. Adams Avenue	Cudahy	S067857	241247160	1153
	US Coast Guard Base	2420 S. Lincoln Memorial Drive	Milwaukee	S067857	241247820	8224
	WI Electric Power Company	4801 E. Elm Road	Oak Creek	S067857	241007690	5607
Storm Water Industrial Tier 3	Hansen Storage Company 3	538 E. Erie Street	Milwaukee	S049158	241989770	1873
	We Energies-Pleasant Prairie Power Plant	8000 95th Street	Pleasant Prairie	S049158	230006260	6773
	Wiscon Products, Inc.	5022 Douglas Avenue	Racine	S049158	252071710	41
Storm Water Scrap Recycling	Miller Compressing Company	1339 17th Street	Racine	S058831	- -	8560
	Miller Compressing Company	3056 Hamilton Avenue	Racine	S058831	252202830	13053

[a]*The Milwaukee Municipal Stormwater Permit applies to the entire city and encompasses all the watersheds in the city.*

[b]*These communities received their permits after 2003.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Appendix H

NONPOINT SOURCE POLLUTION LOADS

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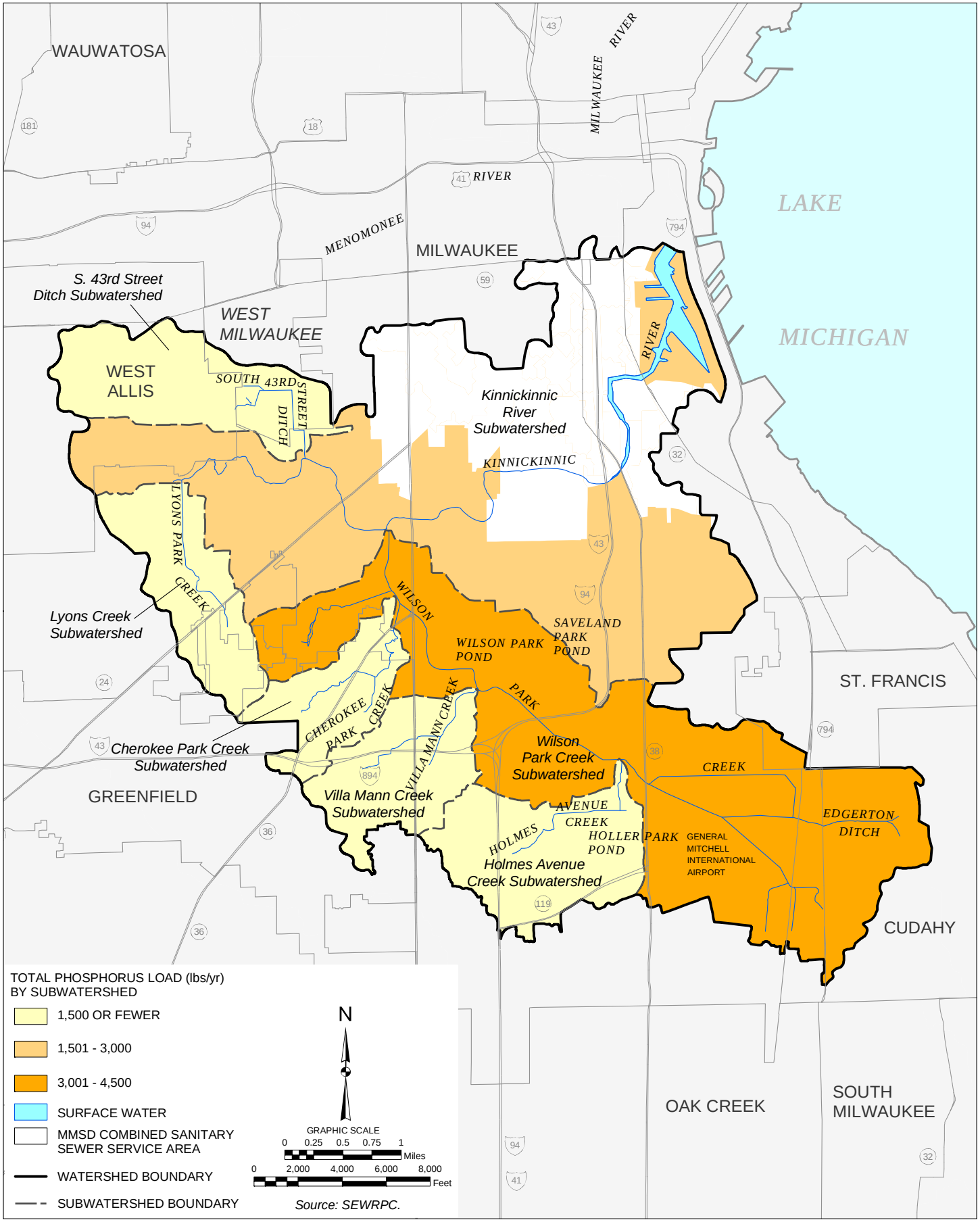
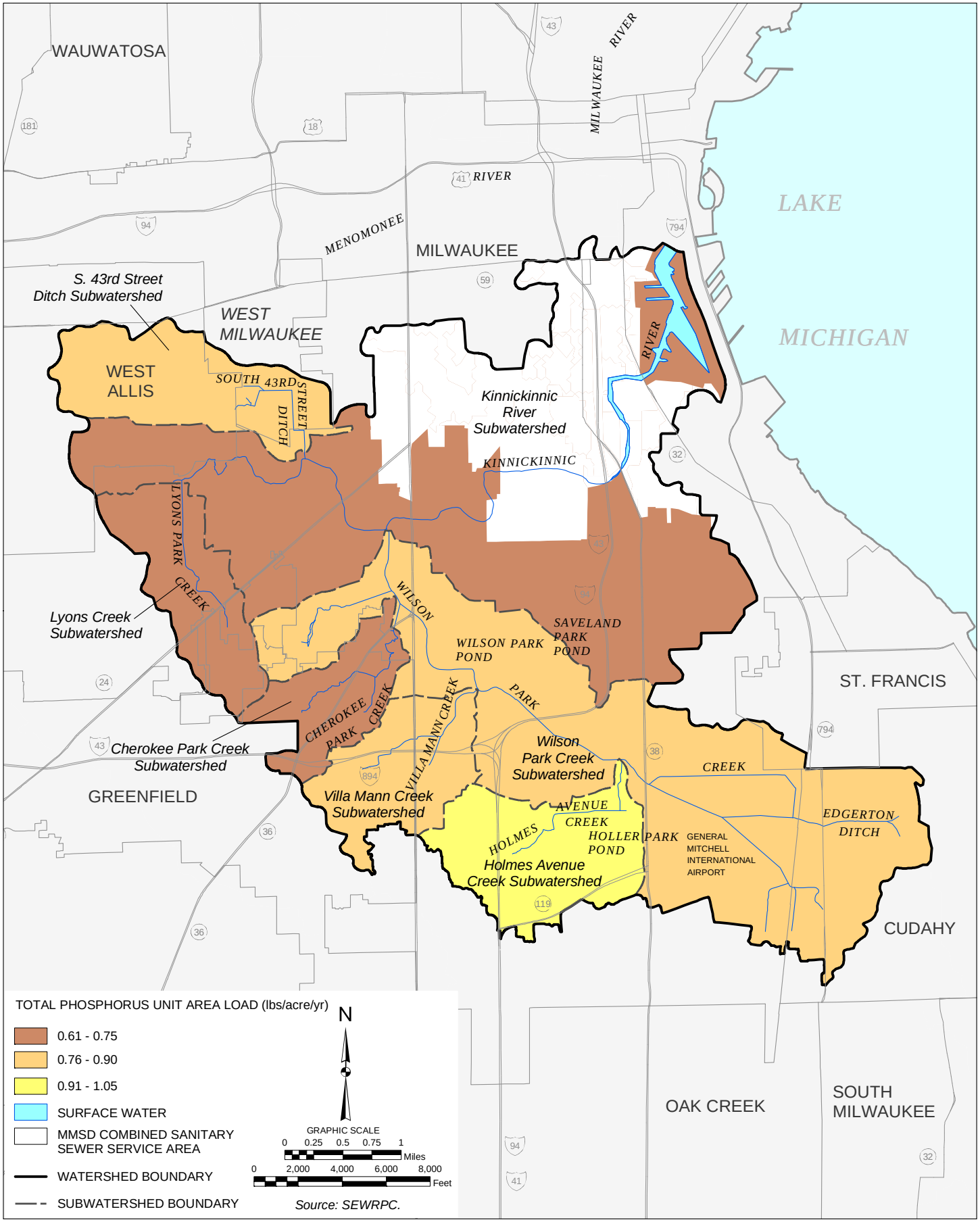
Map H-1

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE KINNICKINNIC RIVER WATERSHED



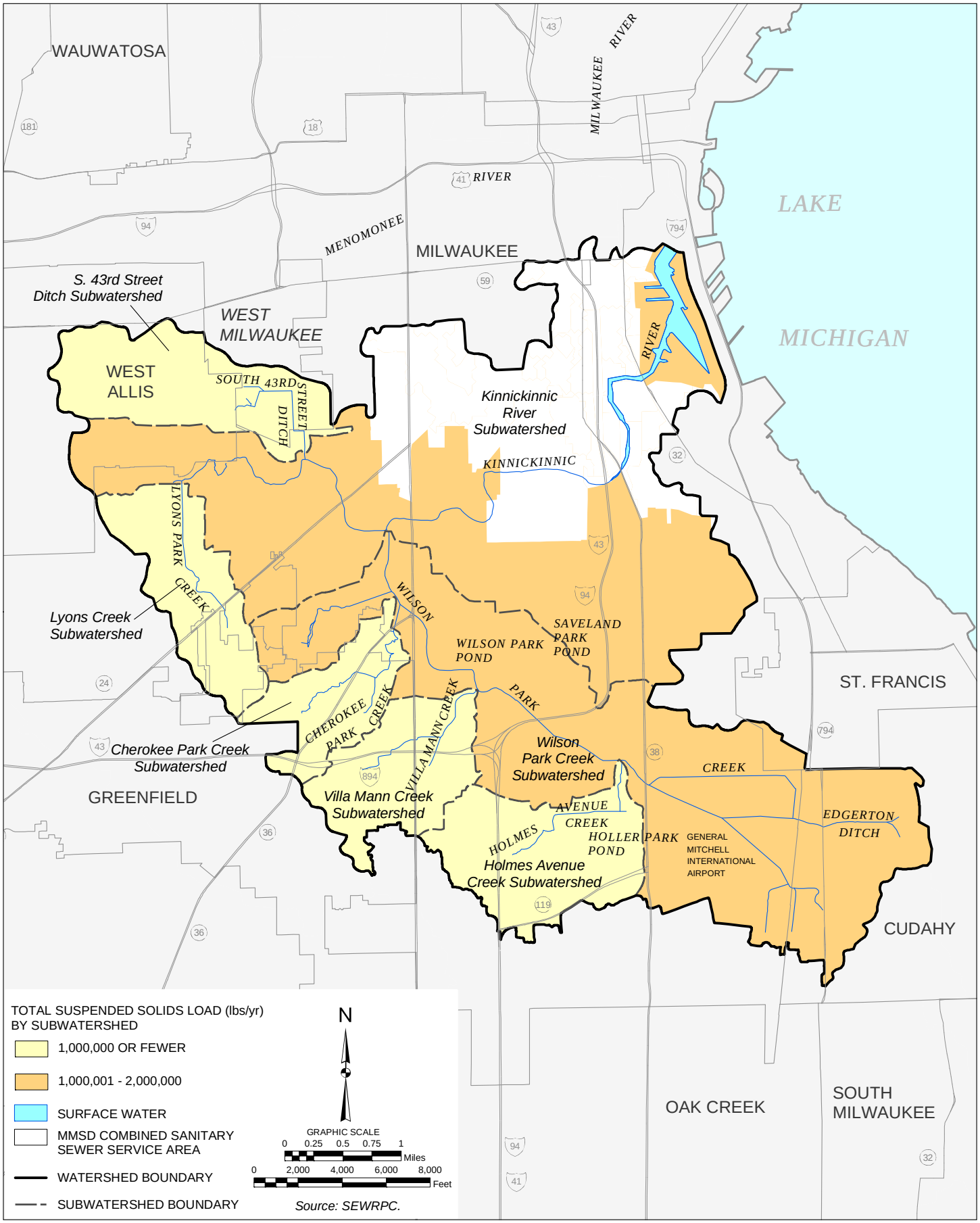
Map H-2

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE KINNICKINNIC RIVER WATERSHED



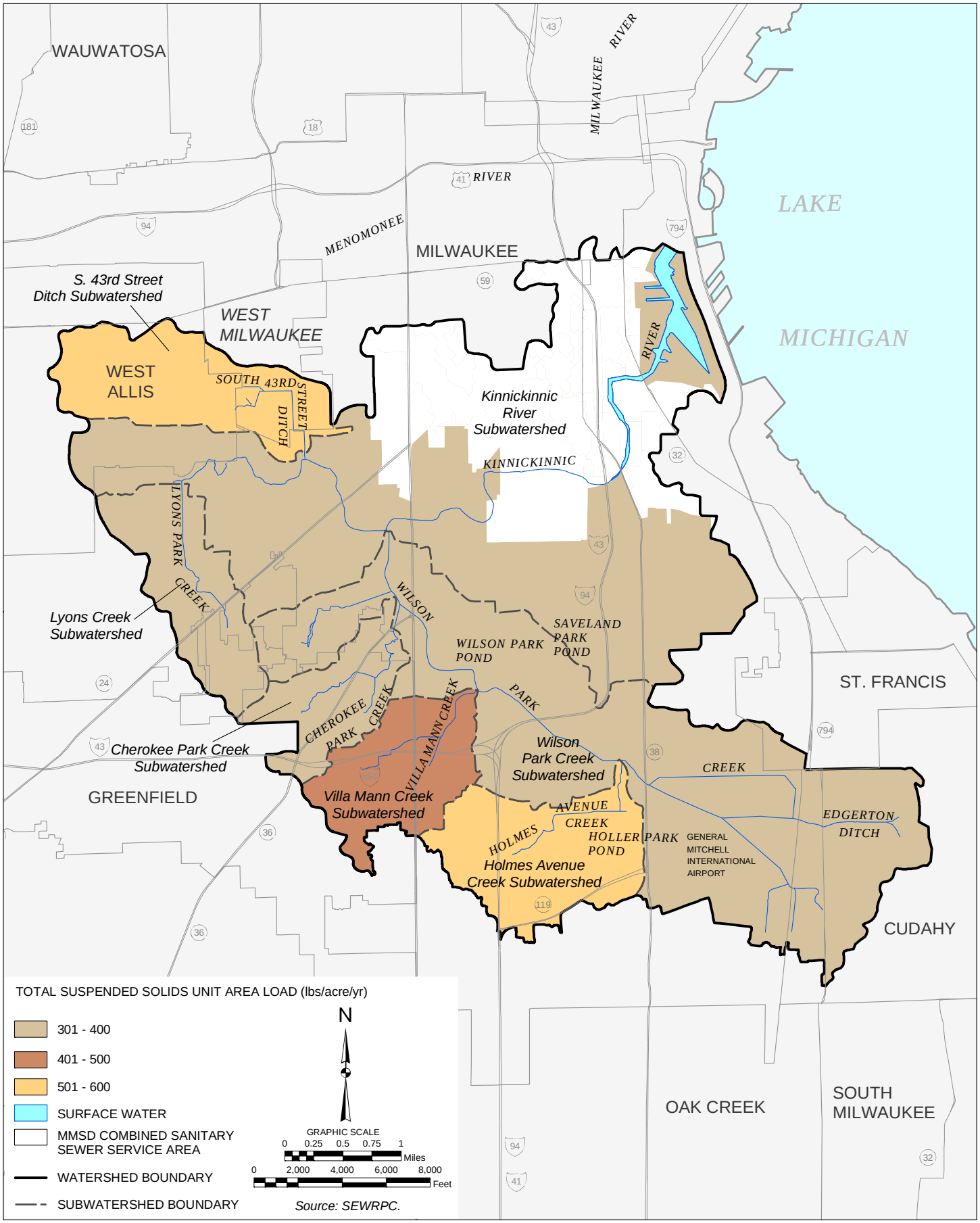
Map H-3

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE KINNICKINNIC RIVER WATERSHED



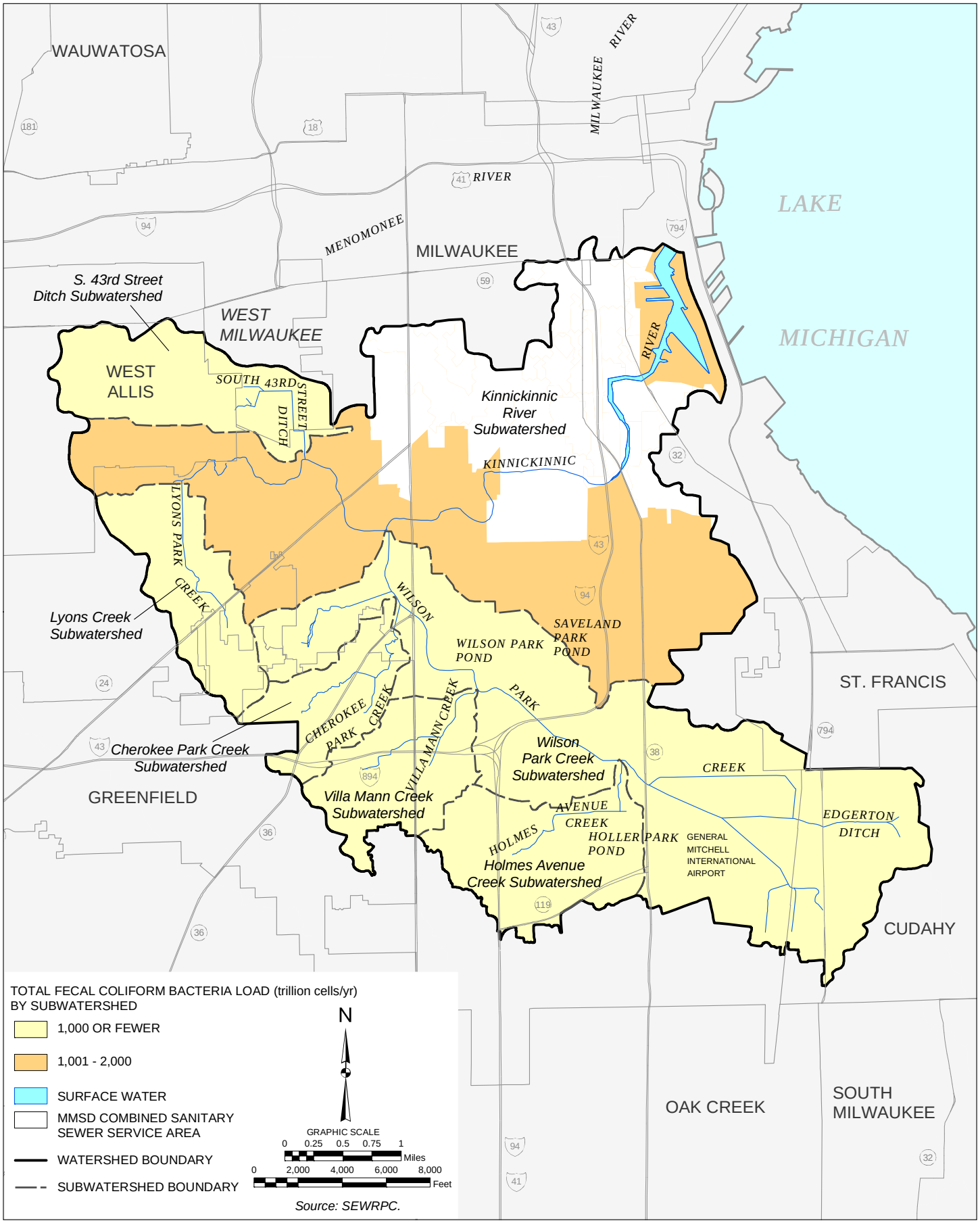
Map H-4

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE KINNICKINNIC RIVER WATERSHED



Map H-5

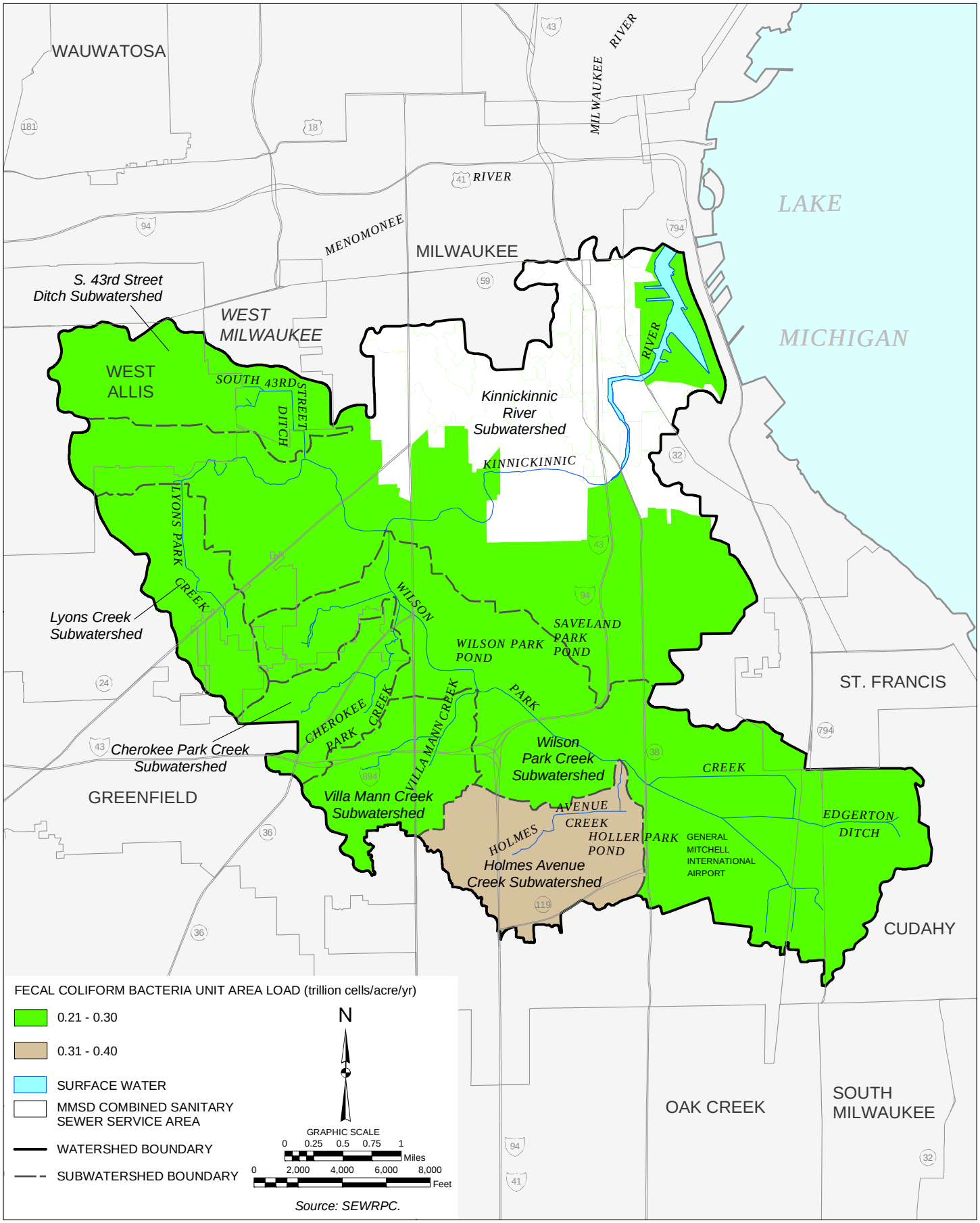
ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF FECAL COLIFORM BACTERIA IN THE KINNICKINNIC RIVER WATERSHED



Source: SEWRPC.

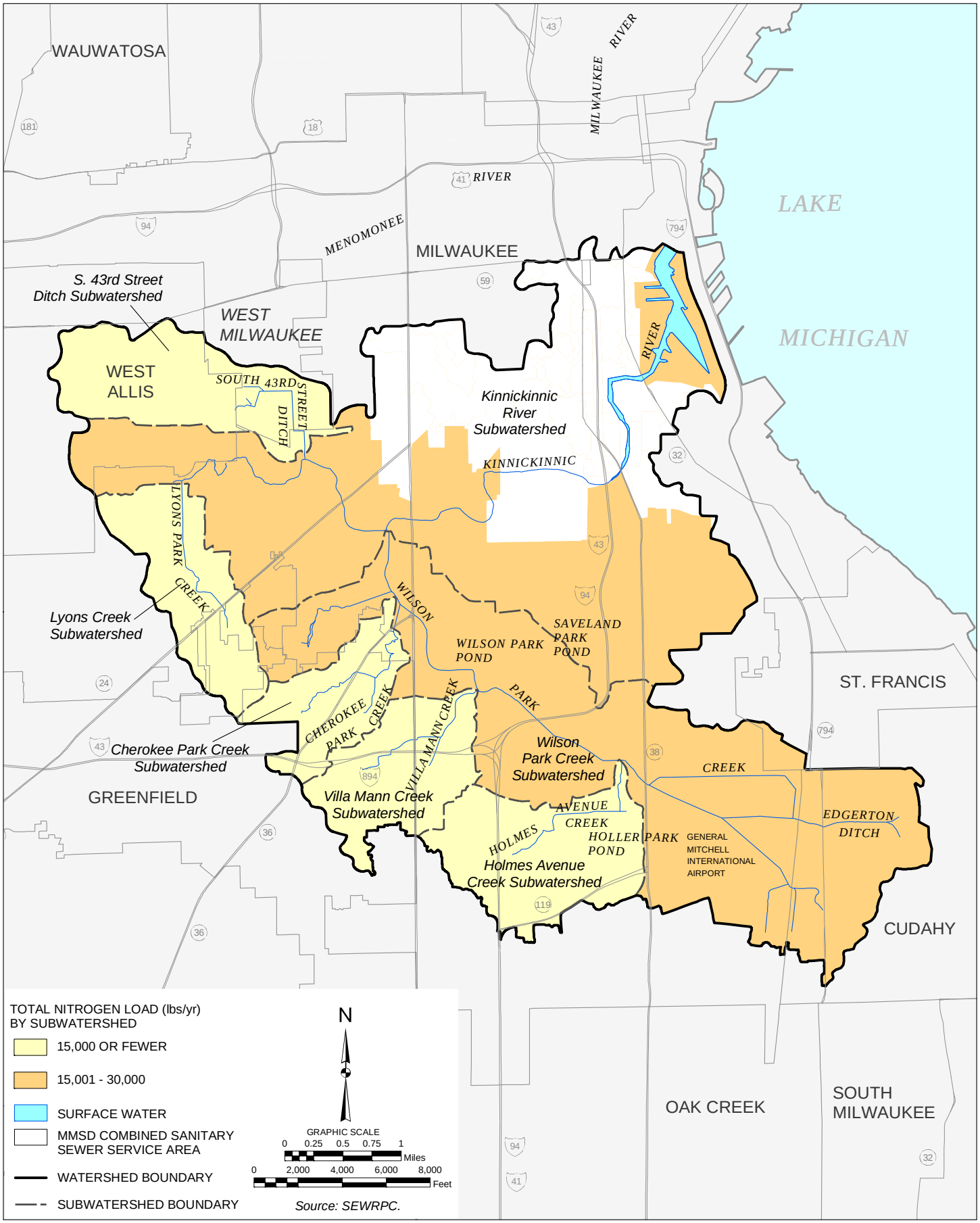
Map H-6

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF FECAL COLIFORM BACTERIA IN THE KINNICKINNIC RIVER WATERSHED



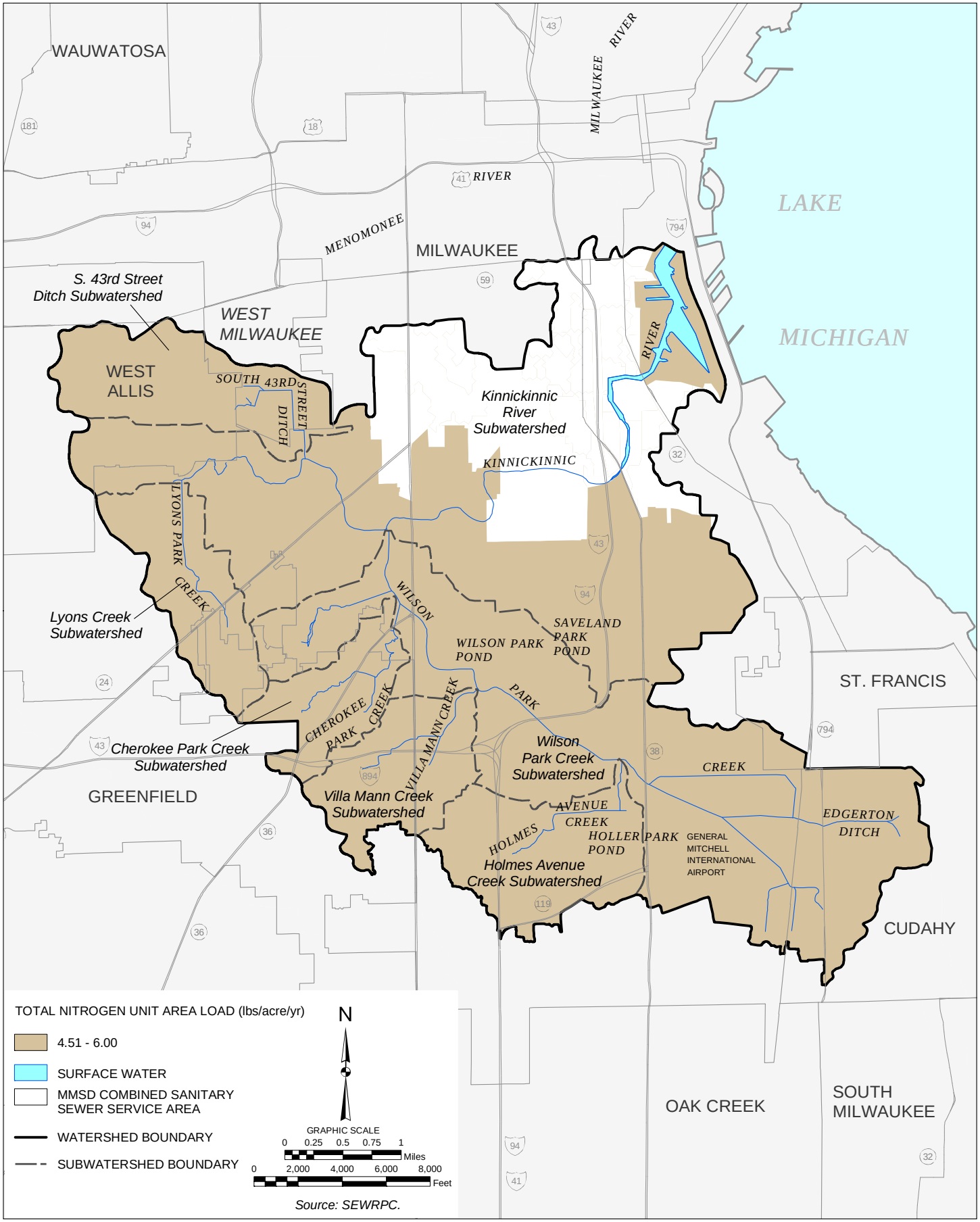
Map H-7

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE KINNICKINNIC RIVER WATERSHED



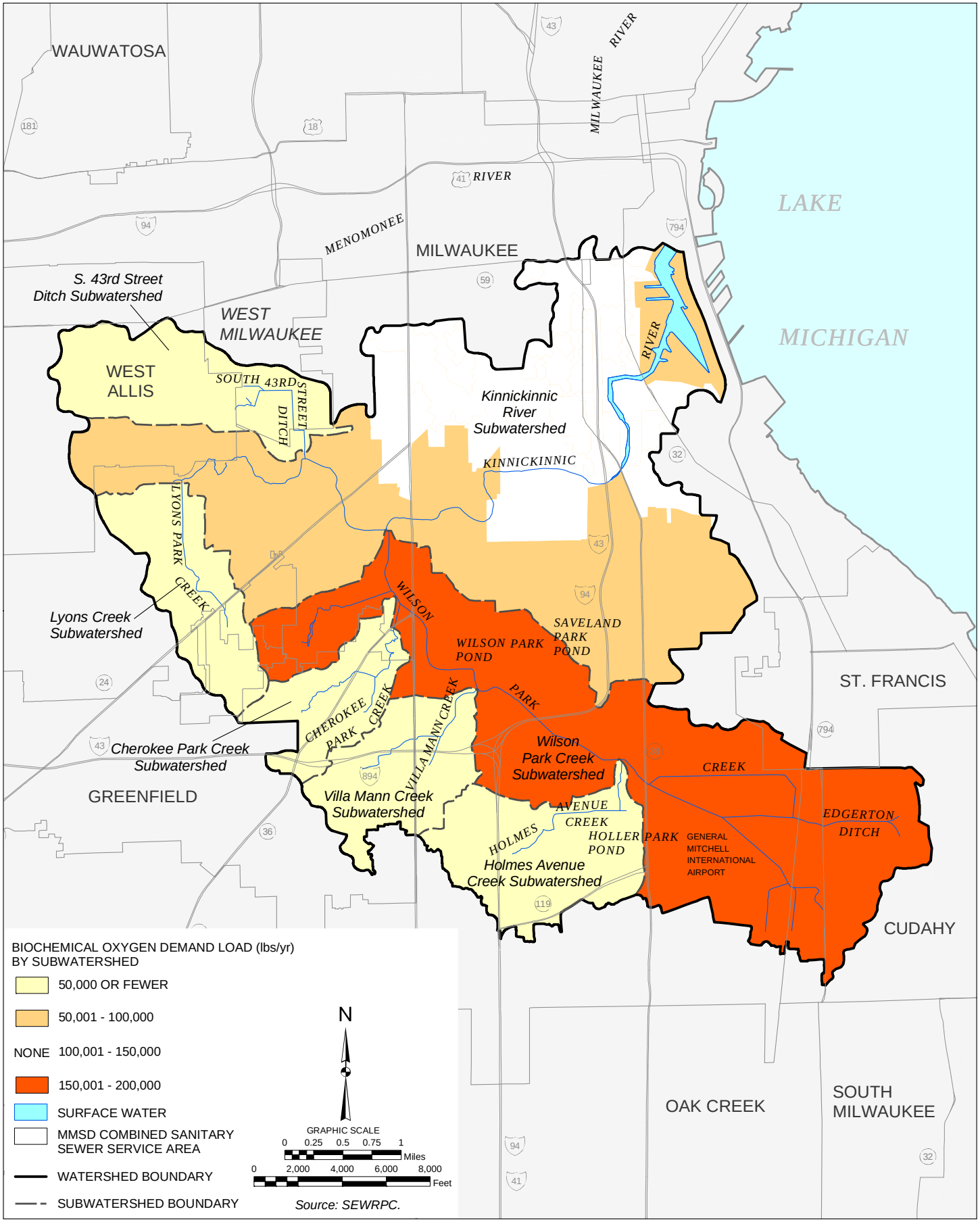
Map H-8

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE KINNICKINNIC RIVER WATERSHED



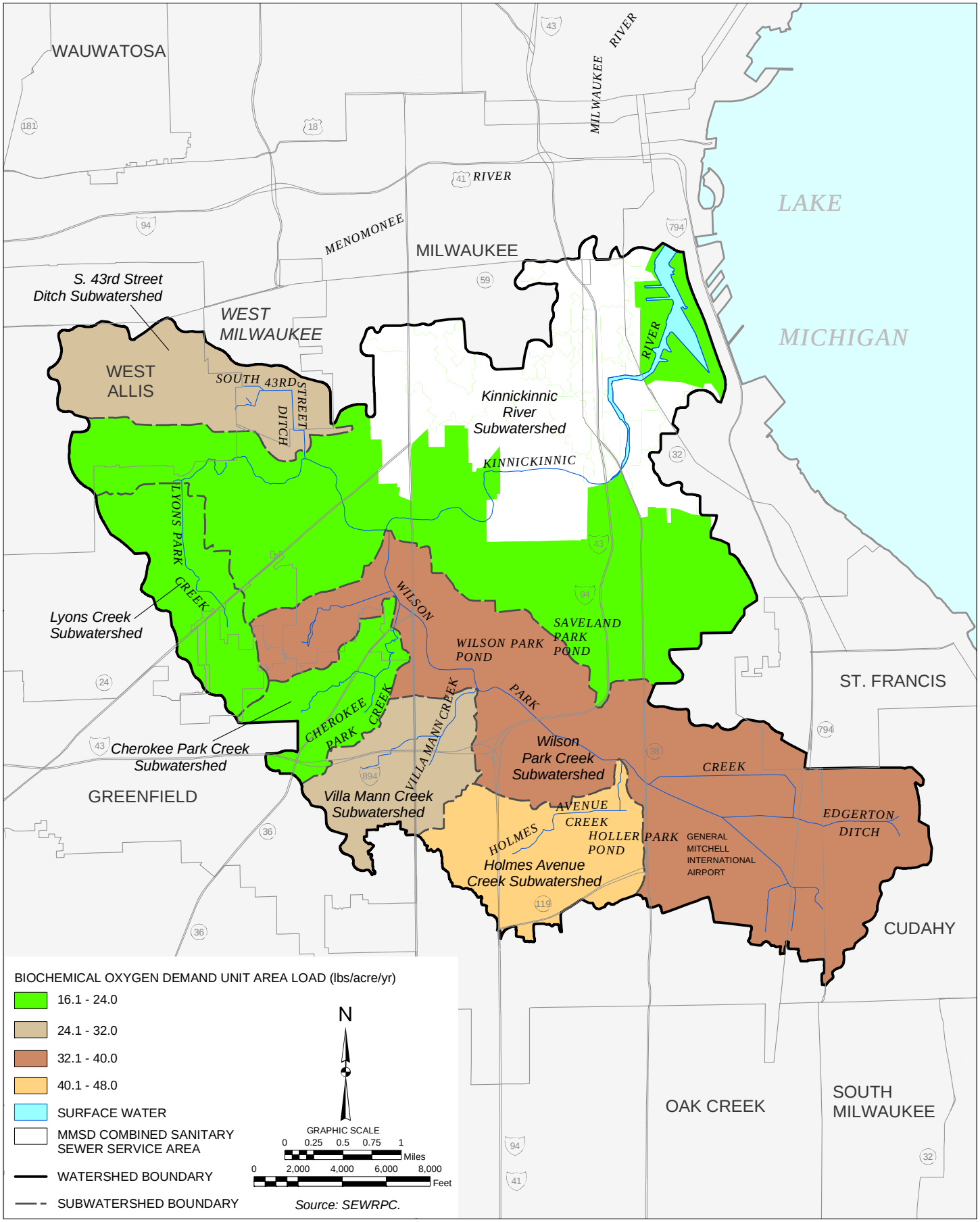
Map H-9

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF BIOCHEMICAL OXYGEN DEMAND IN THE KINNICKINNIC RIVER WATERSHED



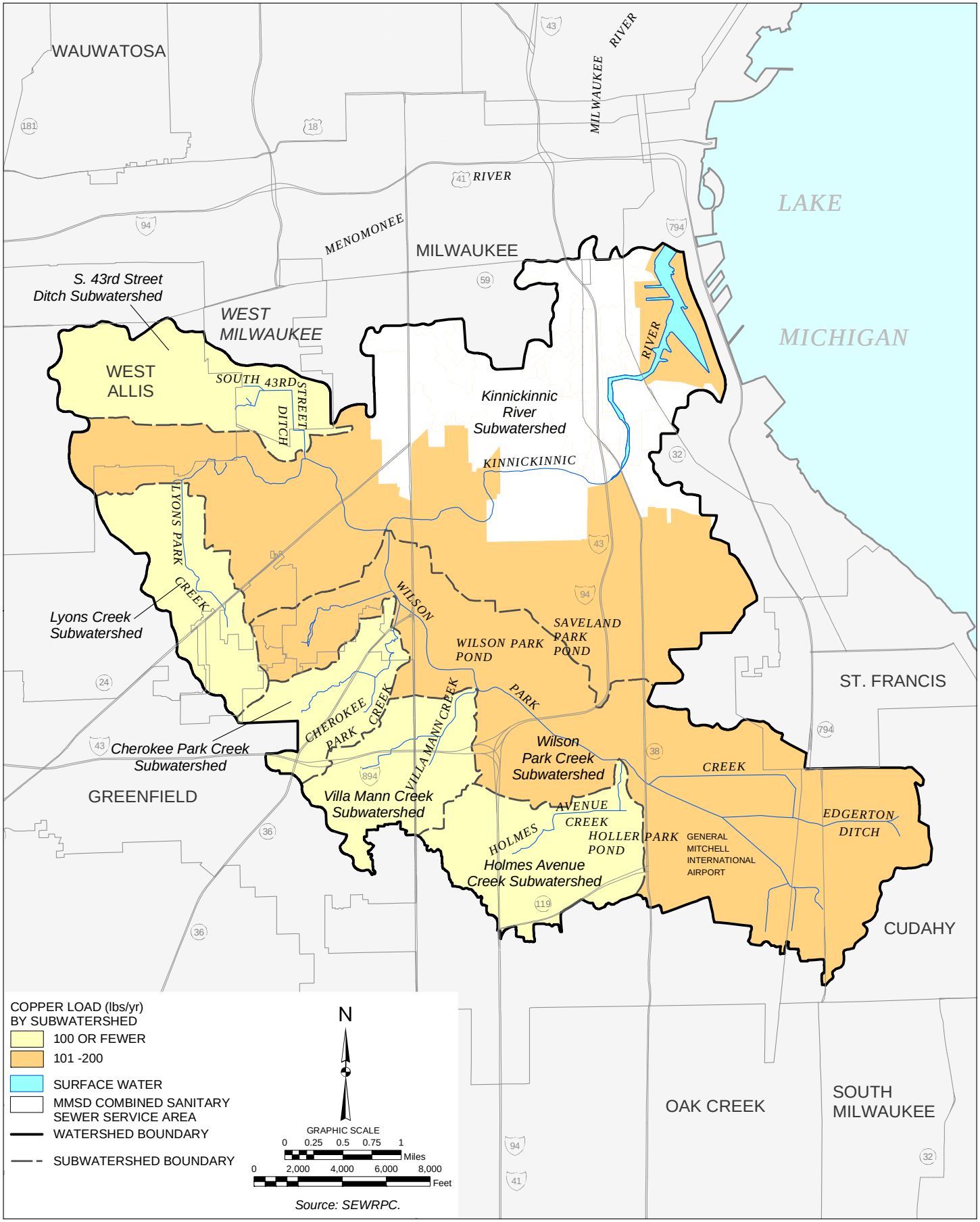
Map H-10

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF BIOCHEMICAL OXYGEN DEMAND IN THE KINNICKINNIC RIVER WATERSHED



Map H-11

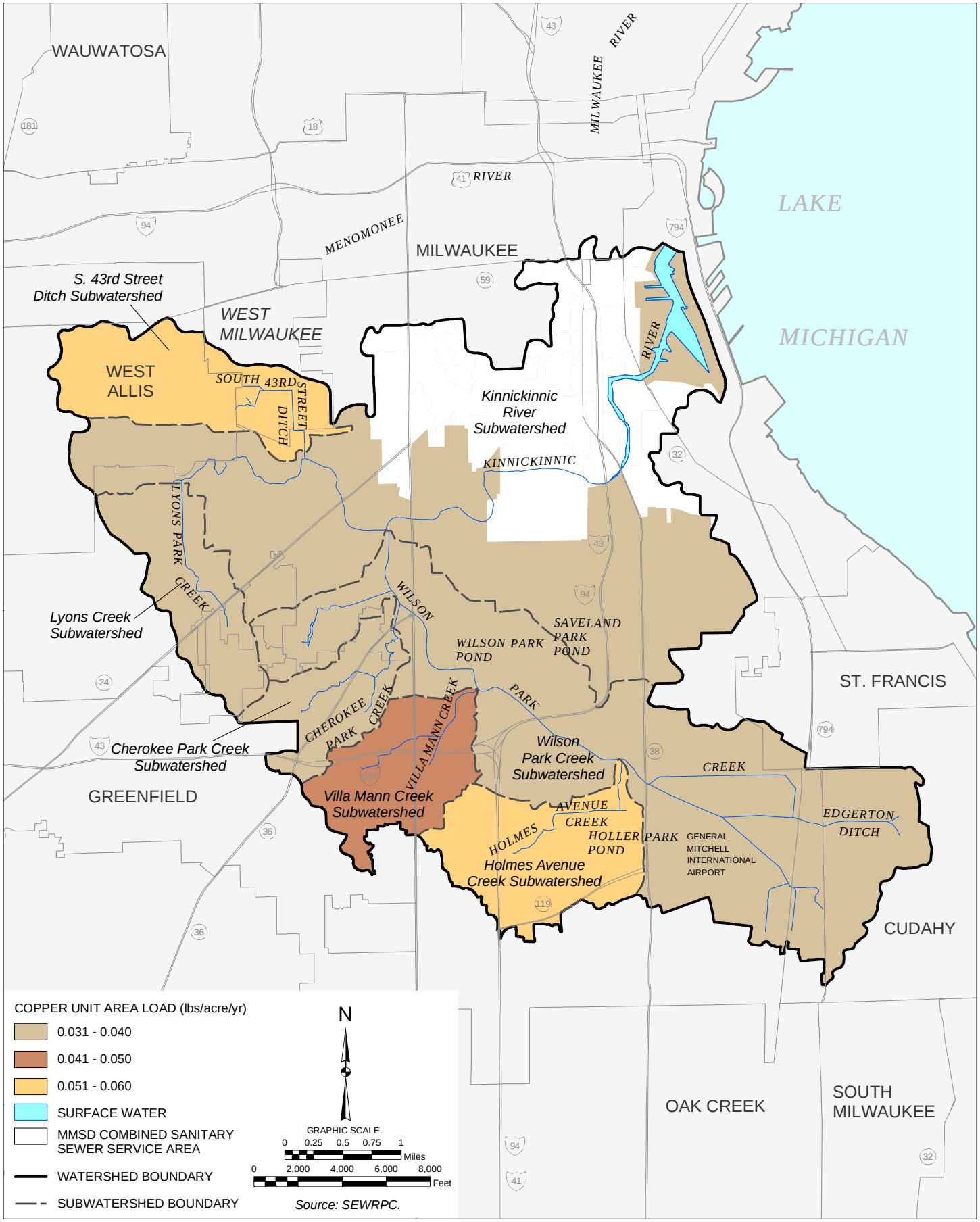
ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF COPPER IN THE KINNICKINNIC RIVER WATERSHED



Source: SEWRPC.

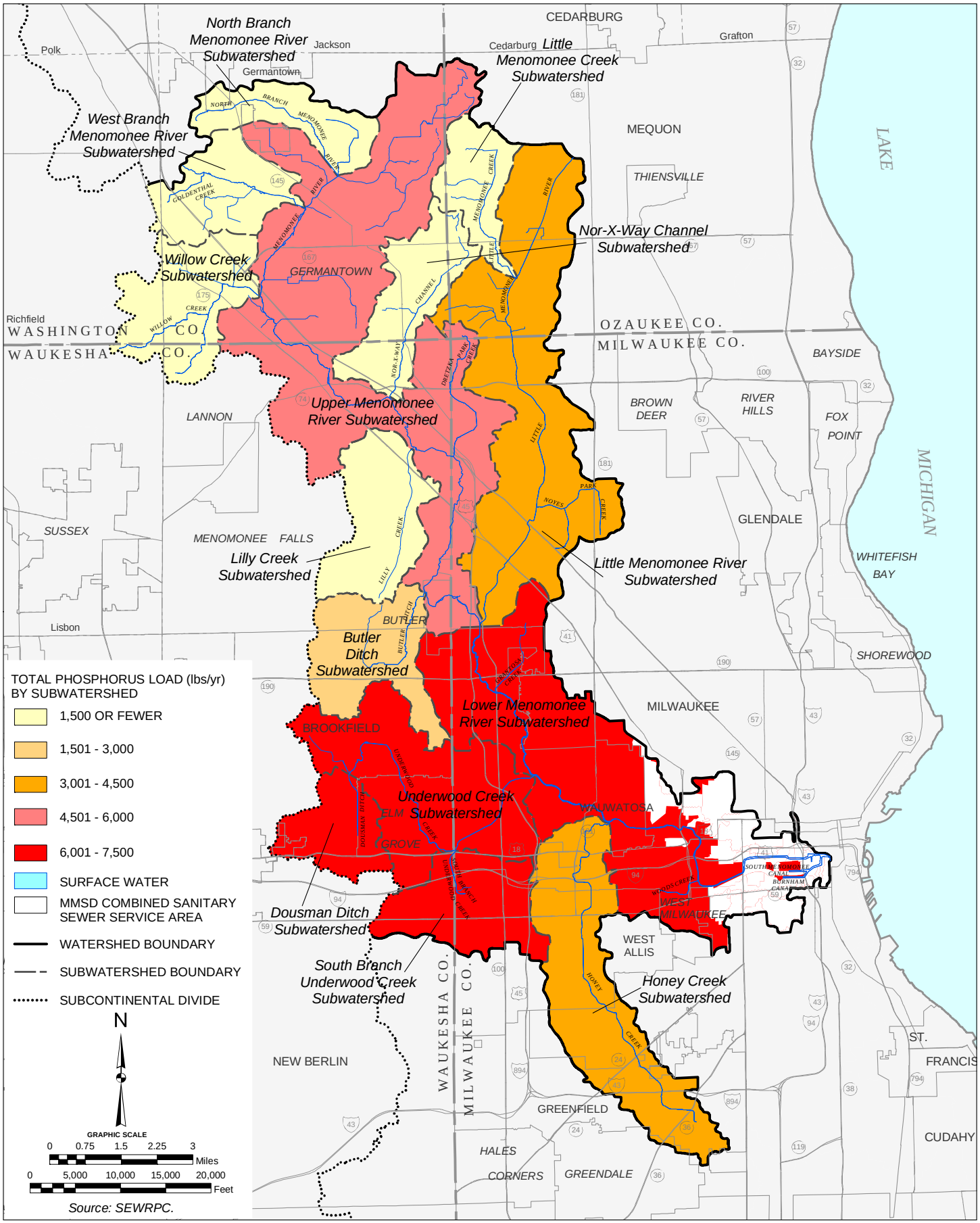
Map H-12

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF COPPER IN THE KINNICKINNIC RIVER WATERSHED



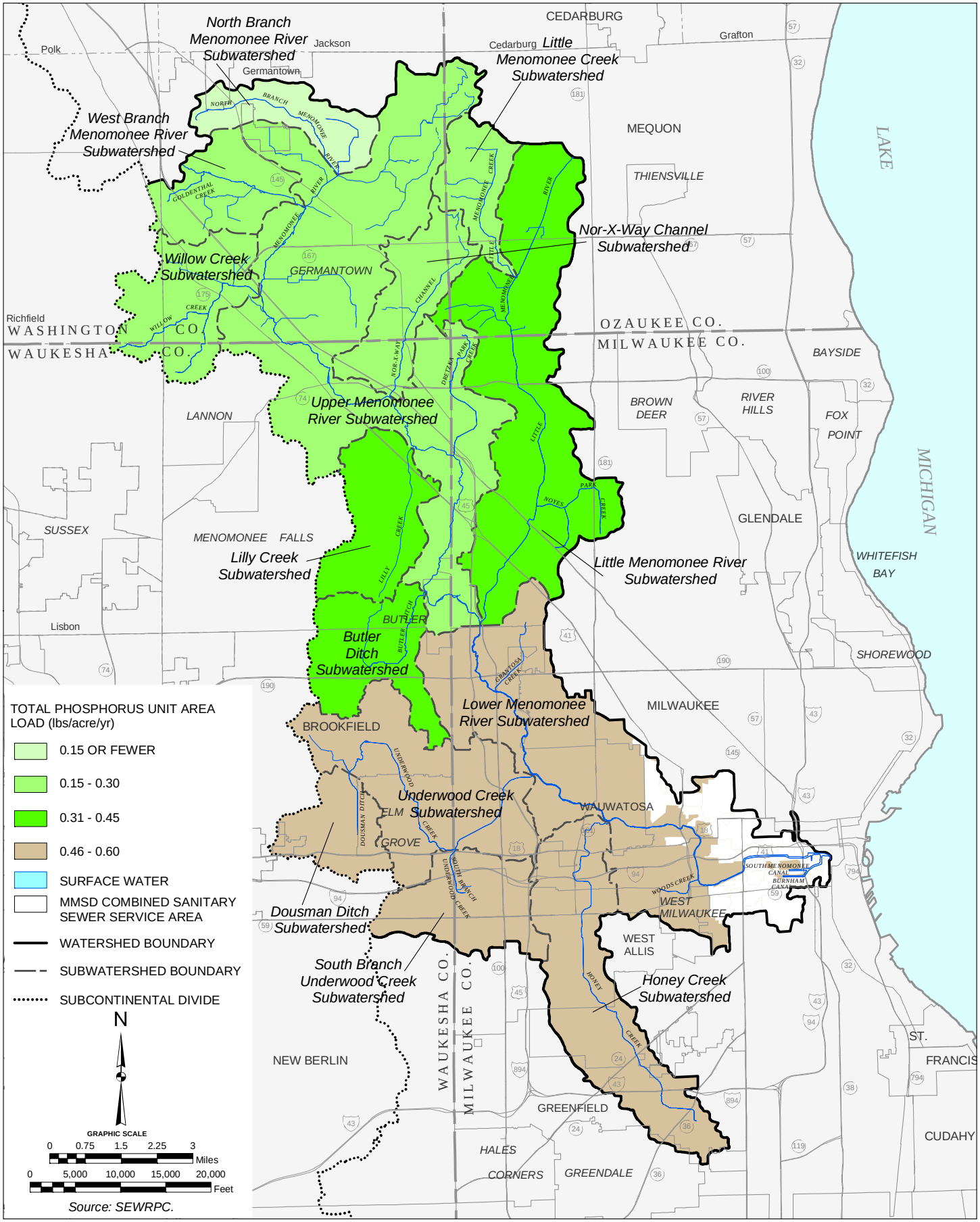
Map H-13

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE MENOMONEE RIVER WATERSHED



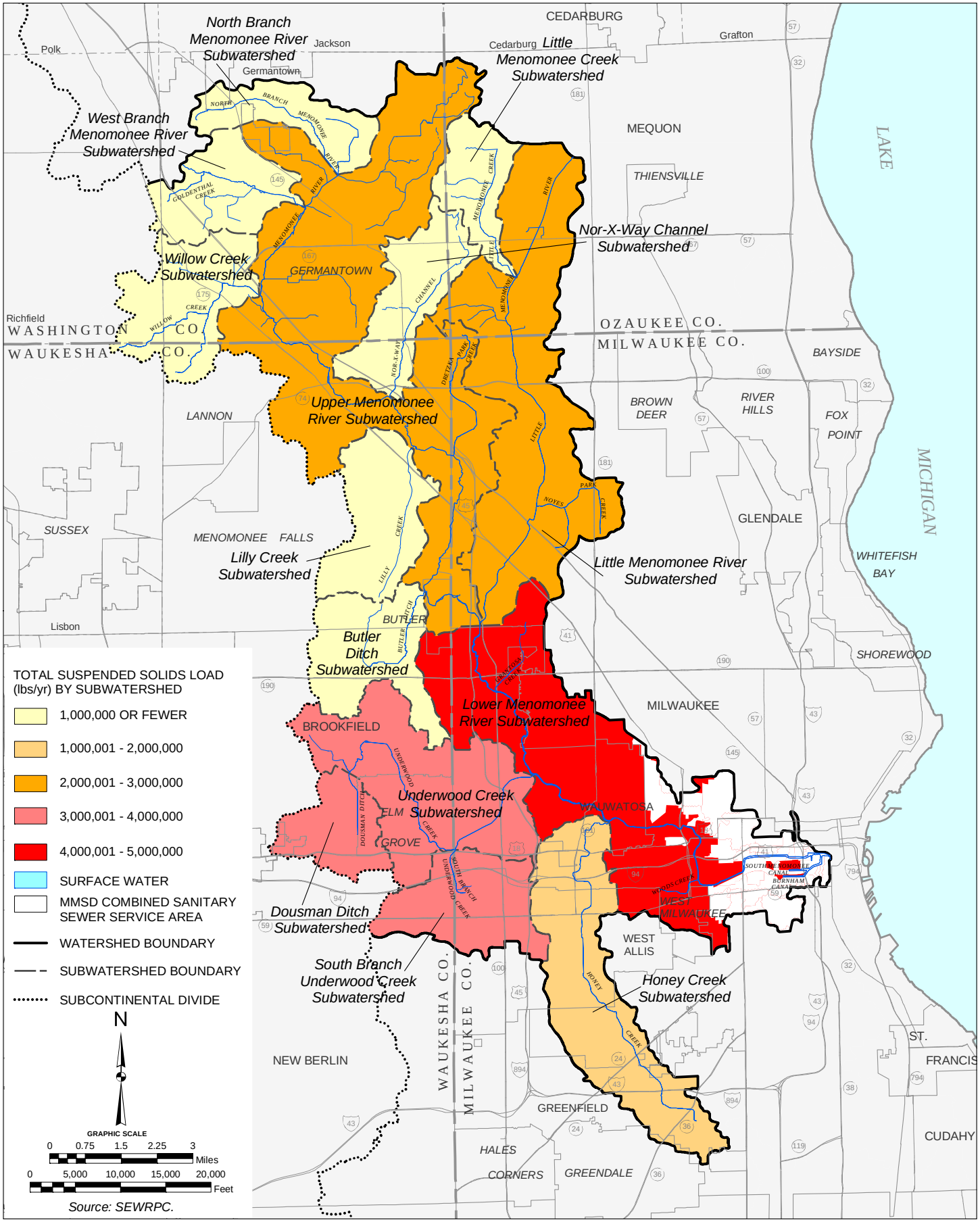
Map H-14

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE MENOMONEE RIVER WATERSHED



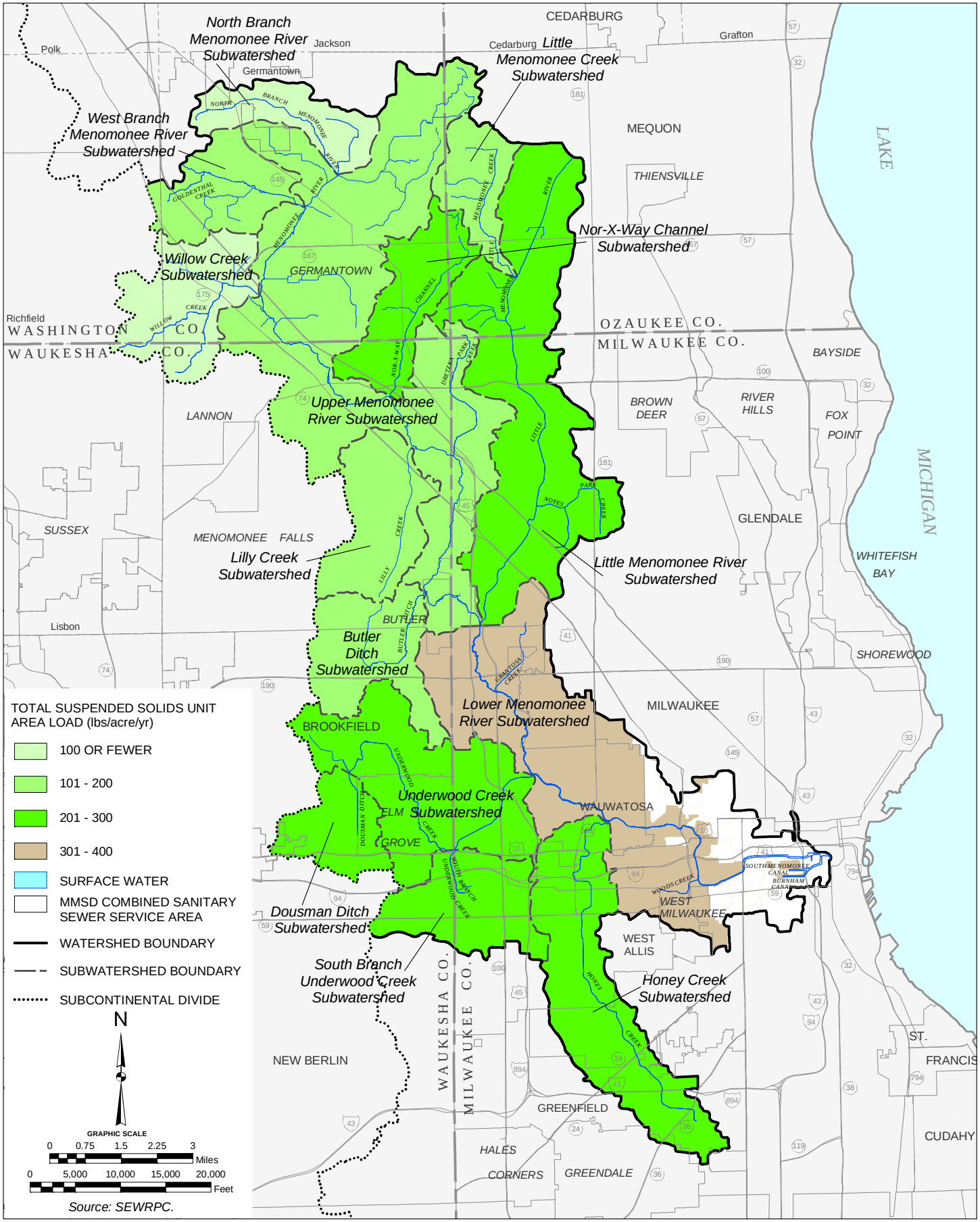
Map H-15

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE MENOMONEE RIVER WATERSHED



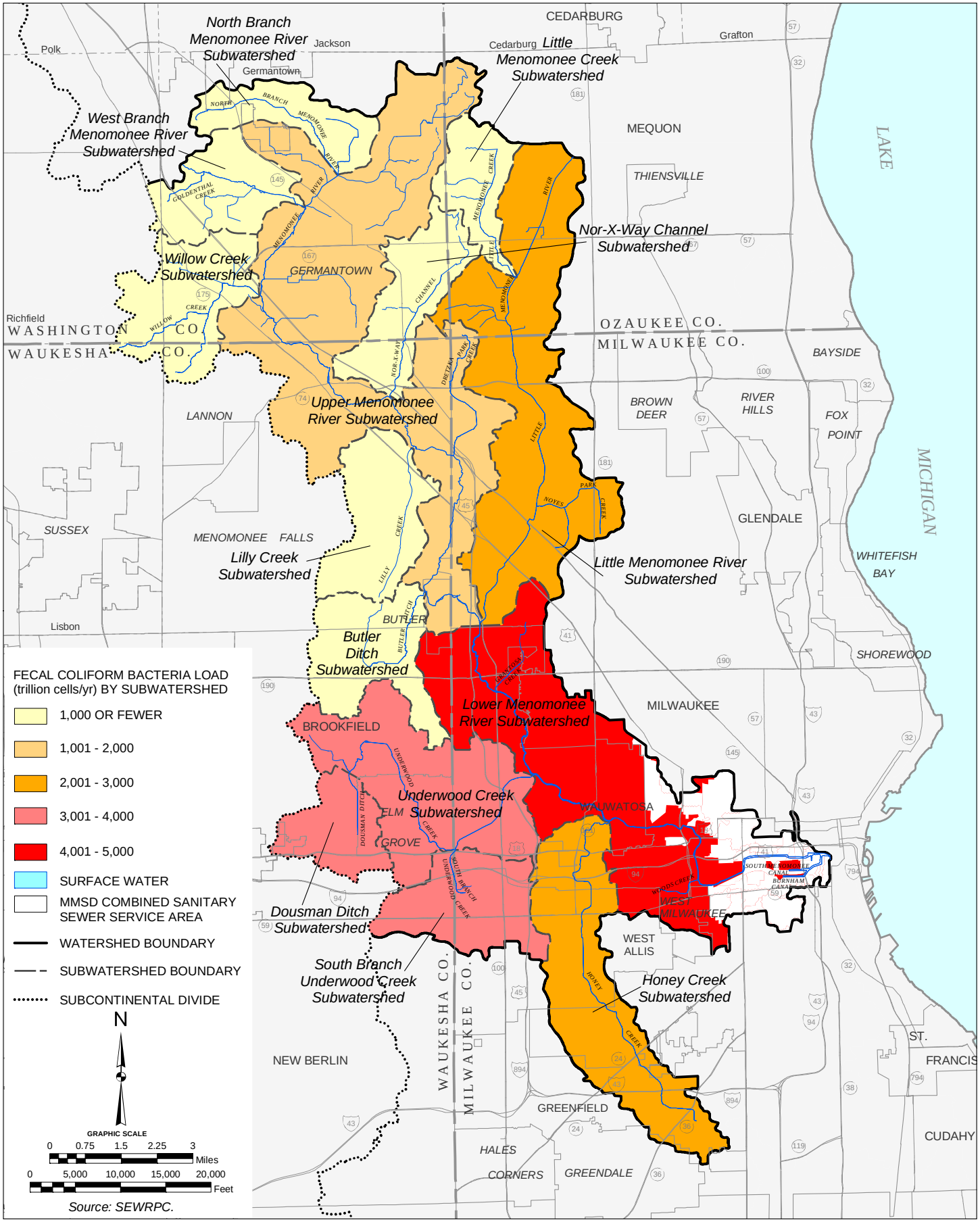
Map H-16

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE MENOMONEE RIVER WATERSHED



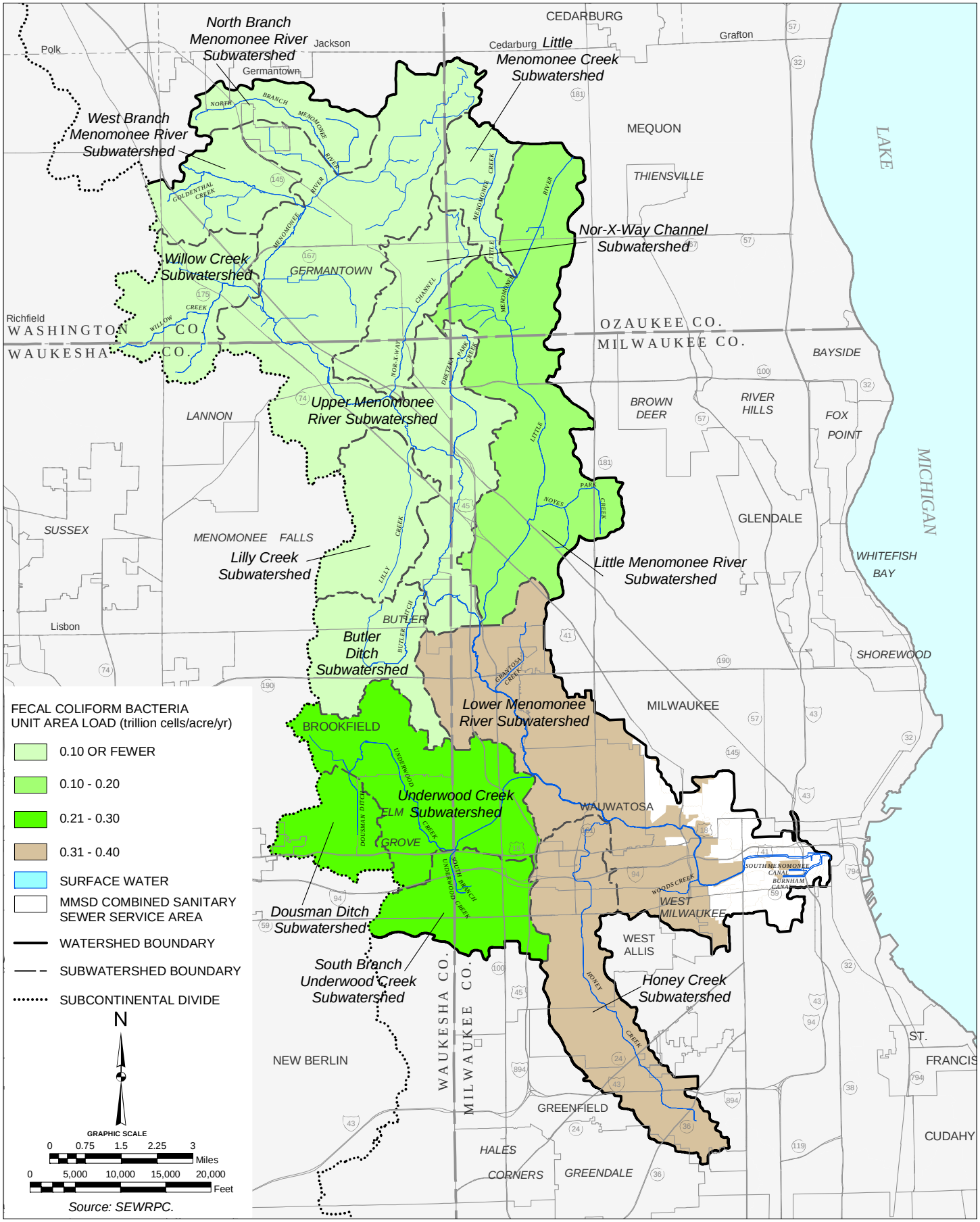
Map H-17

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF FECAL COLIFORM BACTERIA IN THE MENOMONEE RIVER WATERSHED



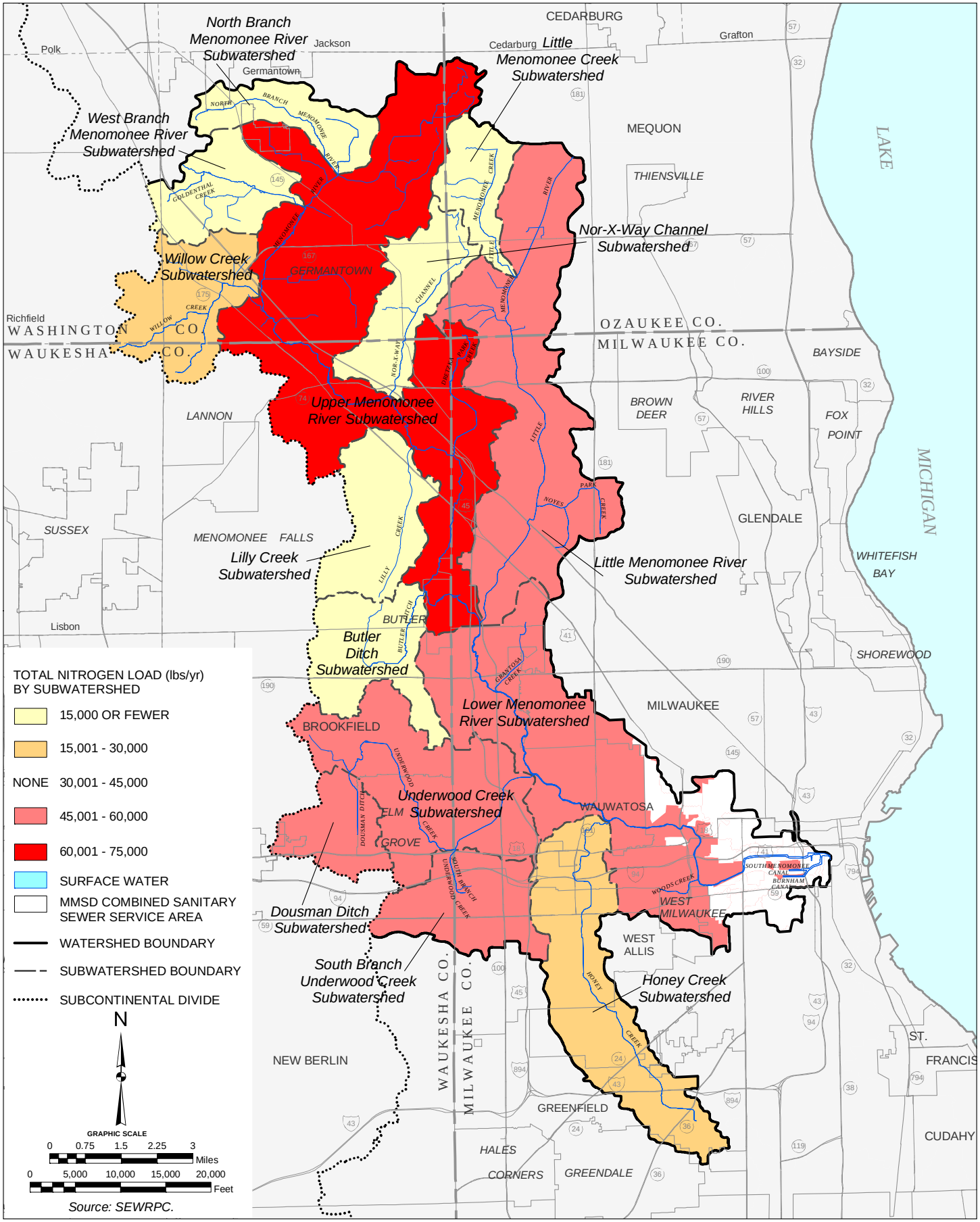
Map H-18

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF FECAL COLIFORM BACTERIA IN THE MENOMONEE RIVER WATERSHED



Map H-19

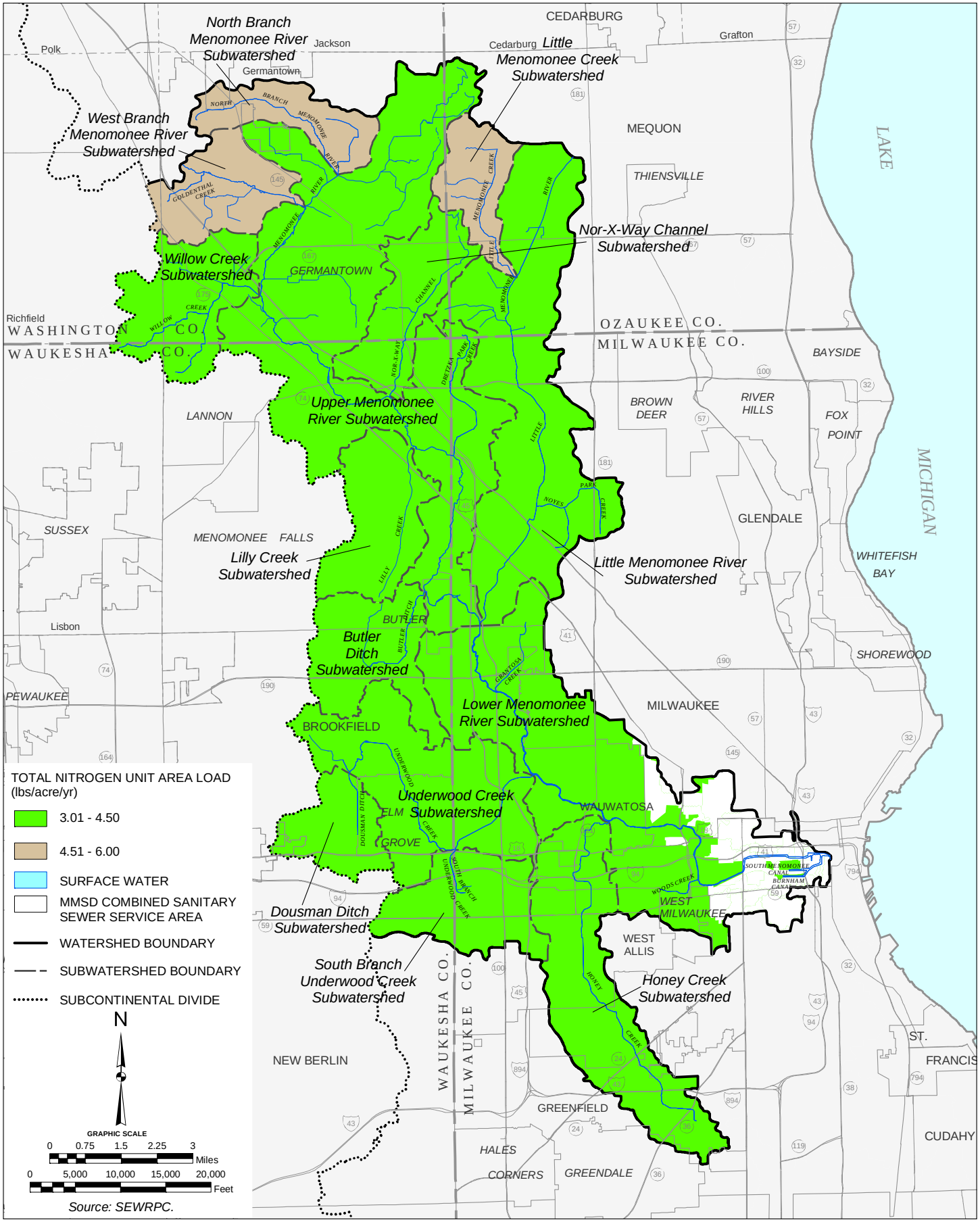
ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE MENOMONEE RIVER WATERSHED



Source: SEWRPC.

Map H-20

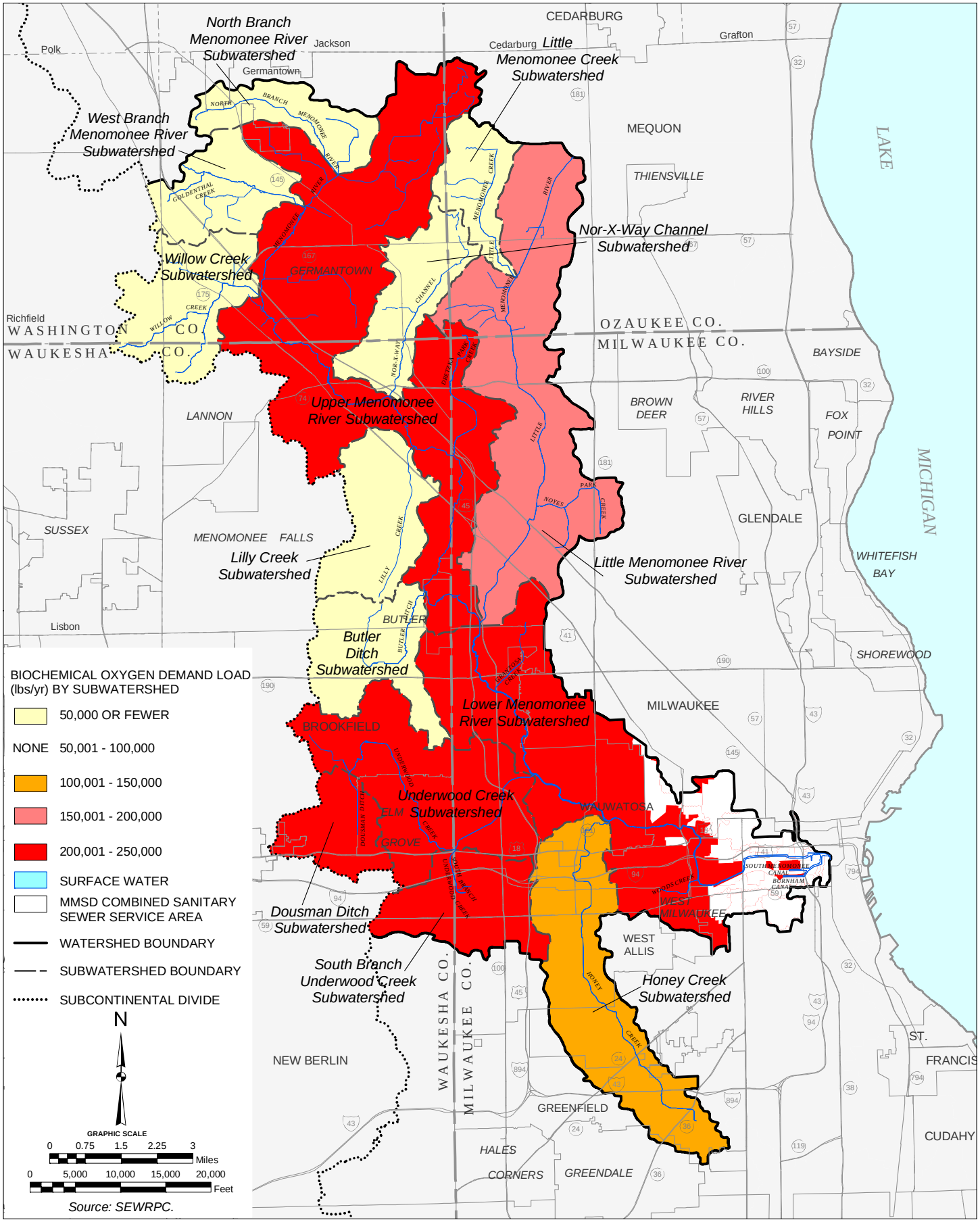
ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE MENOMONEE RIVER WATERSHED



Source: SEWRPC.

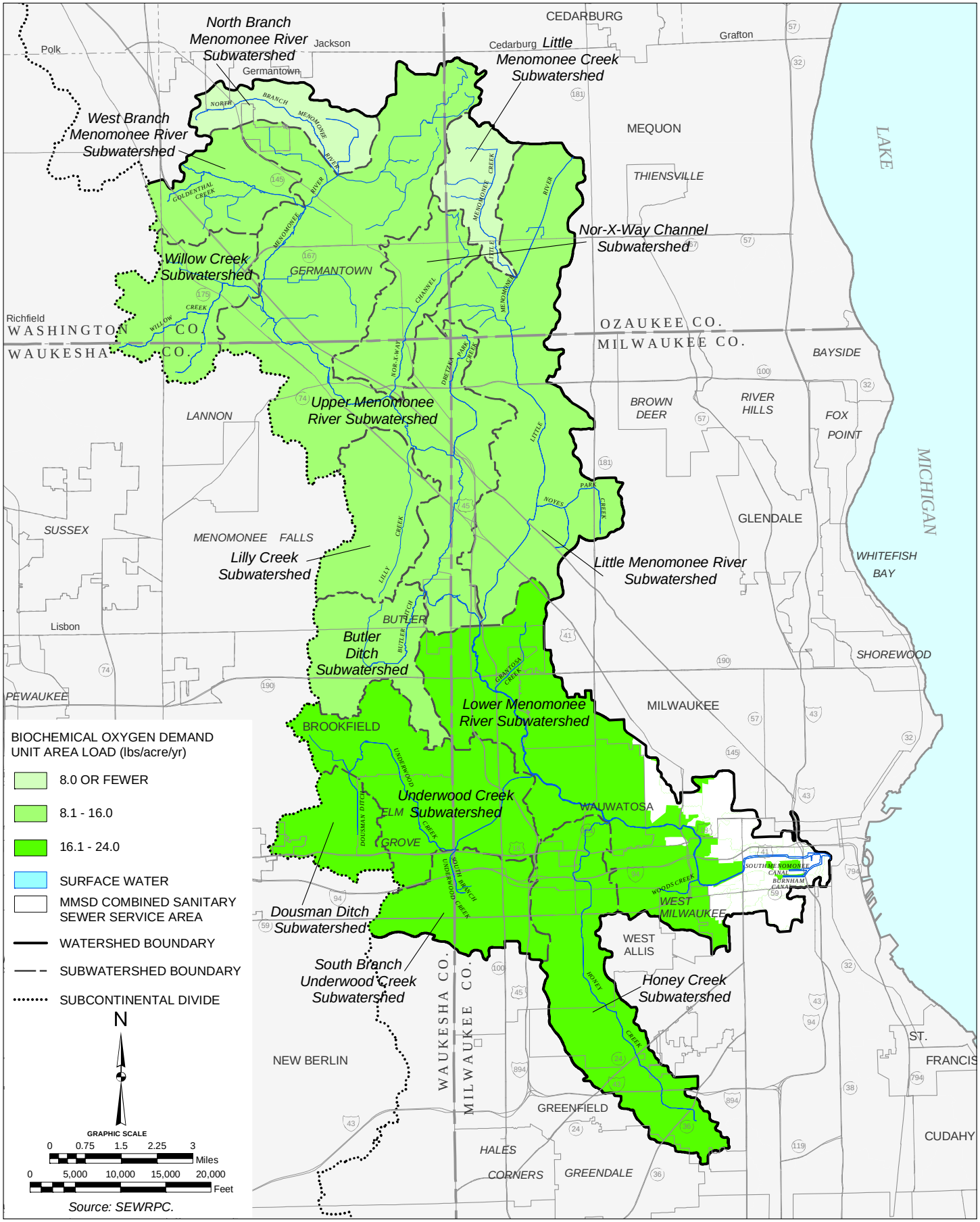
Map H-21

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF BIOCHEMICAL OXYGEN DEMAND IN THE MENOMONEE RIVER WATERSHED



Map H-22

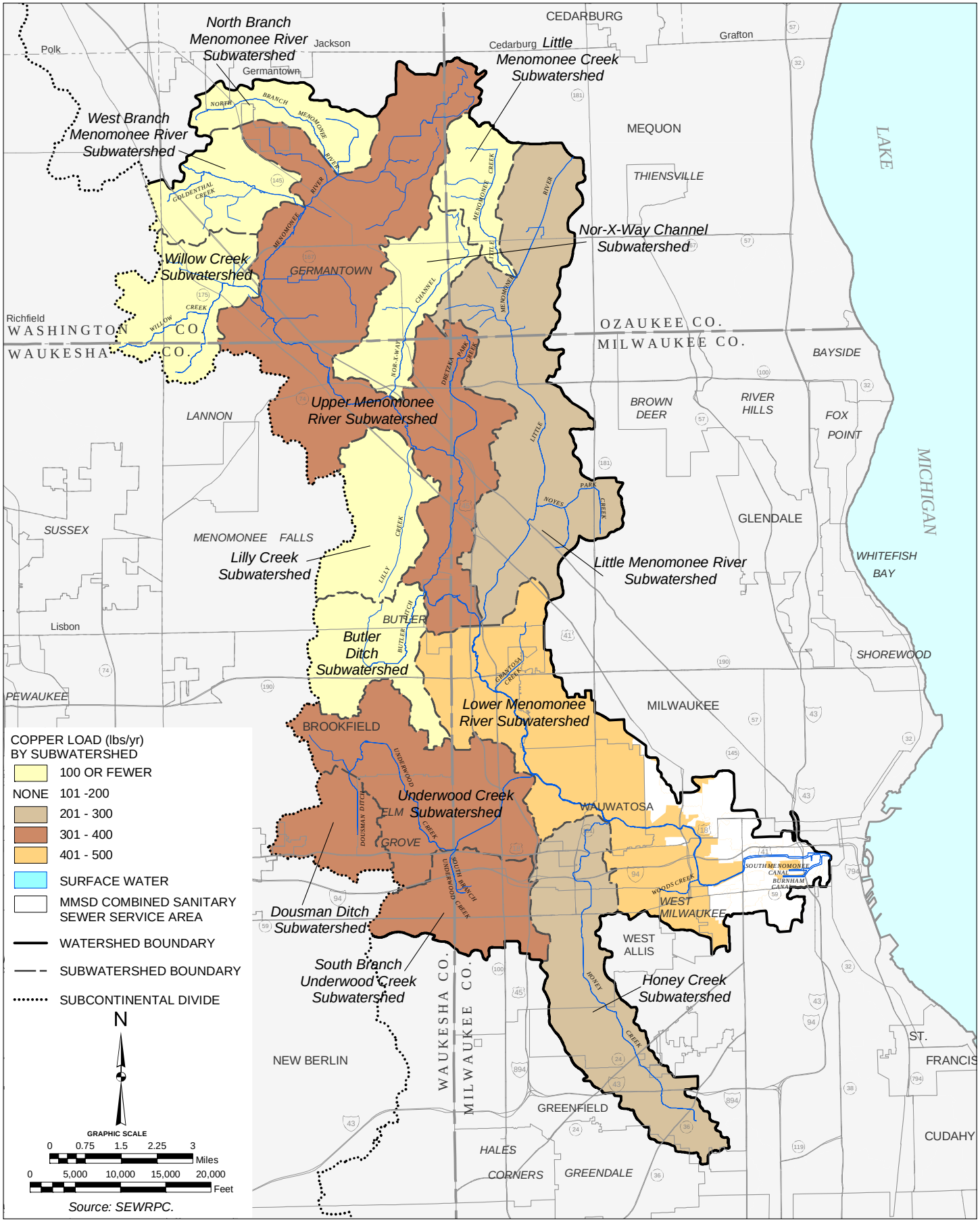
ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF BIOCHEMICAL OXYGEN DEMAND IN THE MENOMONEE RIVER WATERSHED



Source: SEWRPC.

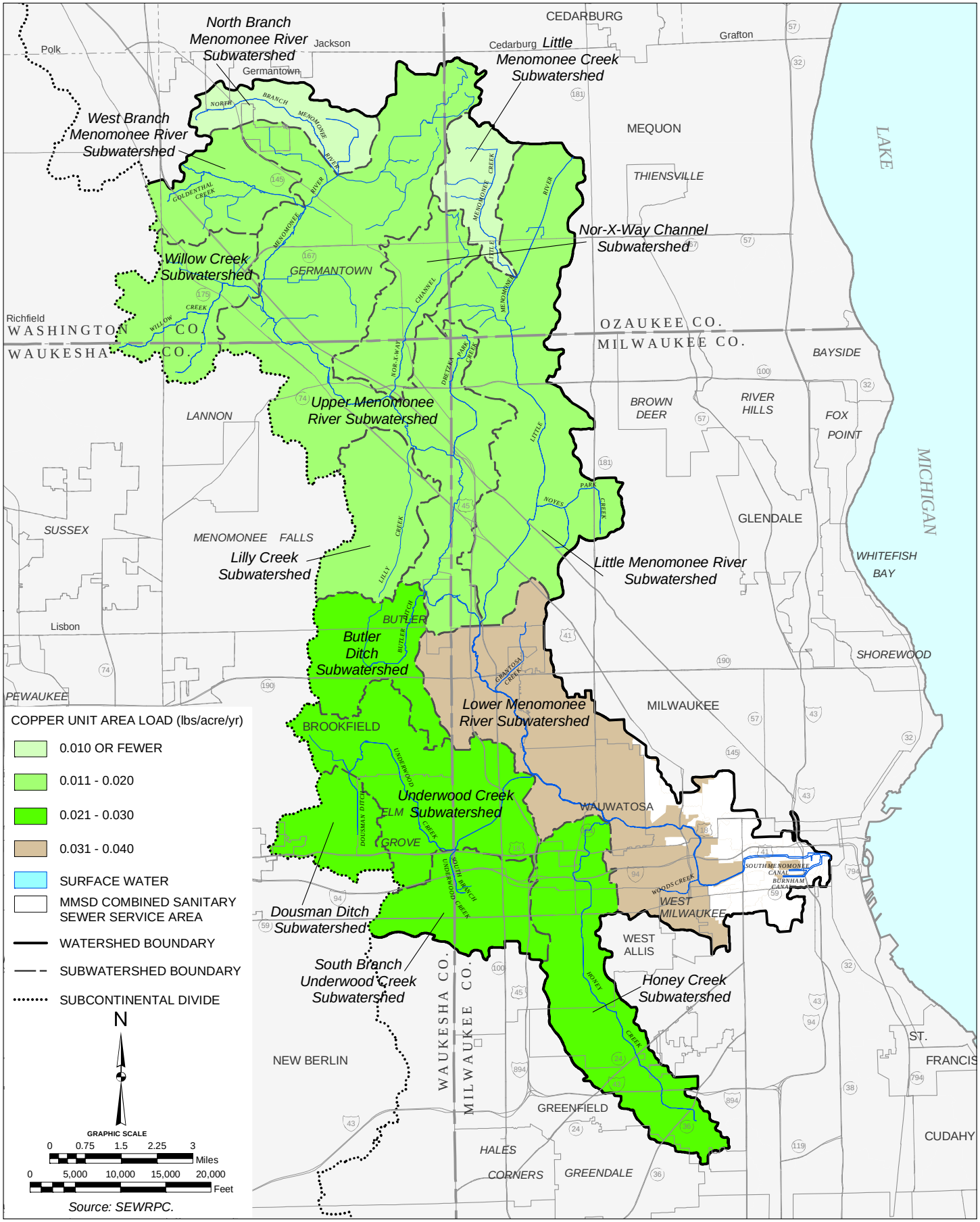
Map H-23

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF COPPER IN THE MENOMONEE RIVER WATERSHED



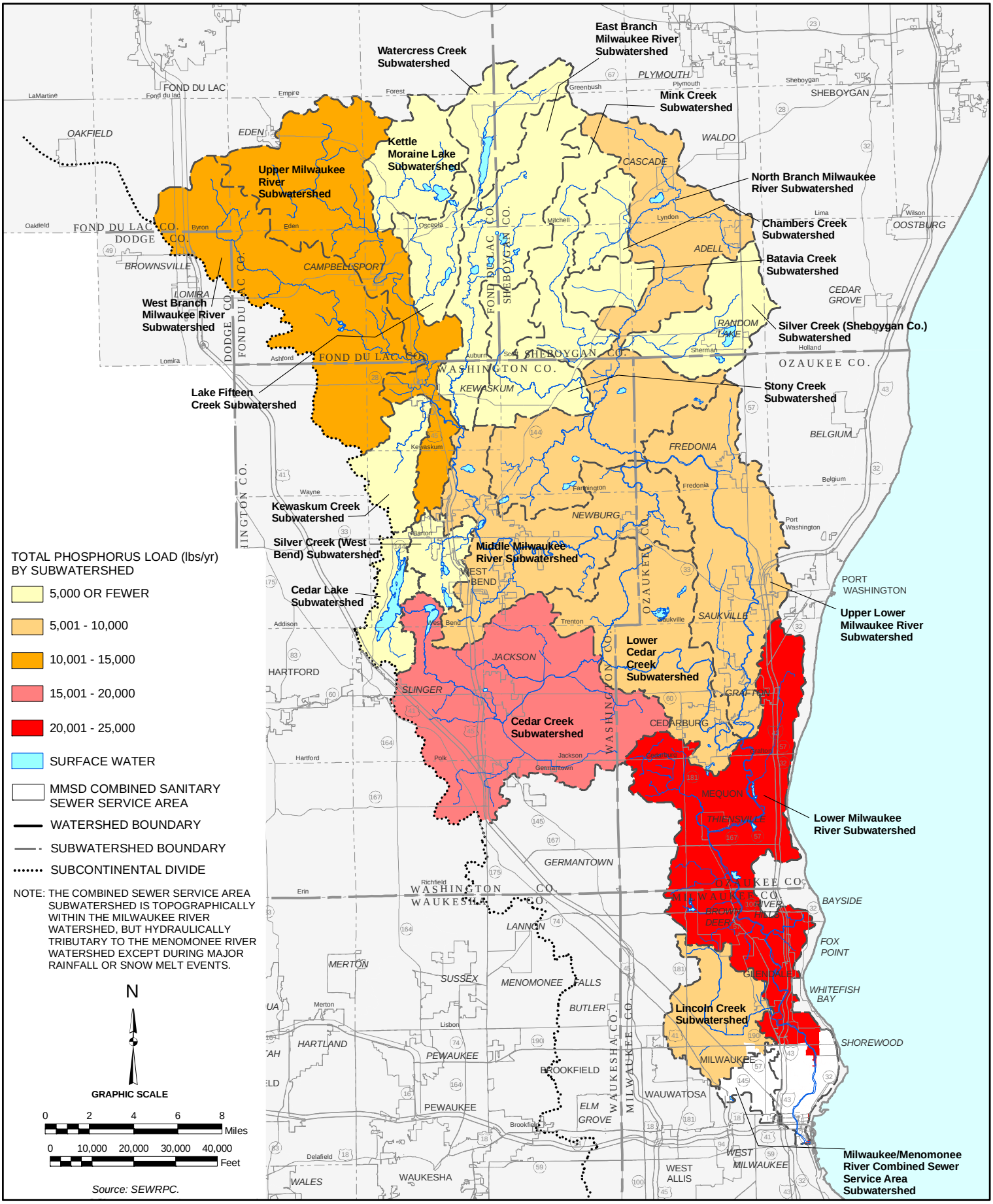
Map H-24

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF COPPER IN THE MENOMONEE RIVER WATERSHED



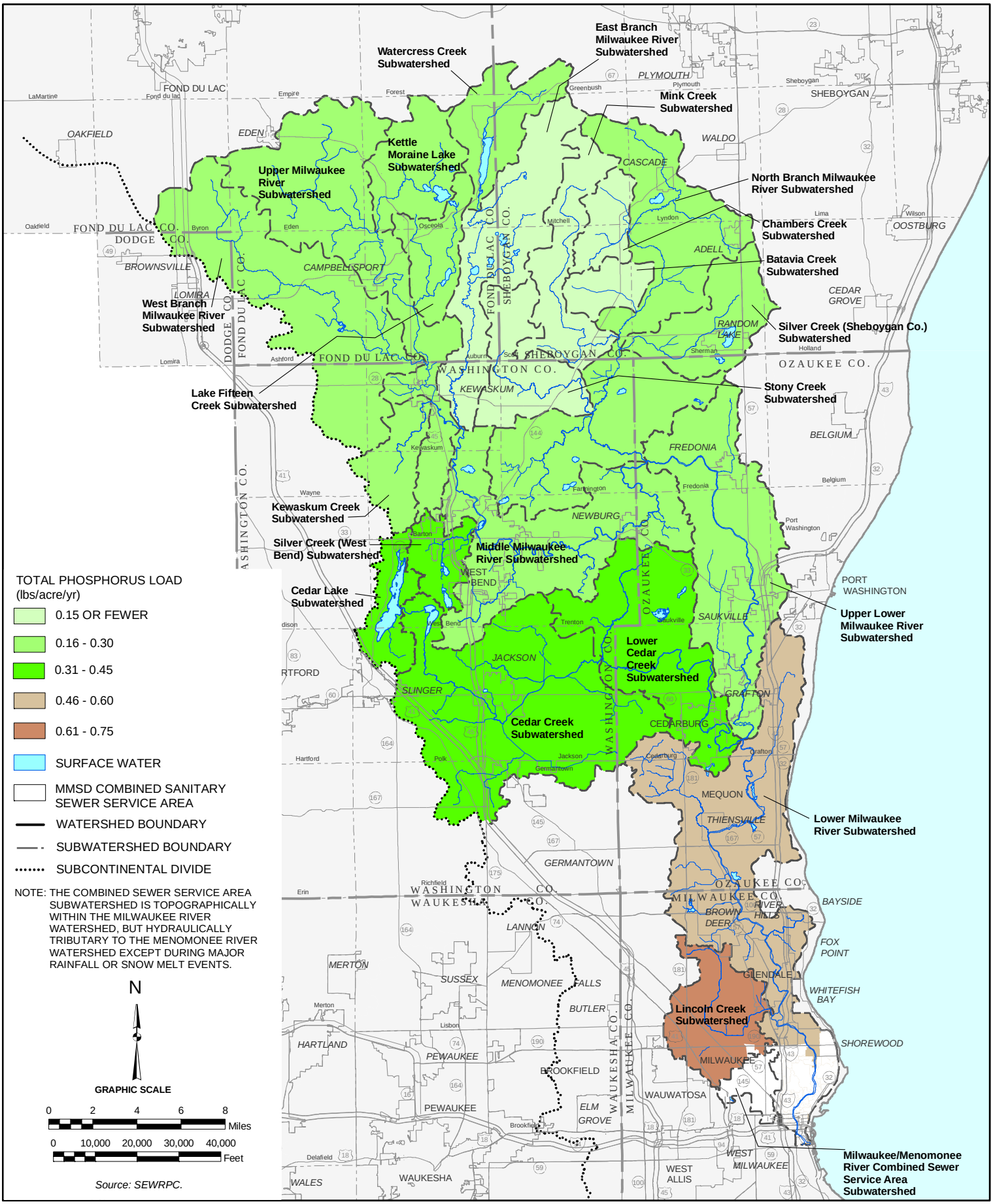
Map H-25

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE MILWAUKEE RIVER WATERSHED



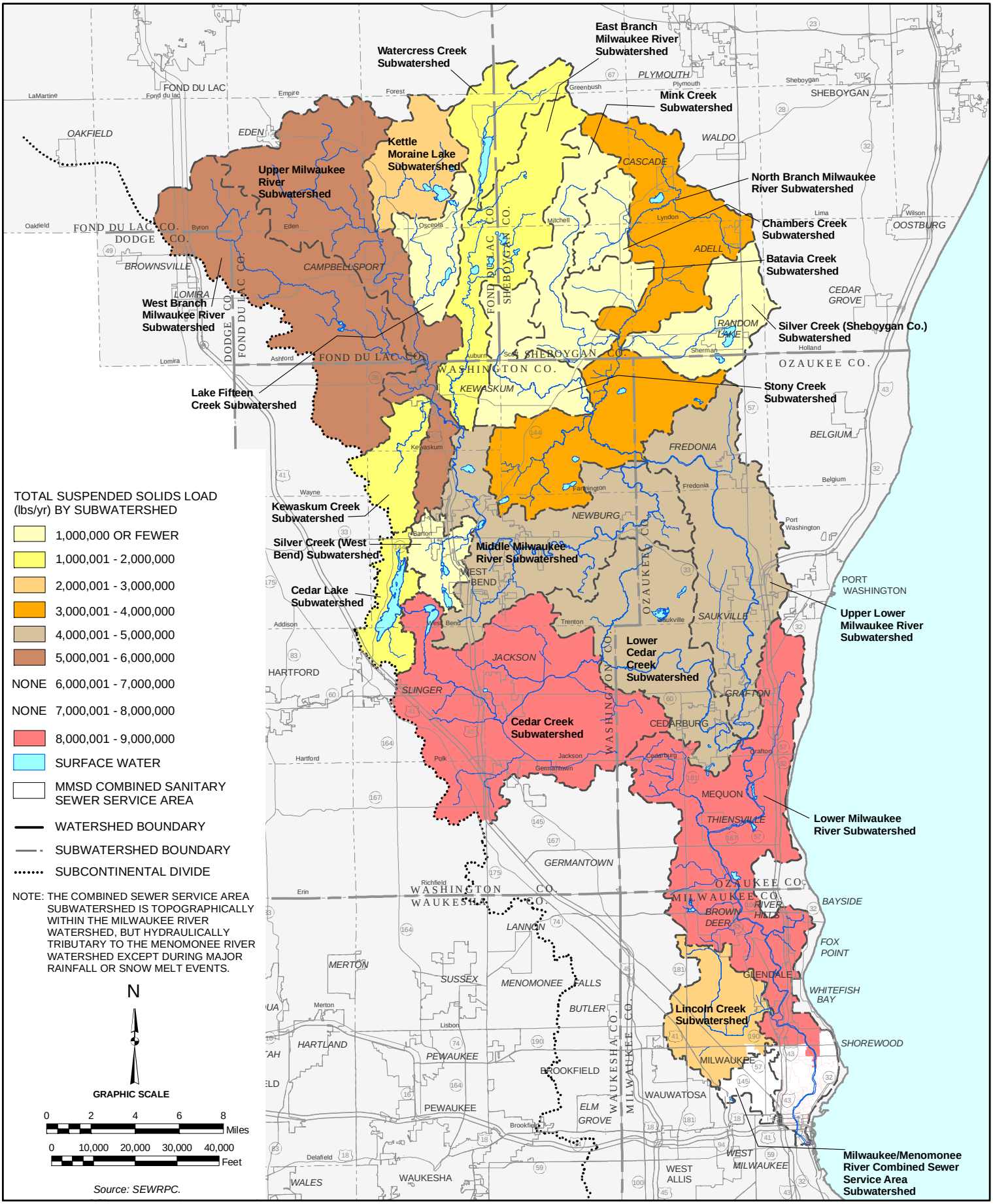
Map H-26

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF PHOSPHORUS IN THE MILWAUKEE RIVER WATERSHED



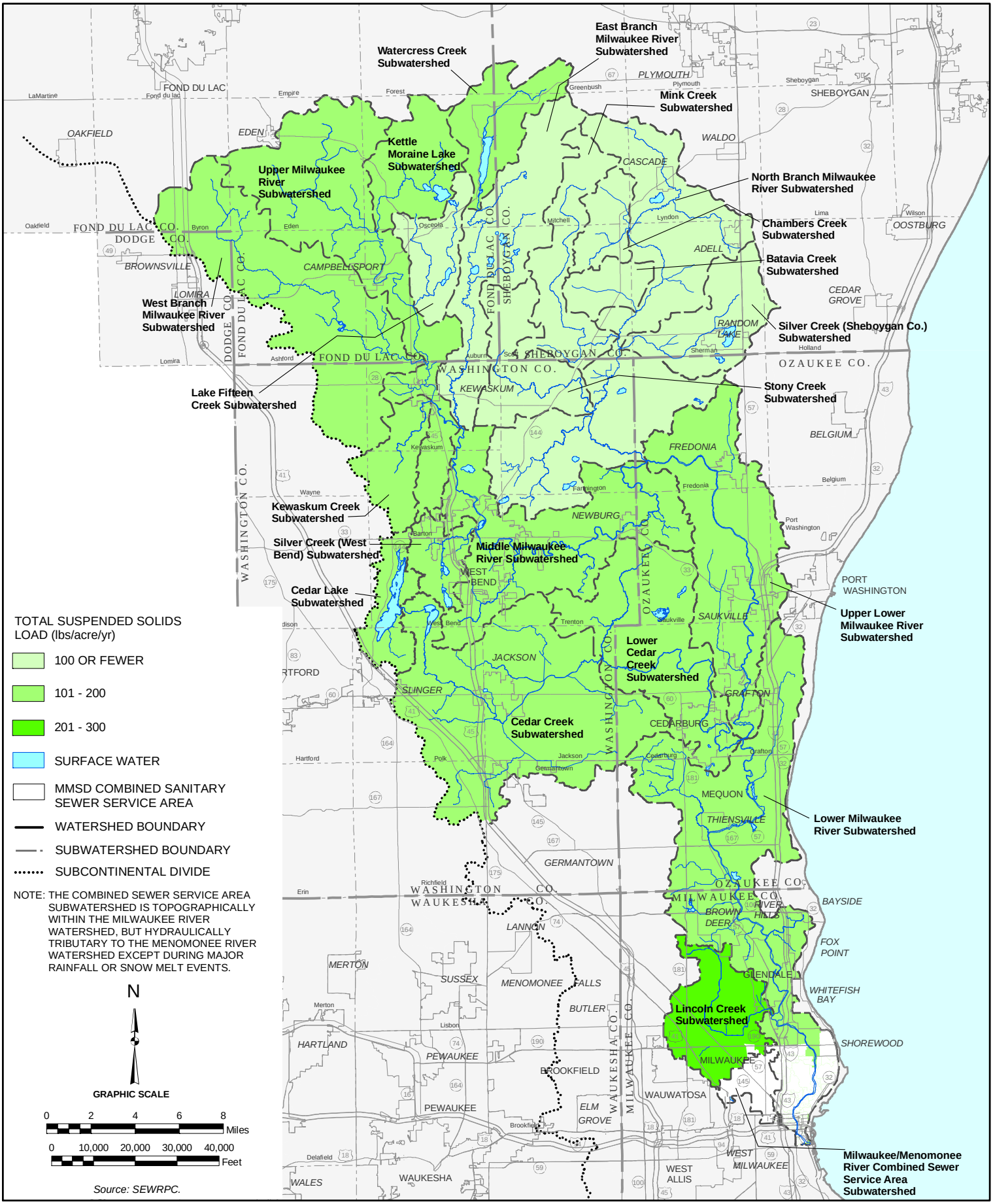
Map H-27

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE MILWAUKEE RIVER WATERSHED



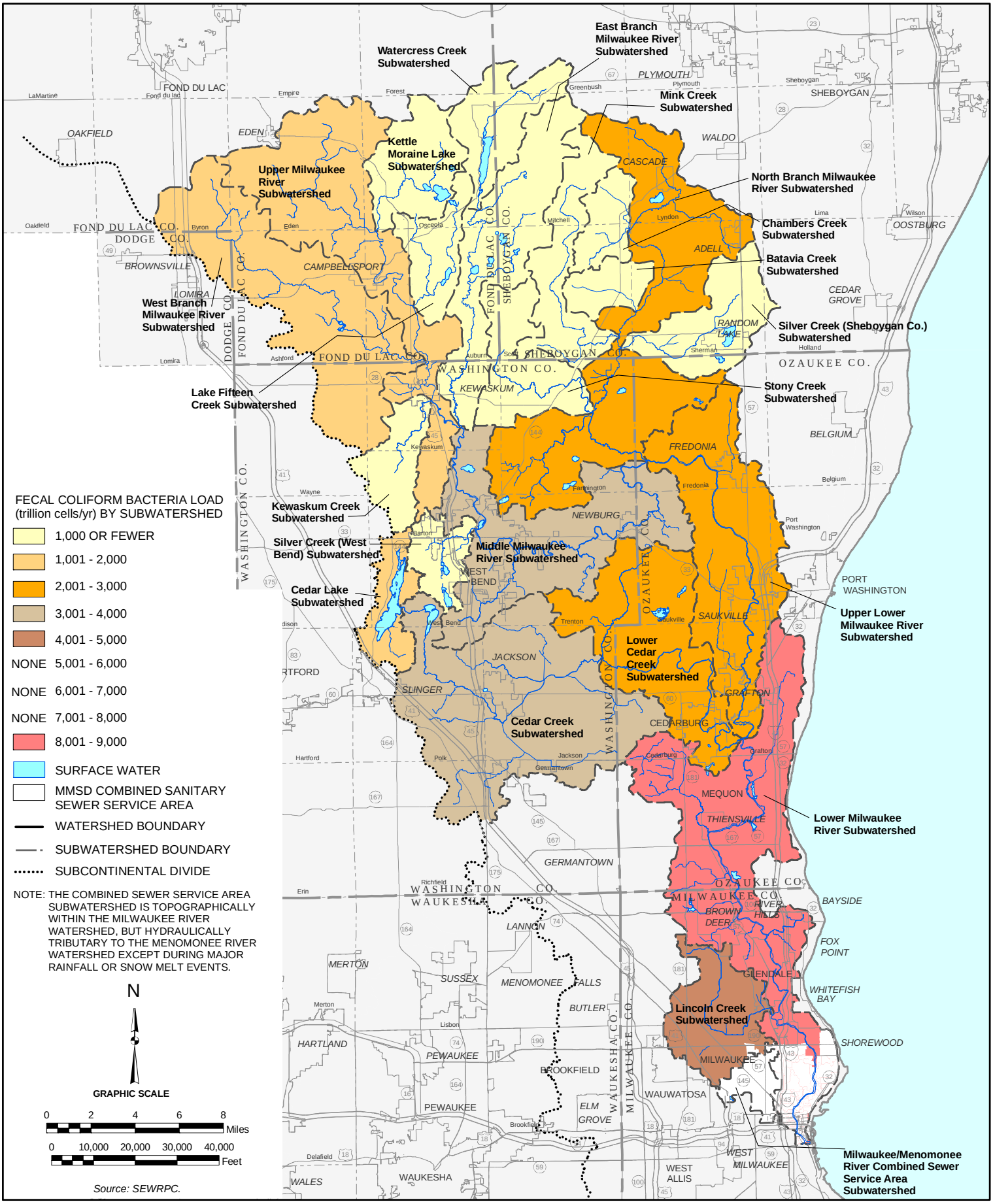
Map H-28

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE MILWAUKEE RIVER WATERSHED



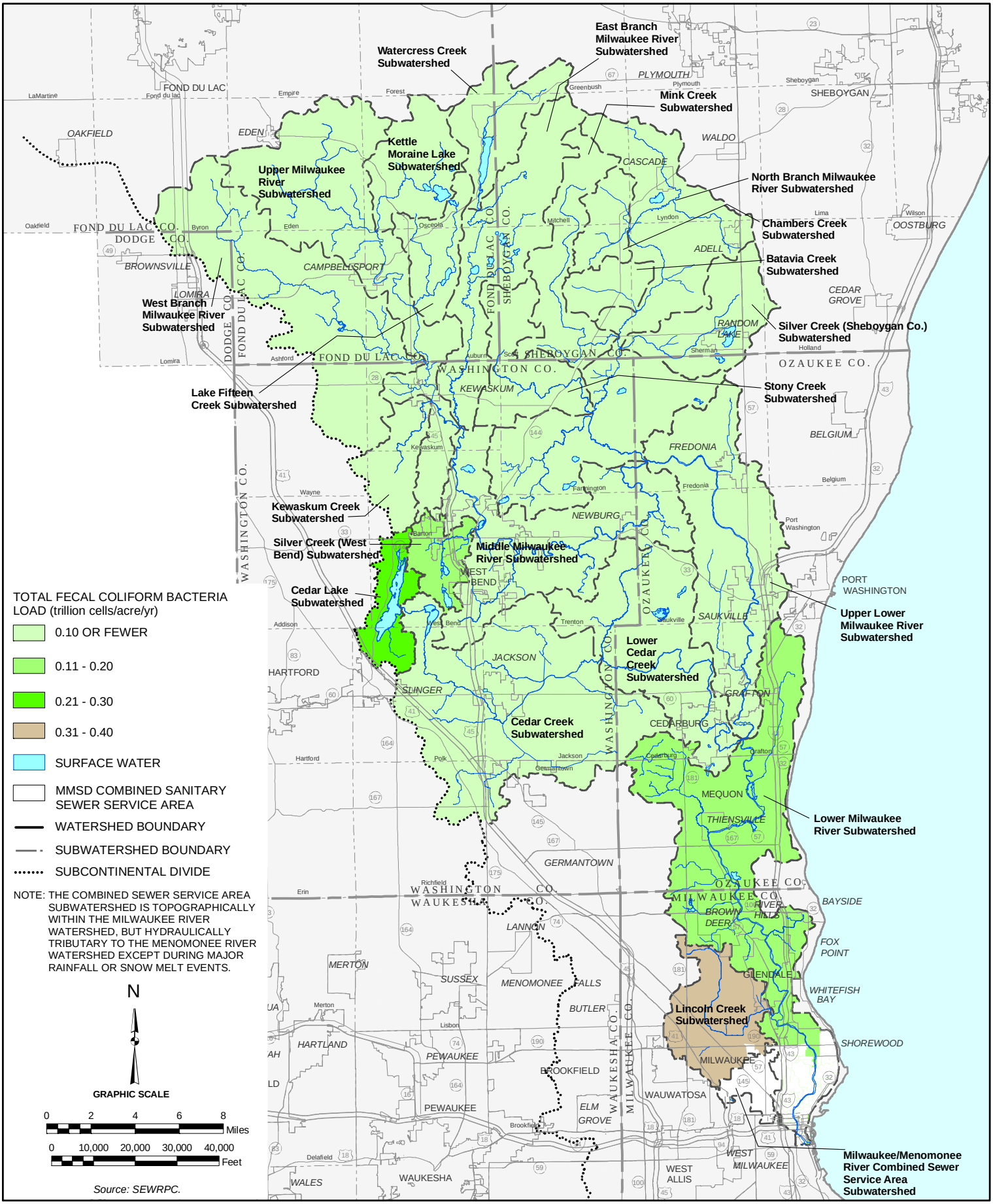
Map H-29

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF FECAL COLIFORM BACTERIA IN THE MILWAUKEE RIVER WATERSHED



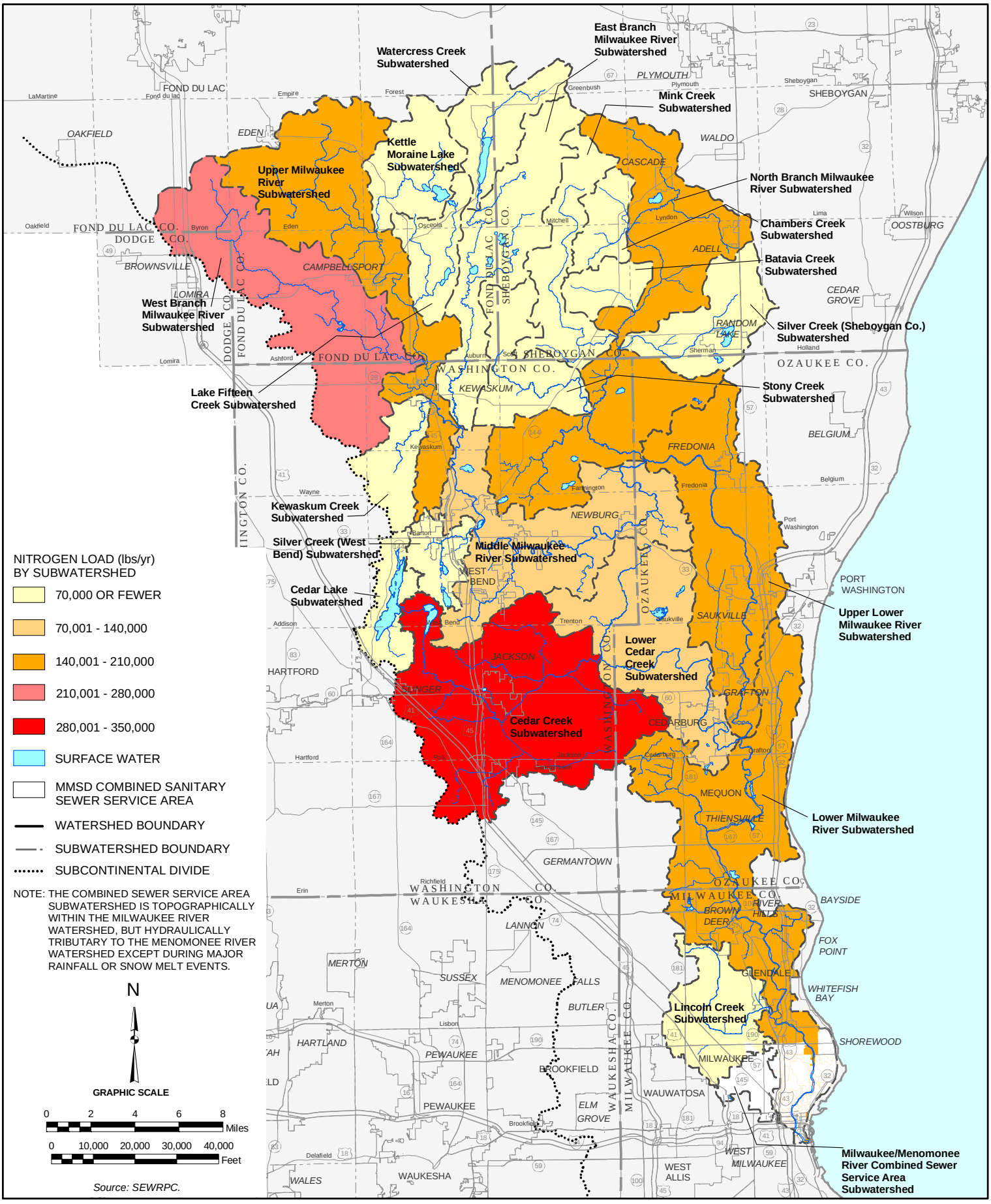
Map H-30

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL FECAL COLIFORM BACTERIA IN THE MILWAUKEE RIVER WATERSHED



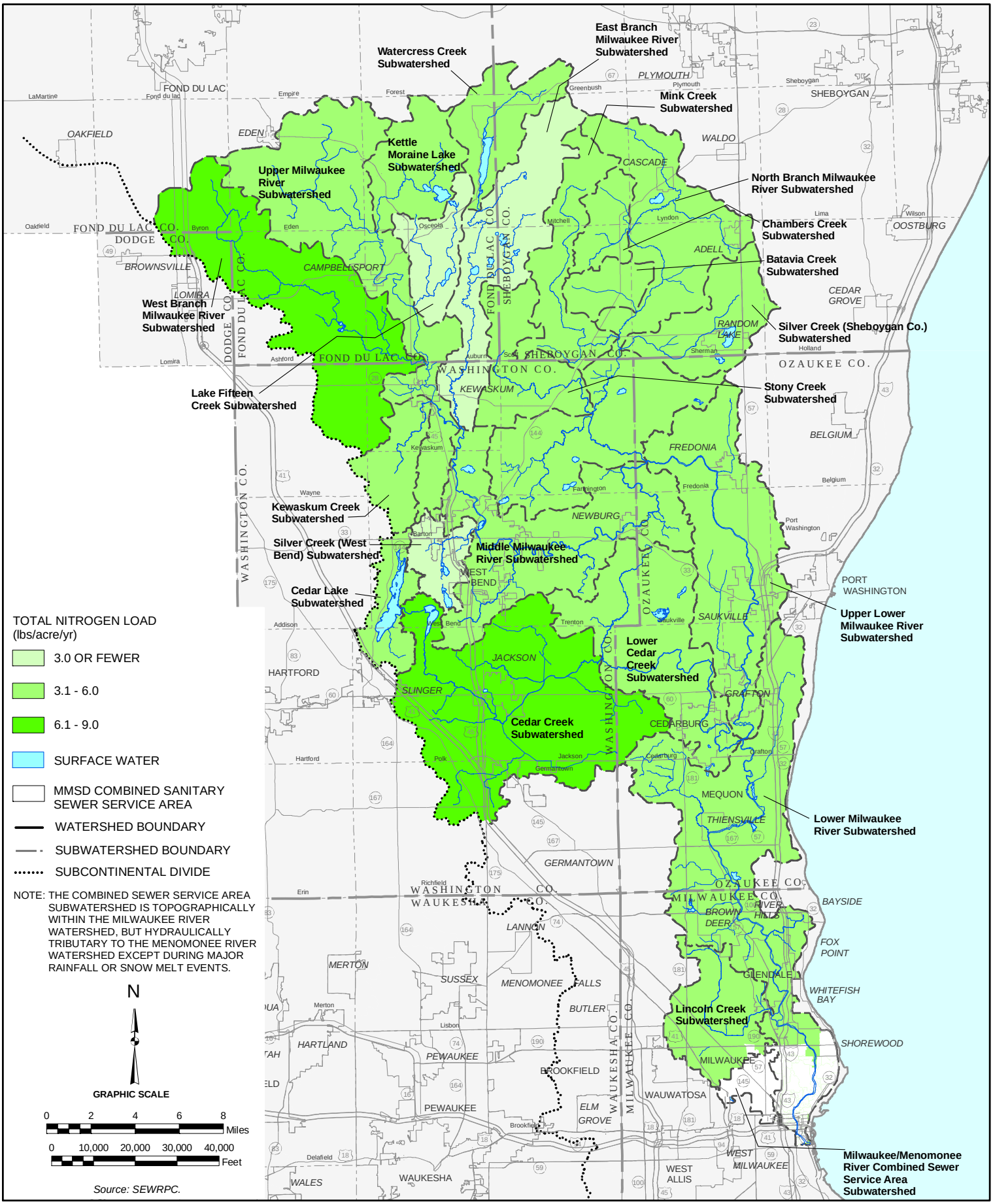
Map H-31

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE MILWAUKEE RIVER WATERSHED



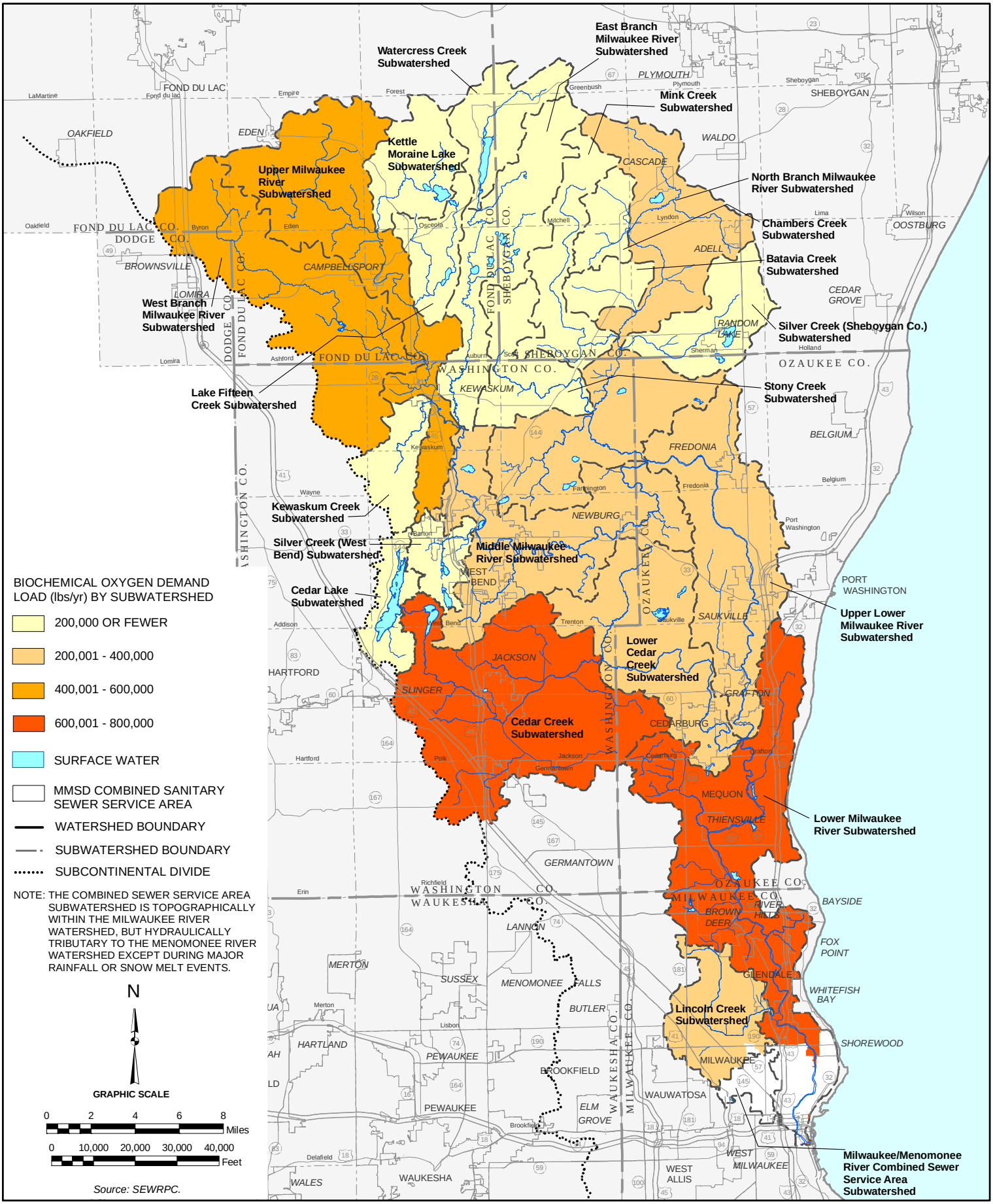
Map H-32

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE MILWAUKEE RIVER WATERSHED



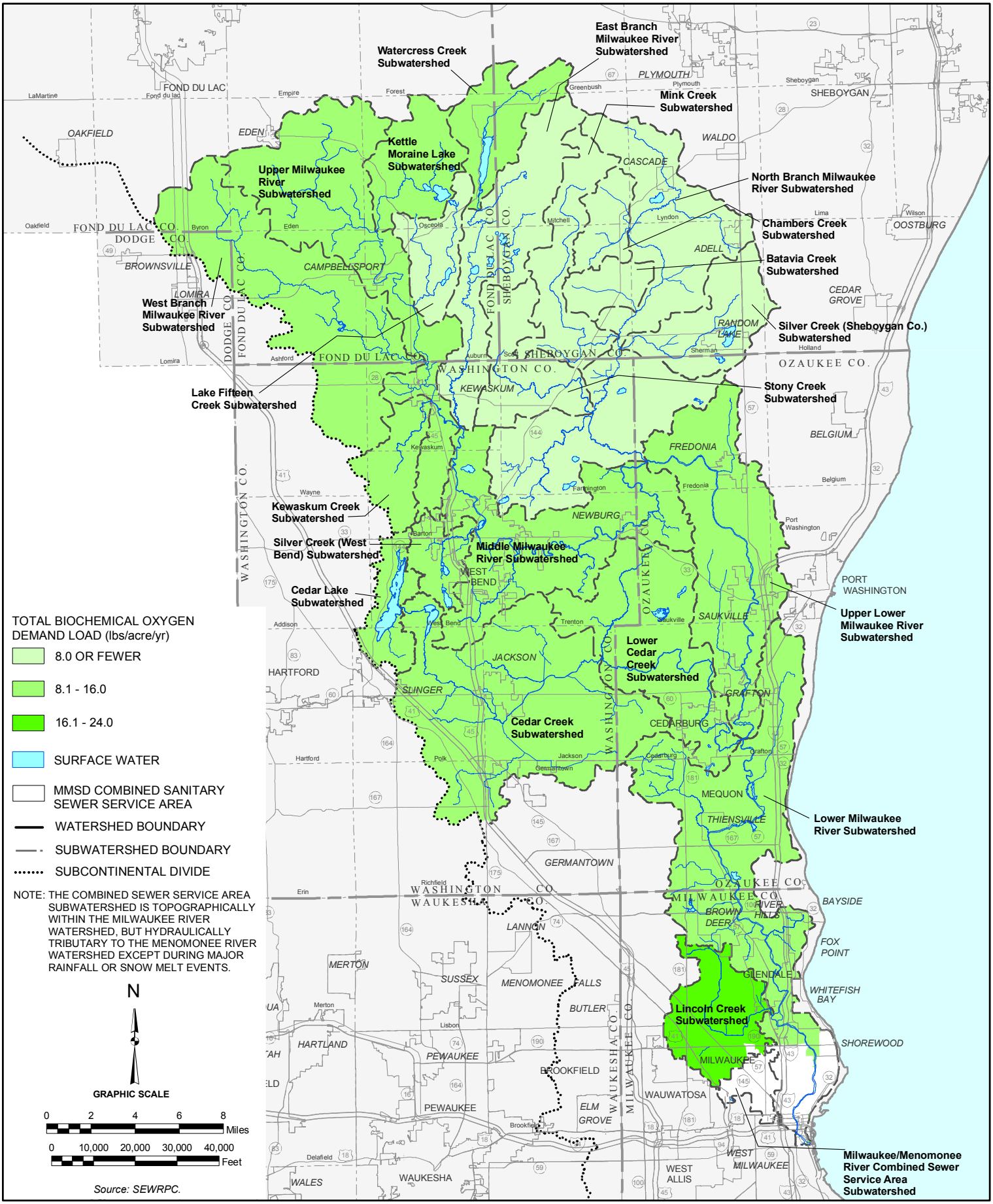
Map H-33

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF BIOCHEMICAL OXYGEN DEMAND IN THE MILWAUKEE RIVER WATERSHED



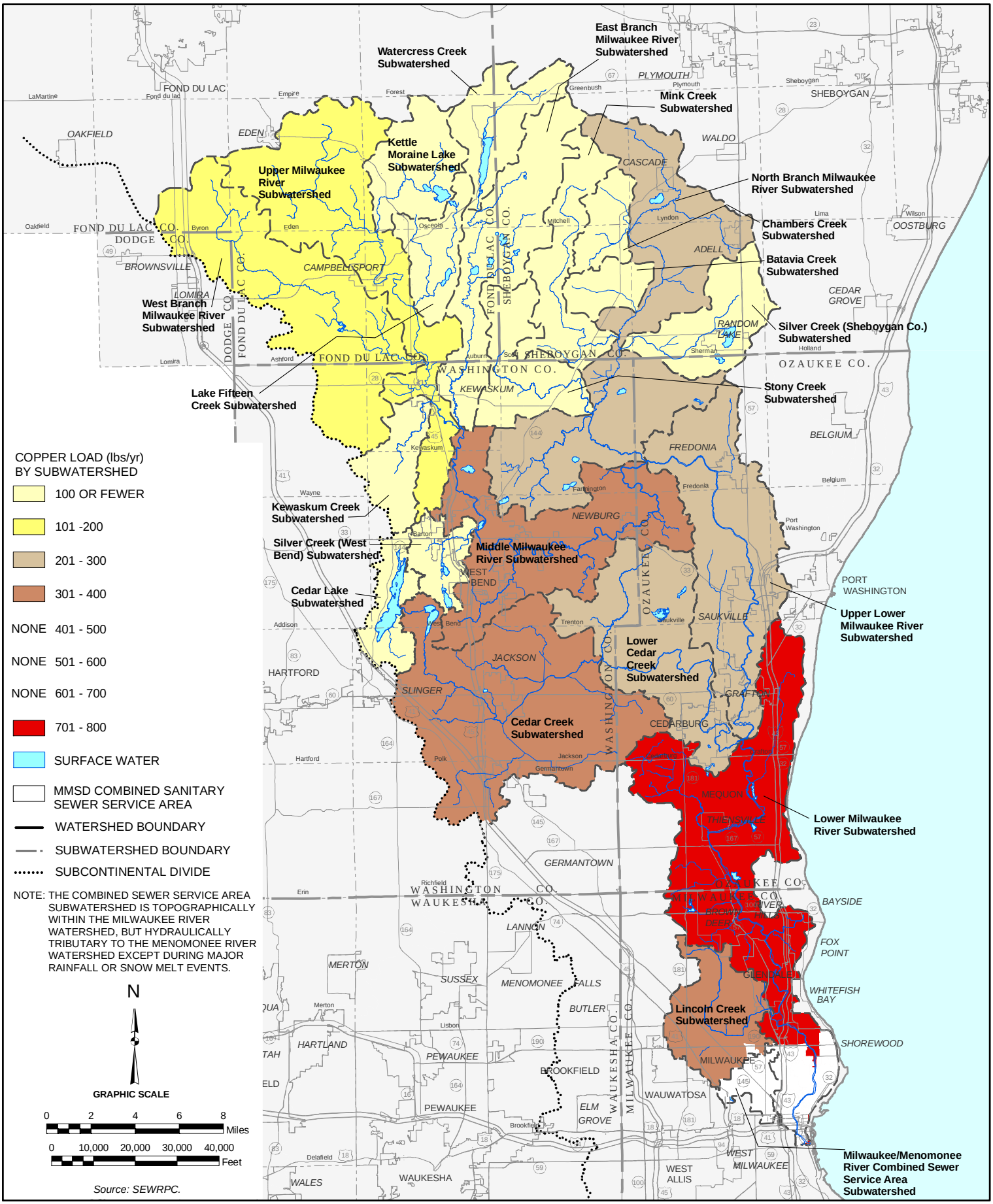
Map H-34

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL BIOCHEMICAL OXYGEN DEMAND IN THE MILWAUKEE RIVER WATERSHED



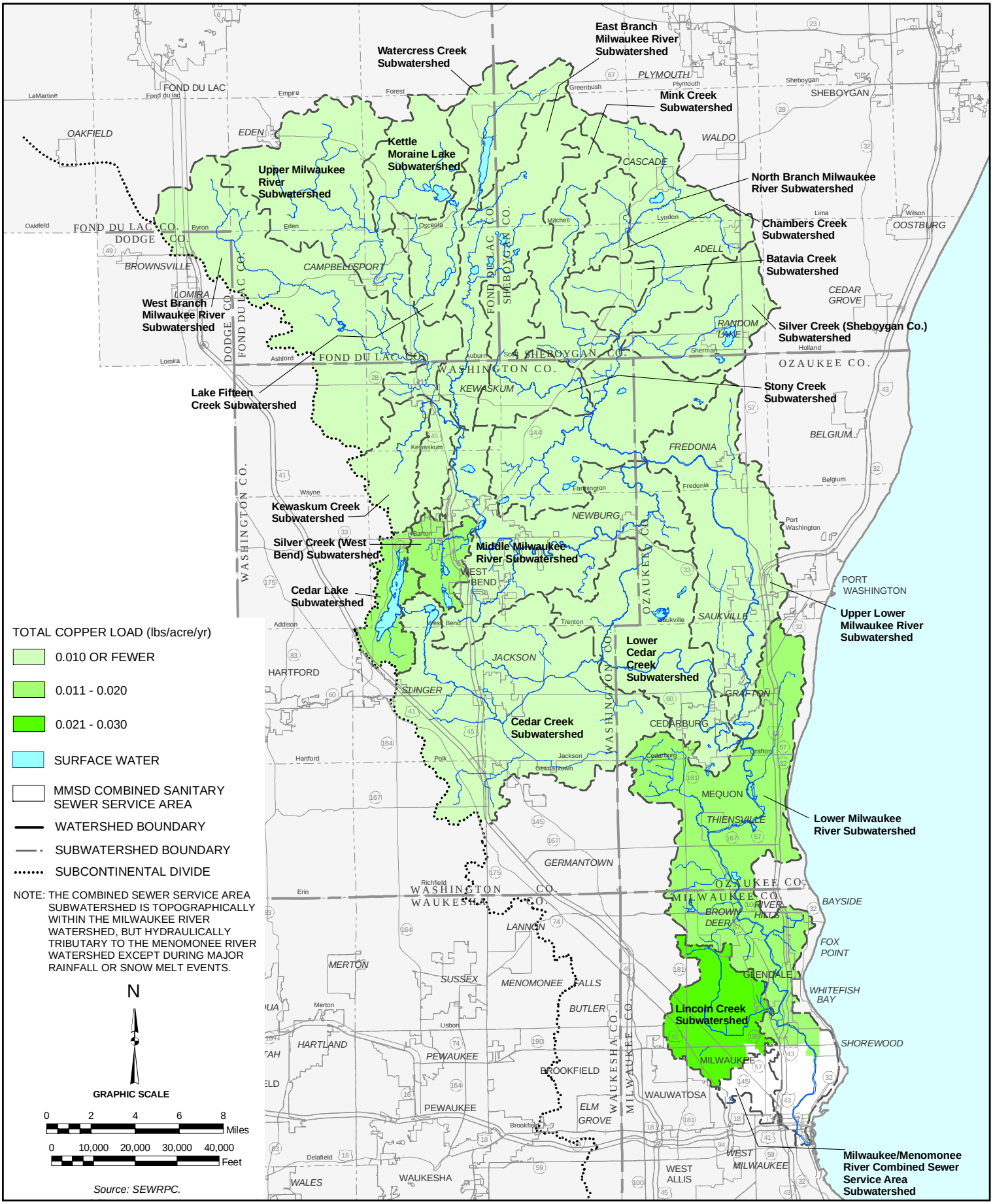
Map H-35

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF COPPER IN THE MILWAUKEE RIVER WATERSHED



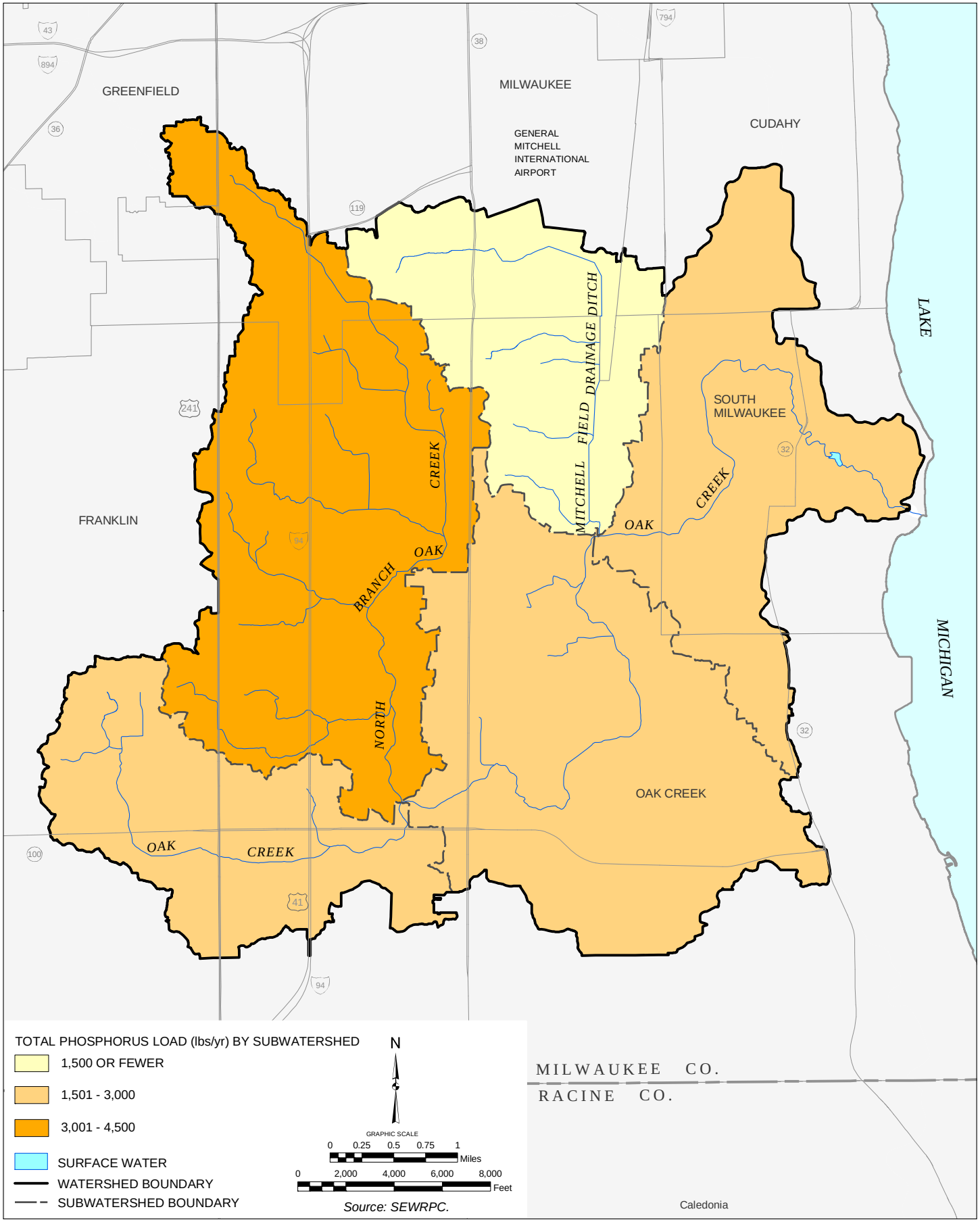
Map H-36

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL COPPER IN THE MILWAUKEE RIVER WATERSHED



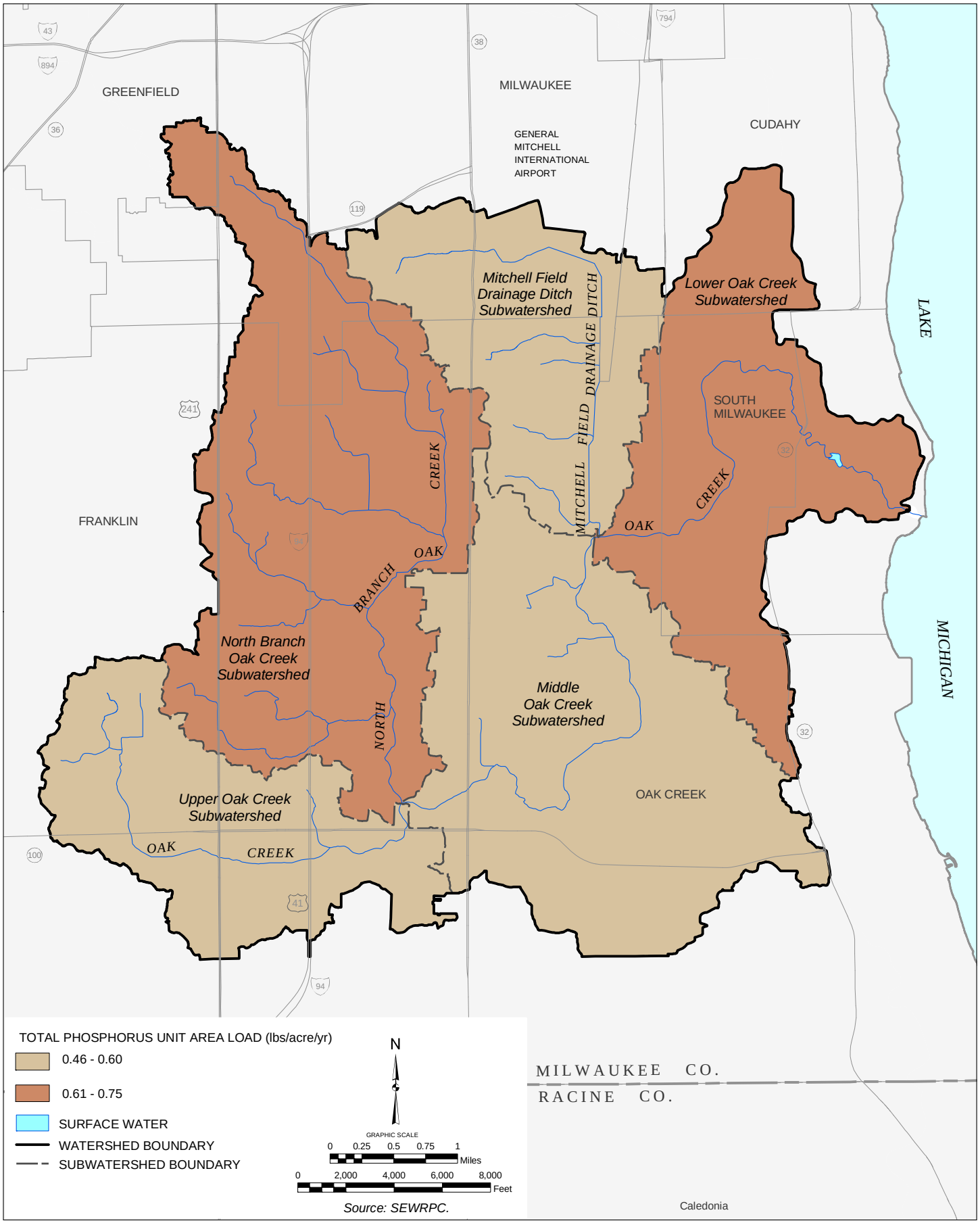
Map H-37

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE OAK CREEK WATERSHED



Map H-38

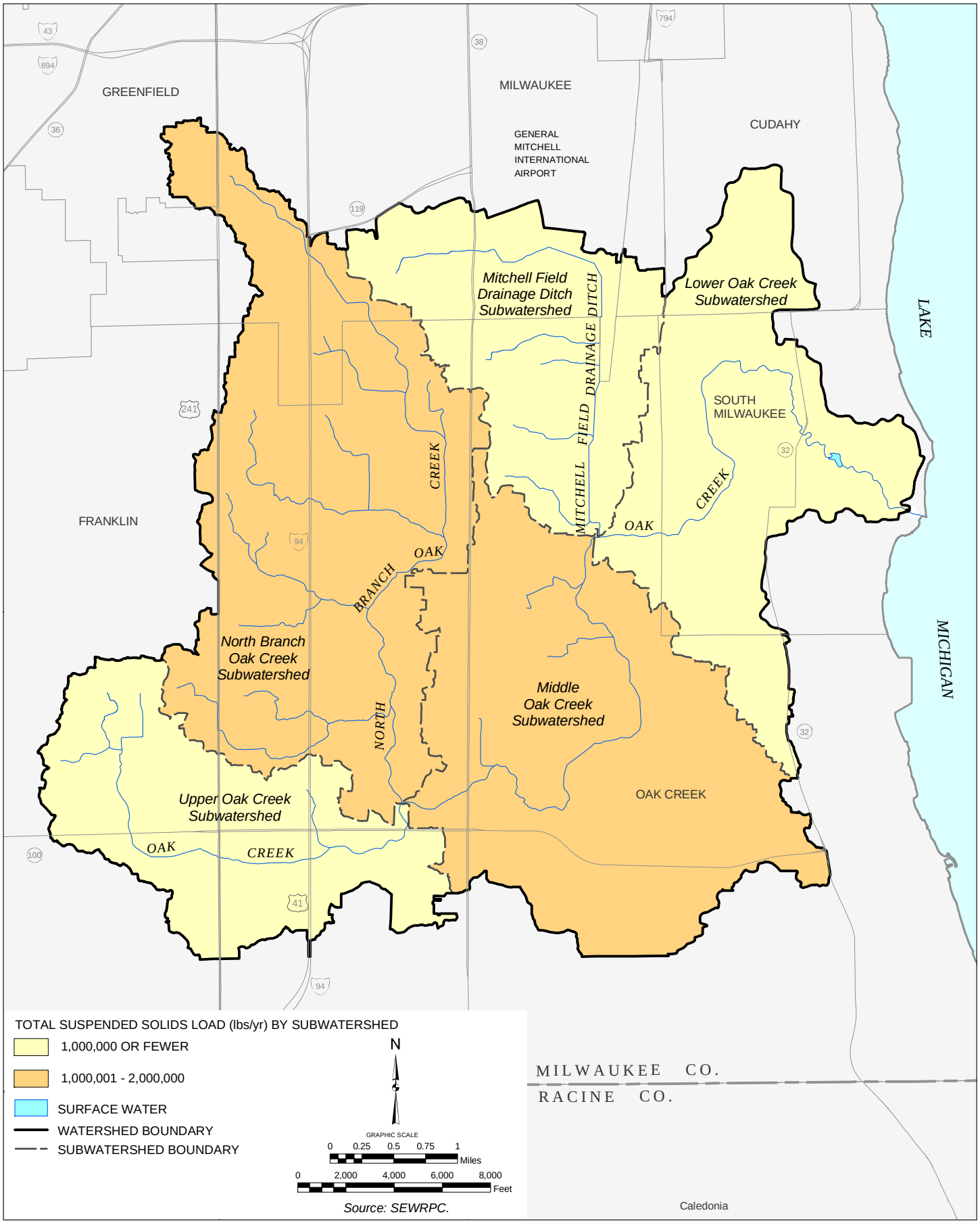
ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE OAK CREEK WATERSHED



Source: SEWRPC.

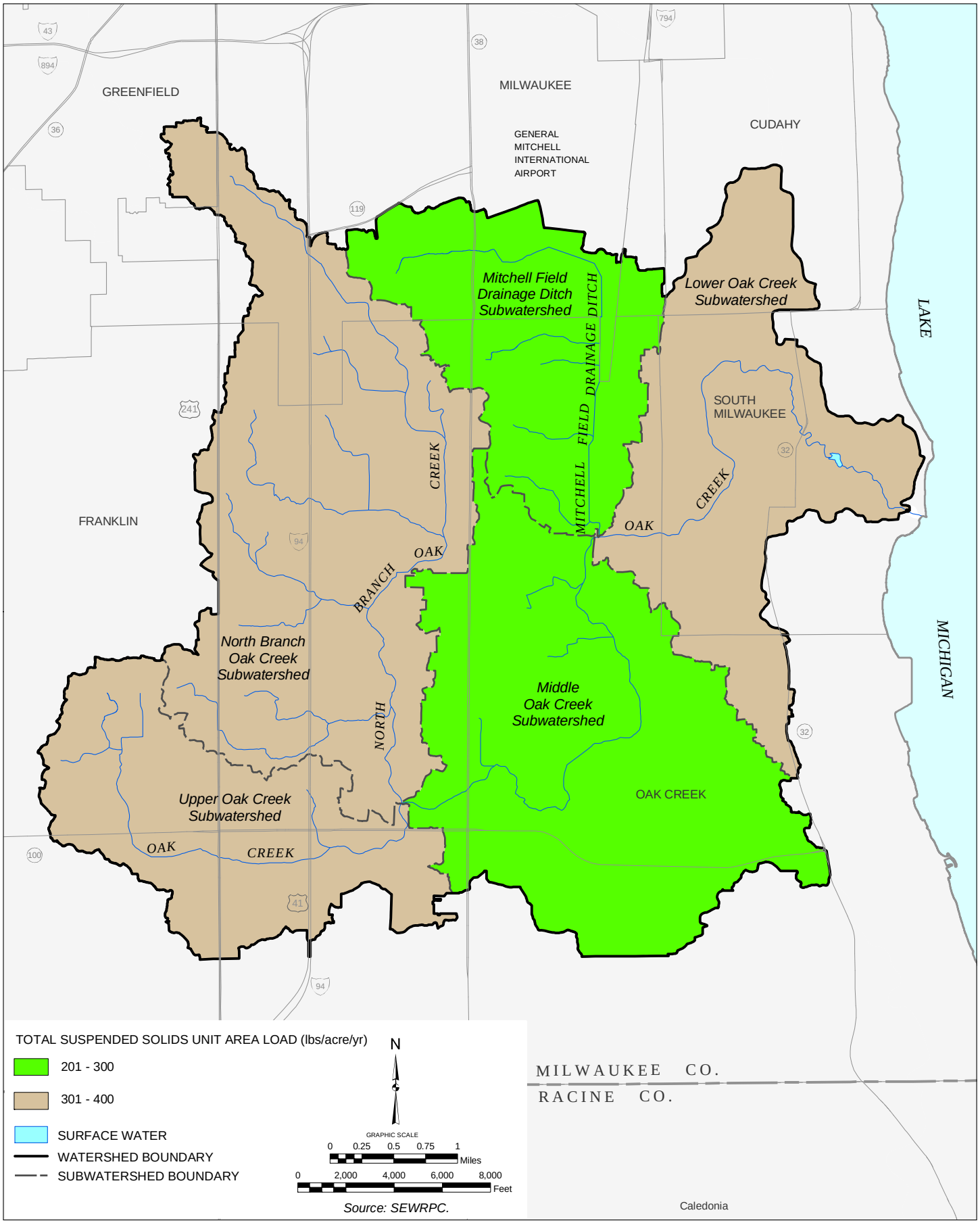
Map H-39

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE OAK CREEK WATERSHED



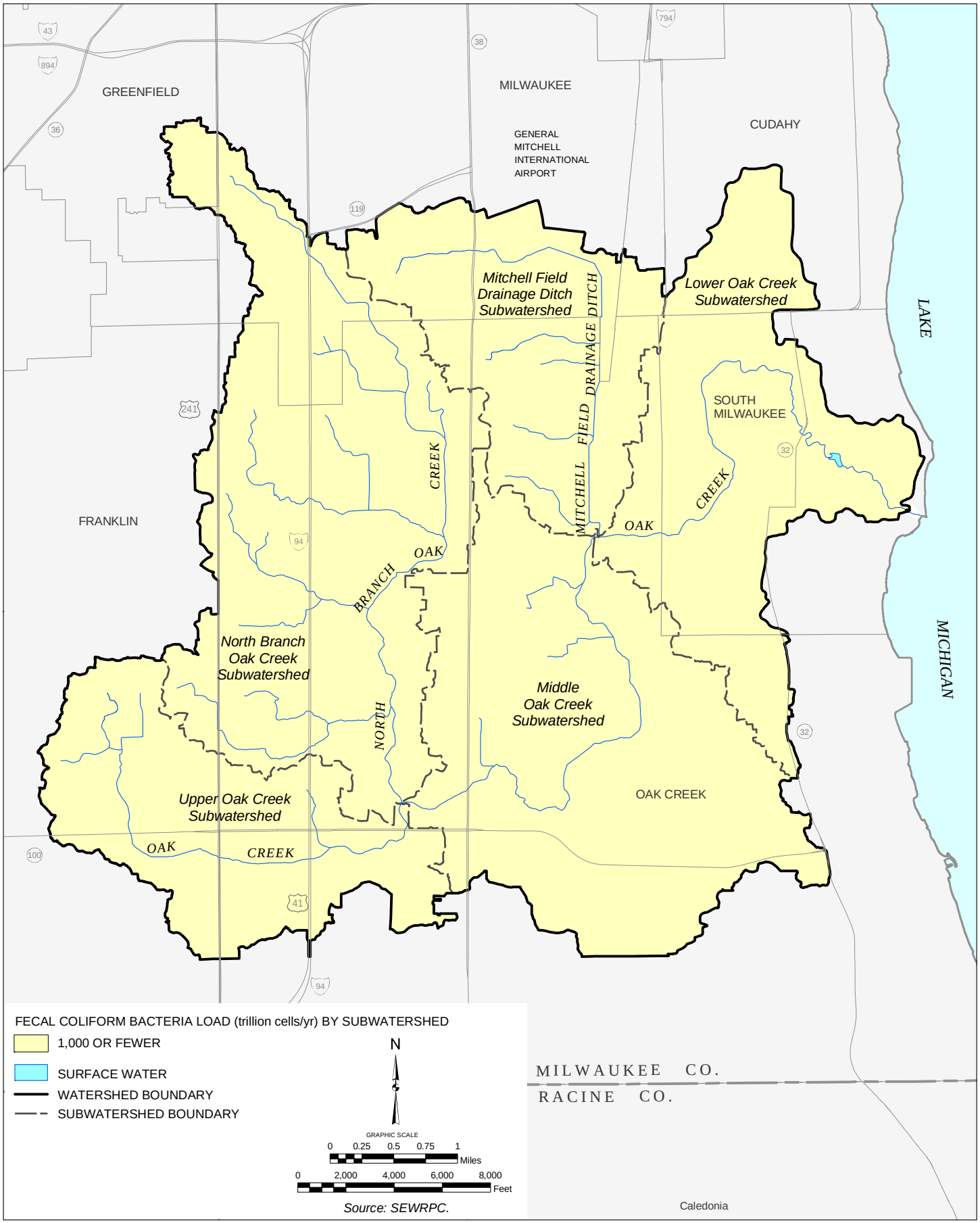
Map H-40

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE OAK CREEK WATERSHED



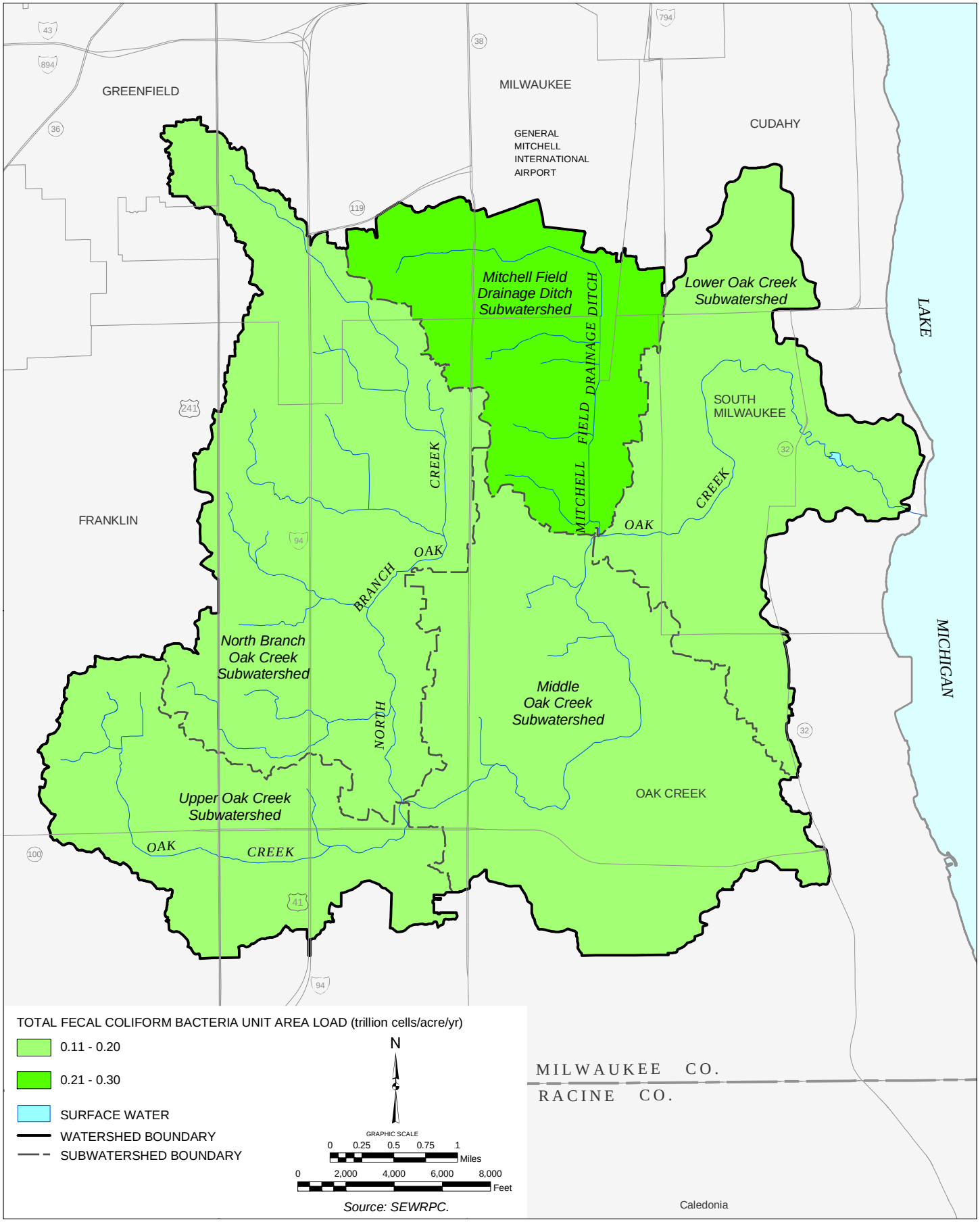
Map H-41

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF FECAL COLIFORM BACTERIA IN THE OAK CREEK WATERSHED



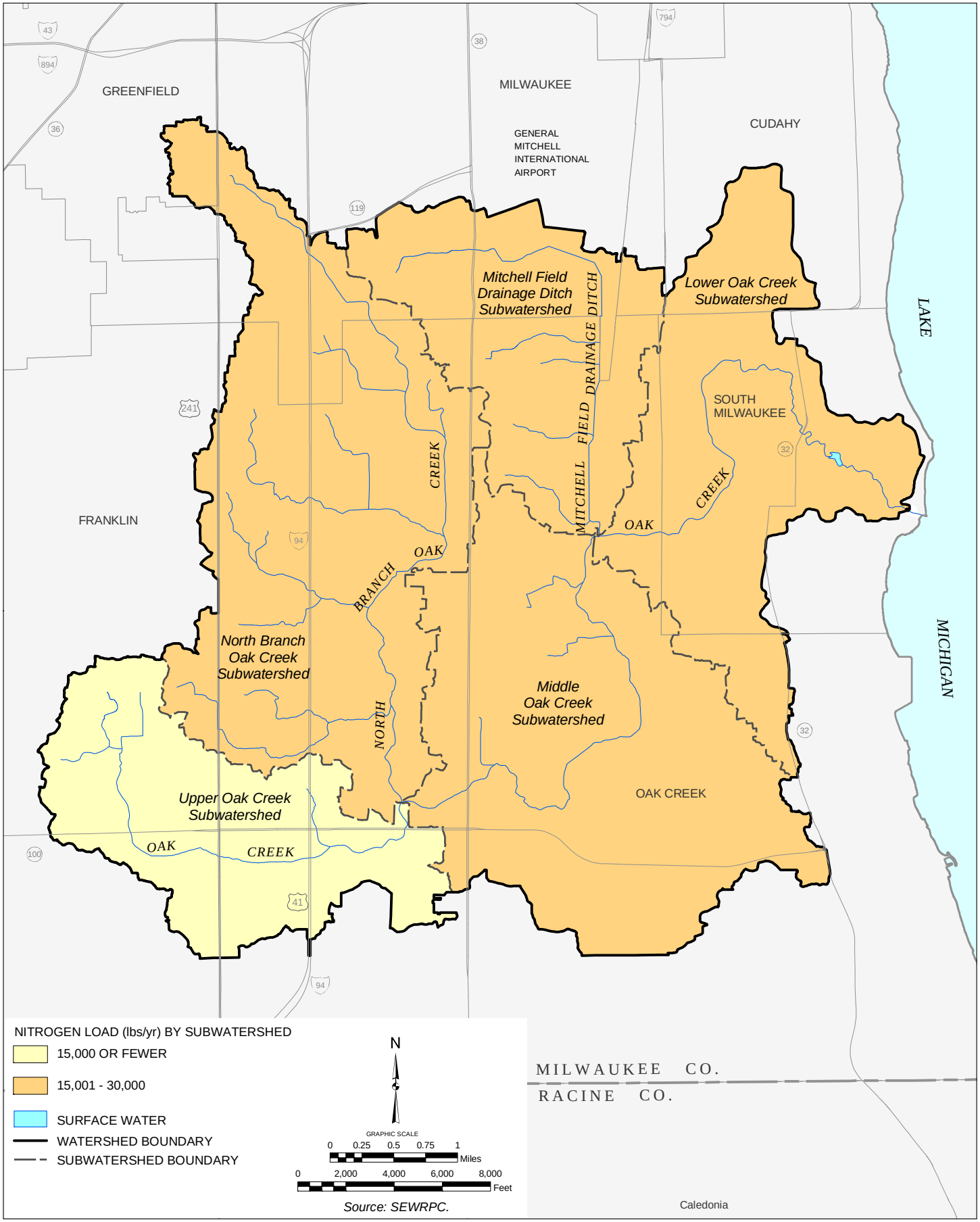
Map H-42

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL FECAL COLIFORM BACTERIA IN THE OAK CREEK WATERSHED



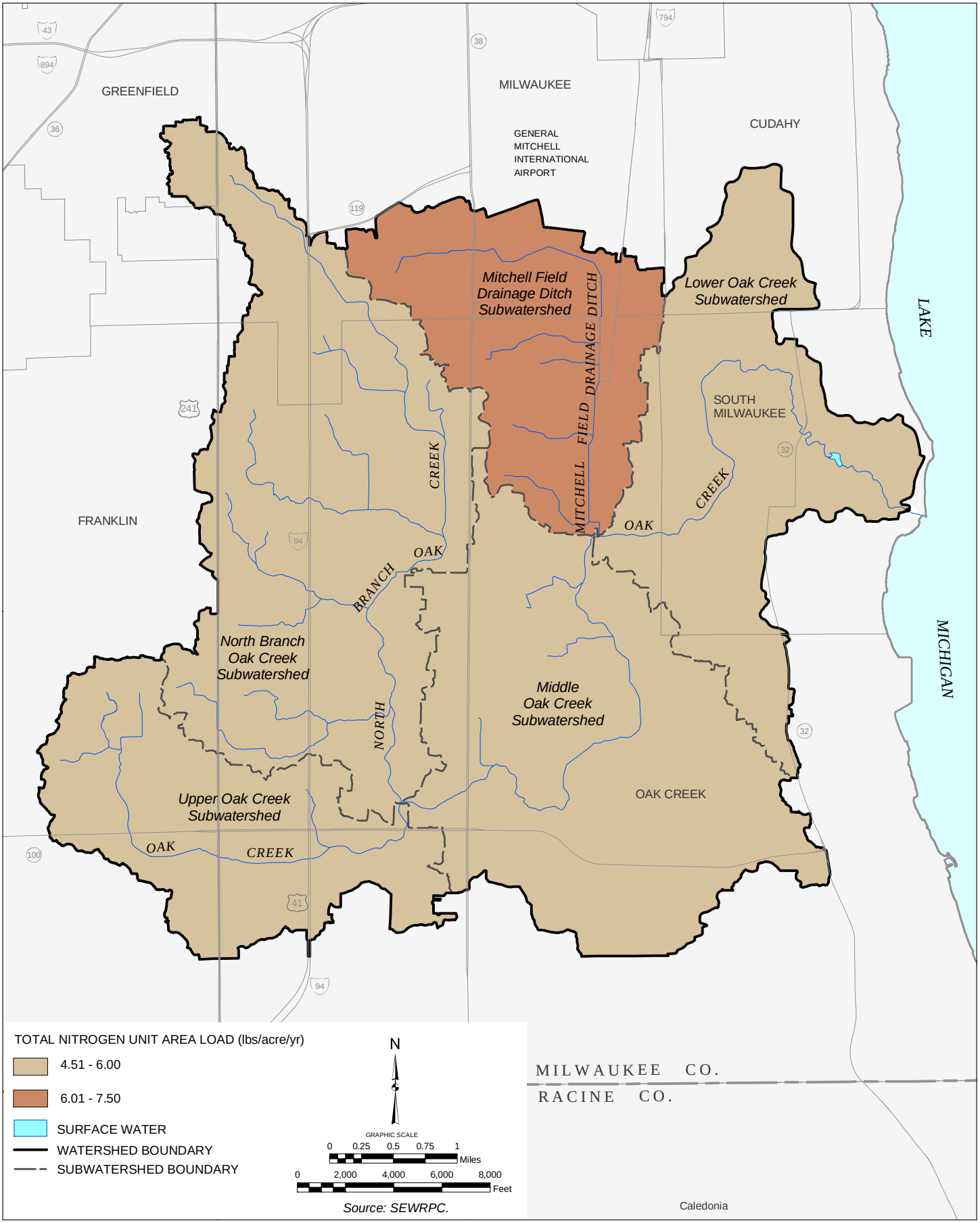
Map H-43

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF NITROGEN IN THE OAK CREEK WATERSHED



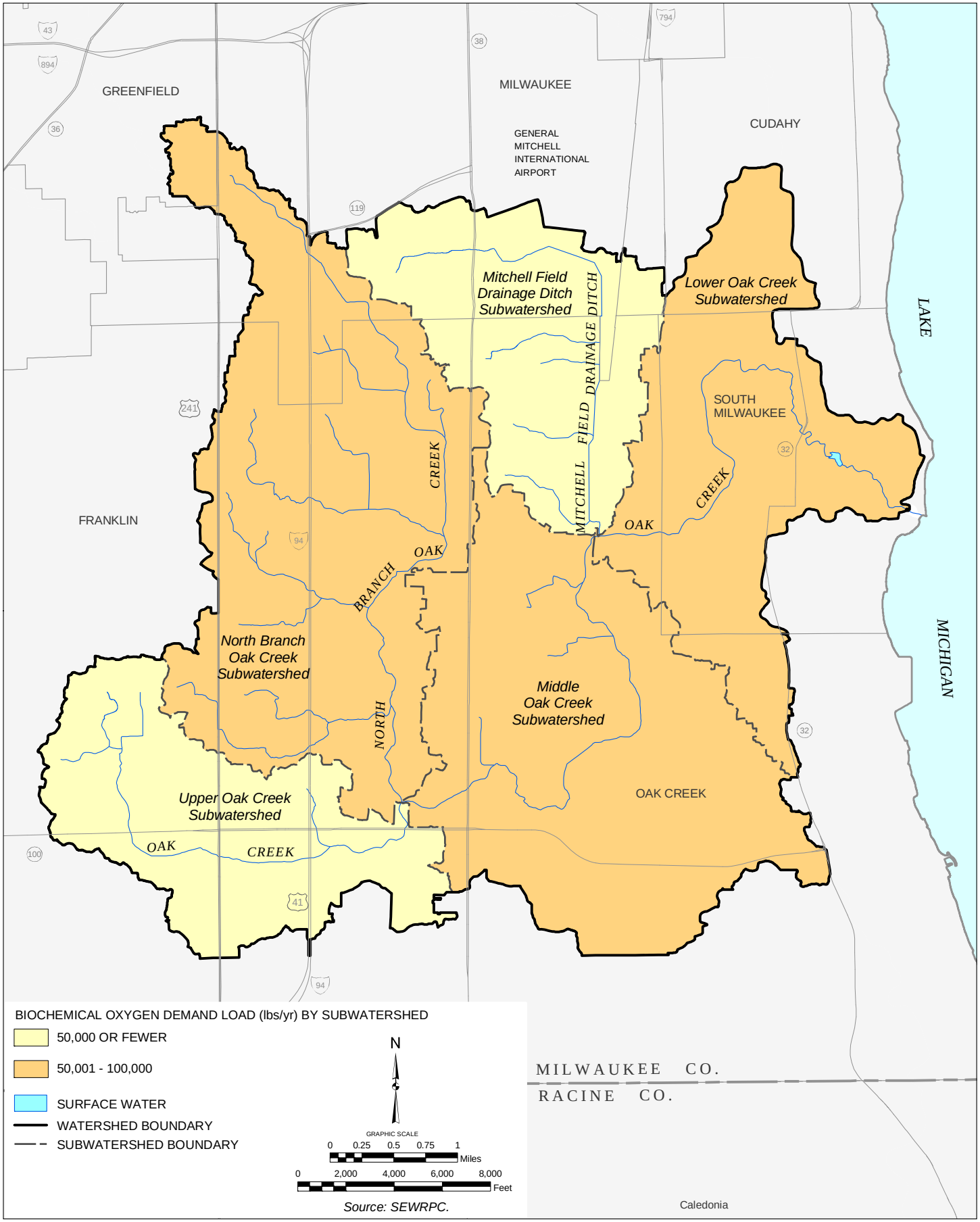
Map H-44

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE OAK CREEK WATERSHED



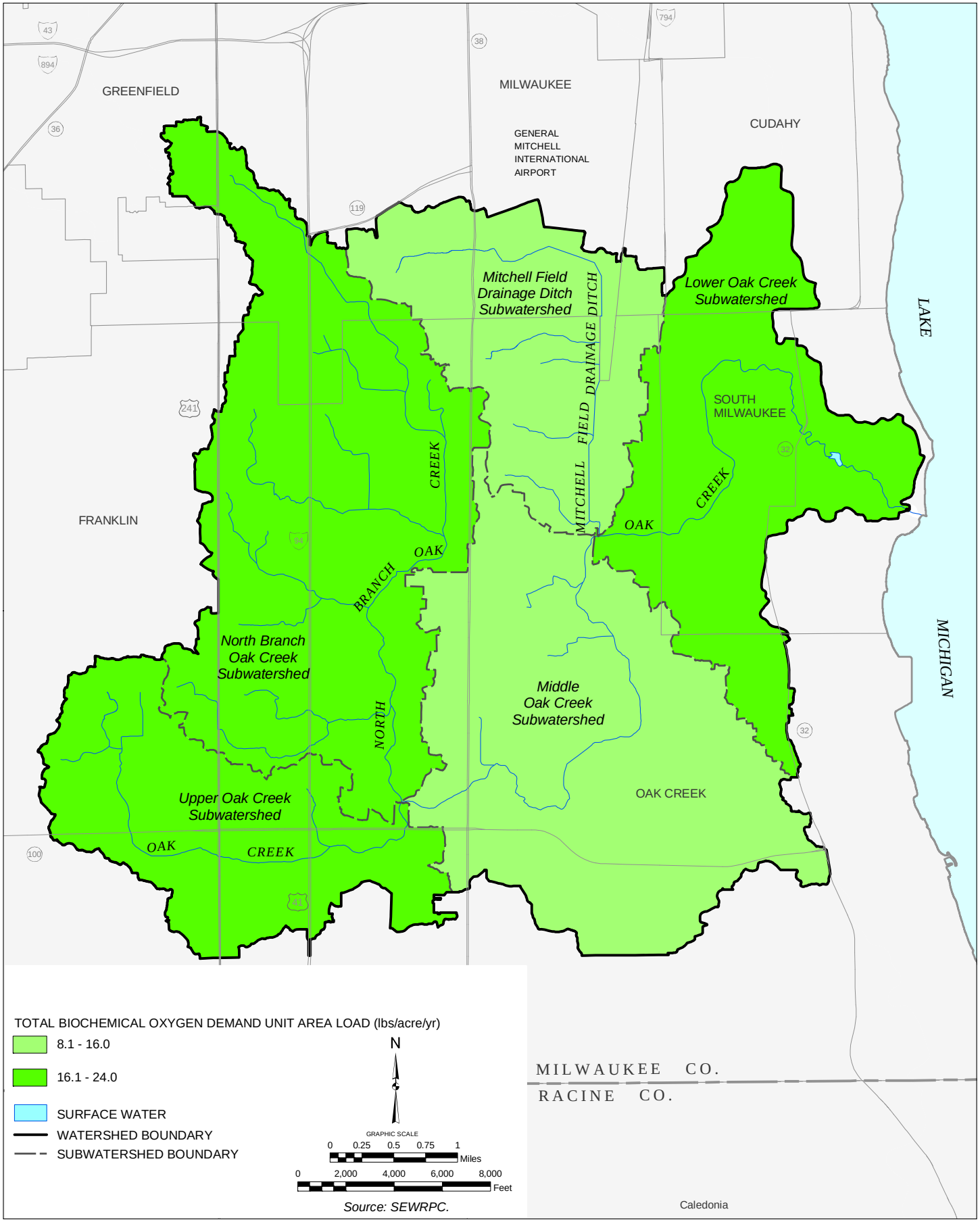
Map H-45

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF BIOCHEMICAL OXYGEN DEMAND IN THE OAK CREEK WATERSHED



Map H-46

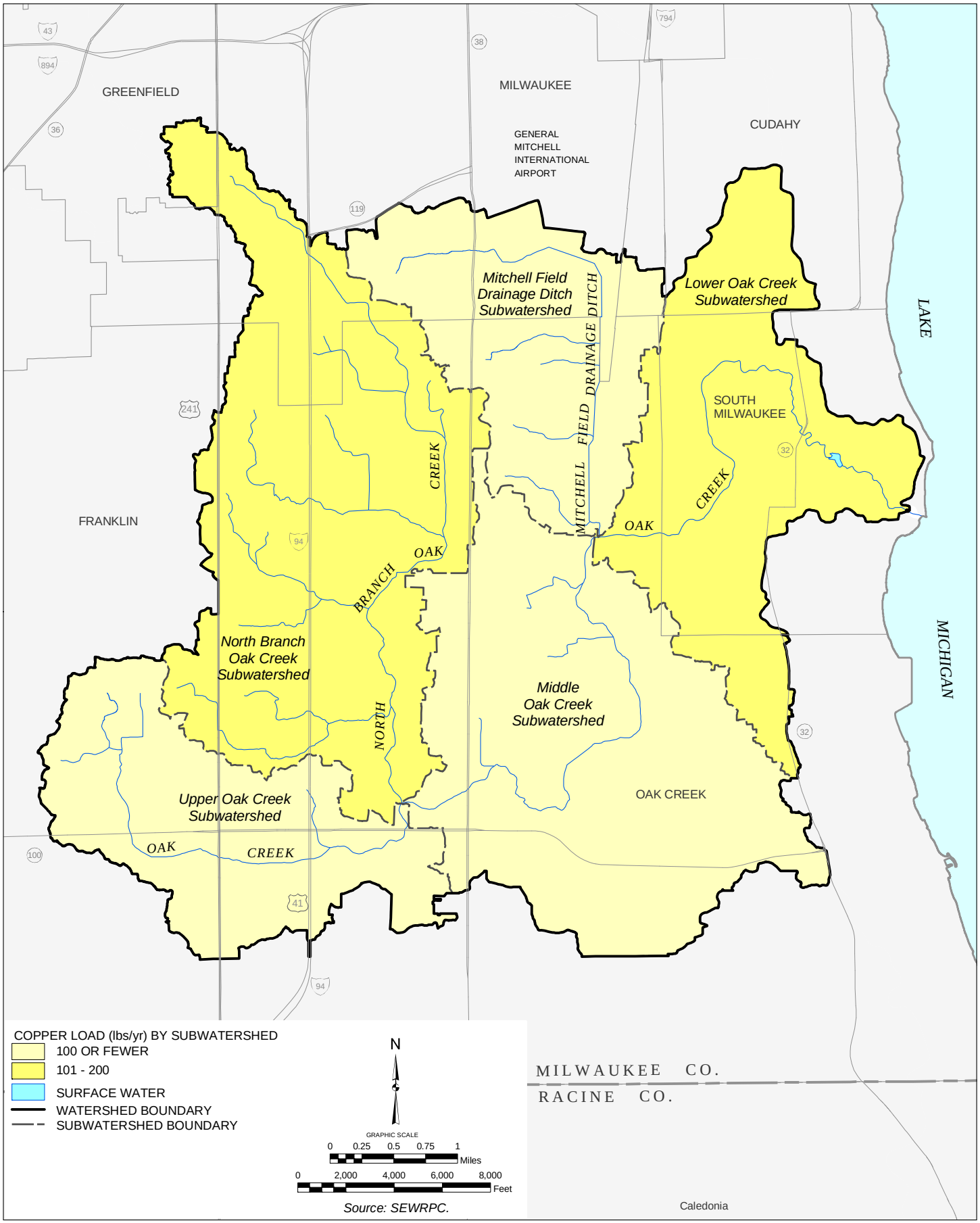
ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL BIOCHEMICAL OXYGEN DEMAND IN THE OAK CREEK WATERSHED



Source: SEWRPC.

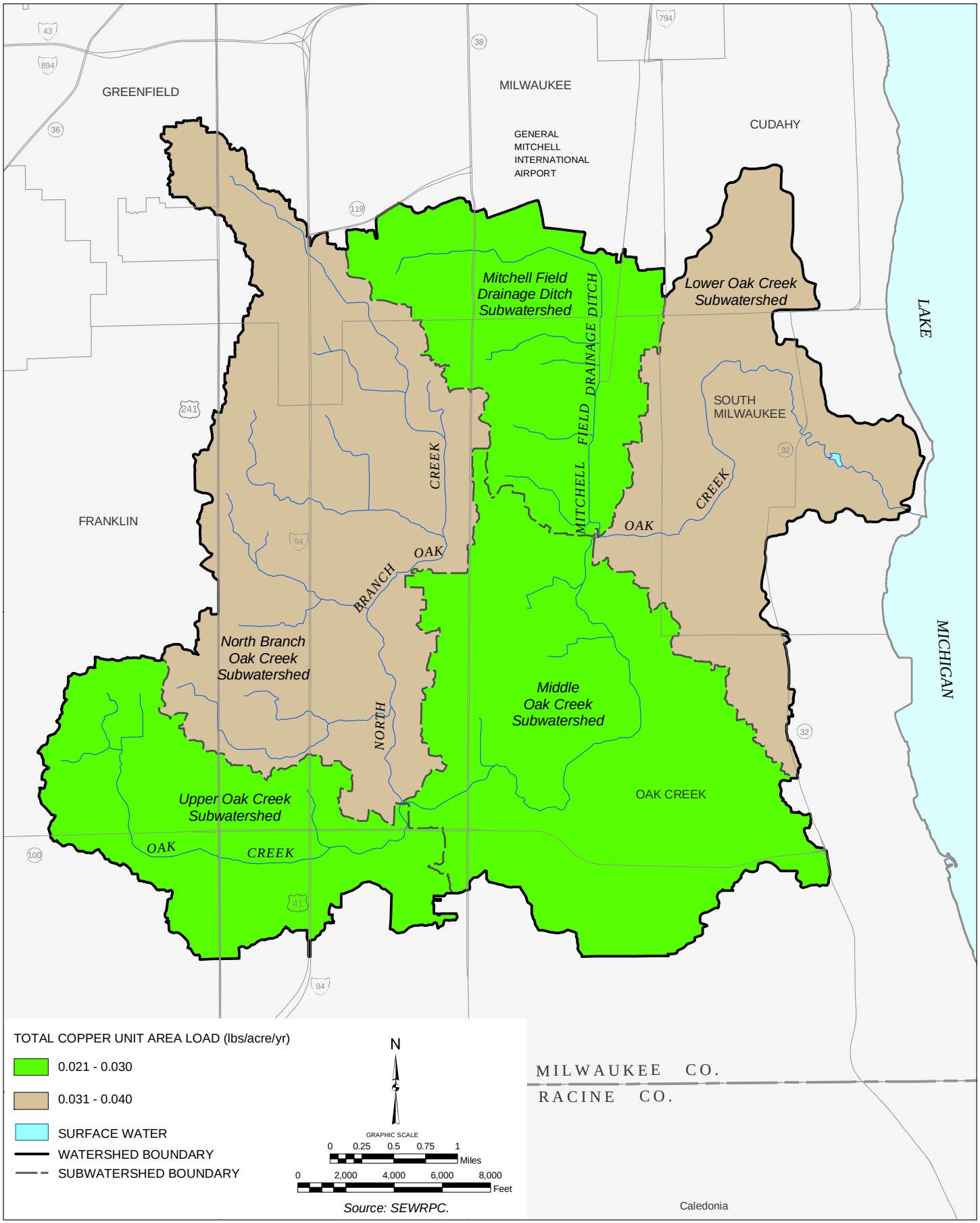
Map H-47

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF COPPER IN THE OAK CREEK WATERSHED



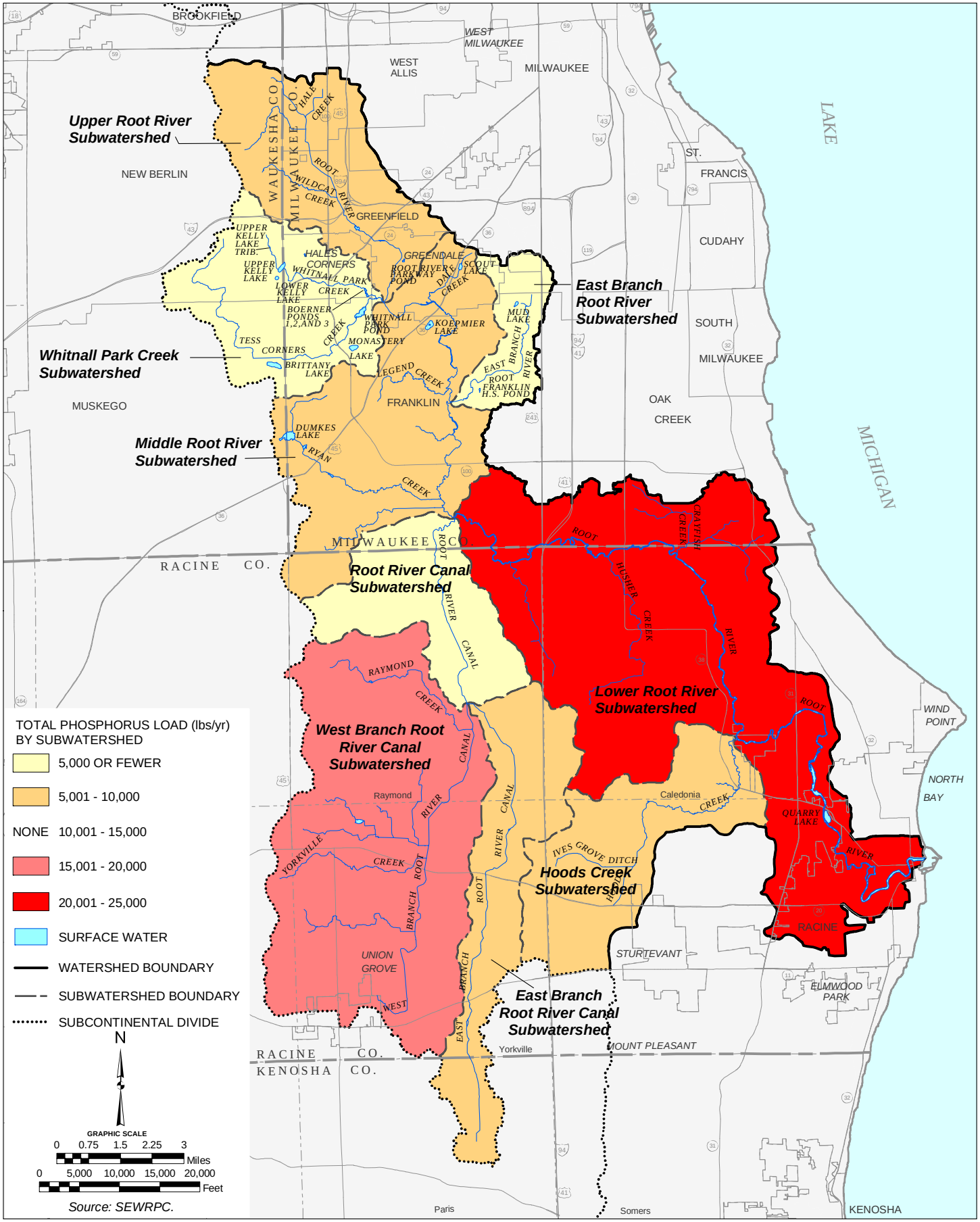
Map H-48

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL COPPER IN THE OAK CREEK WATERSHED



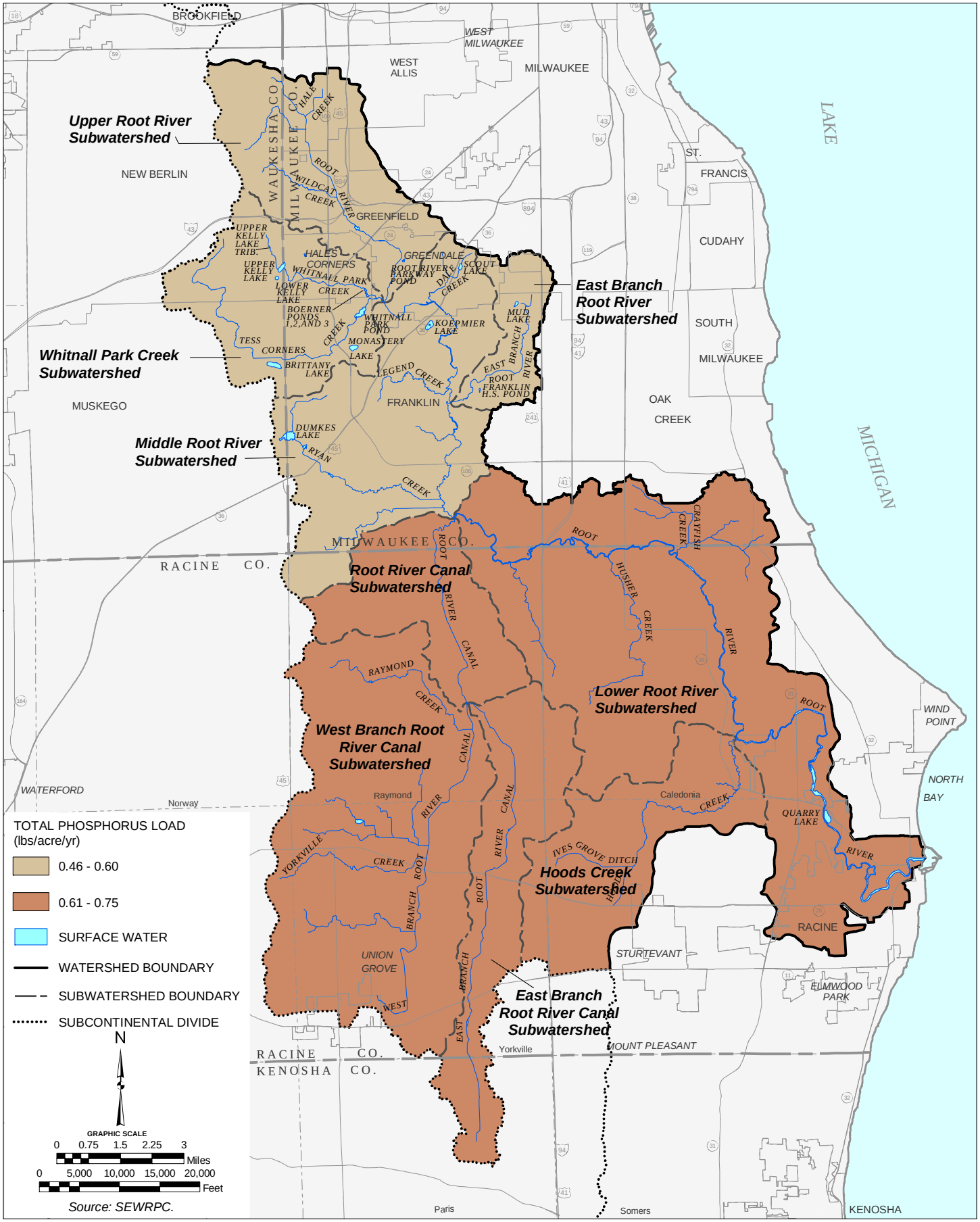
Map H-49

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL PHOSPHORUS IN THE ROOT RIVER WATERSHED



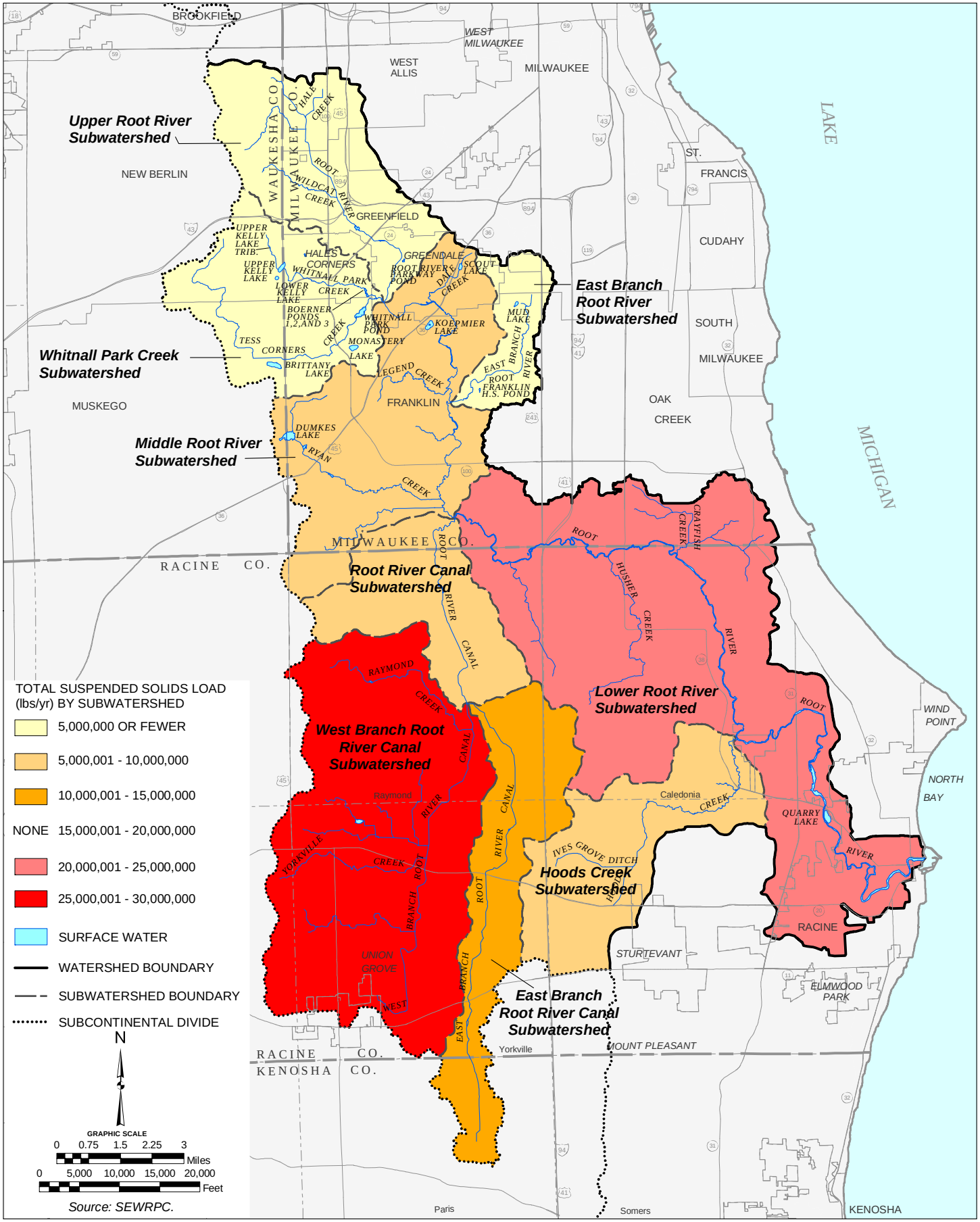
Map H-50

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF PHOSPHORUS IN THE ROOT RIVER WATERSHED



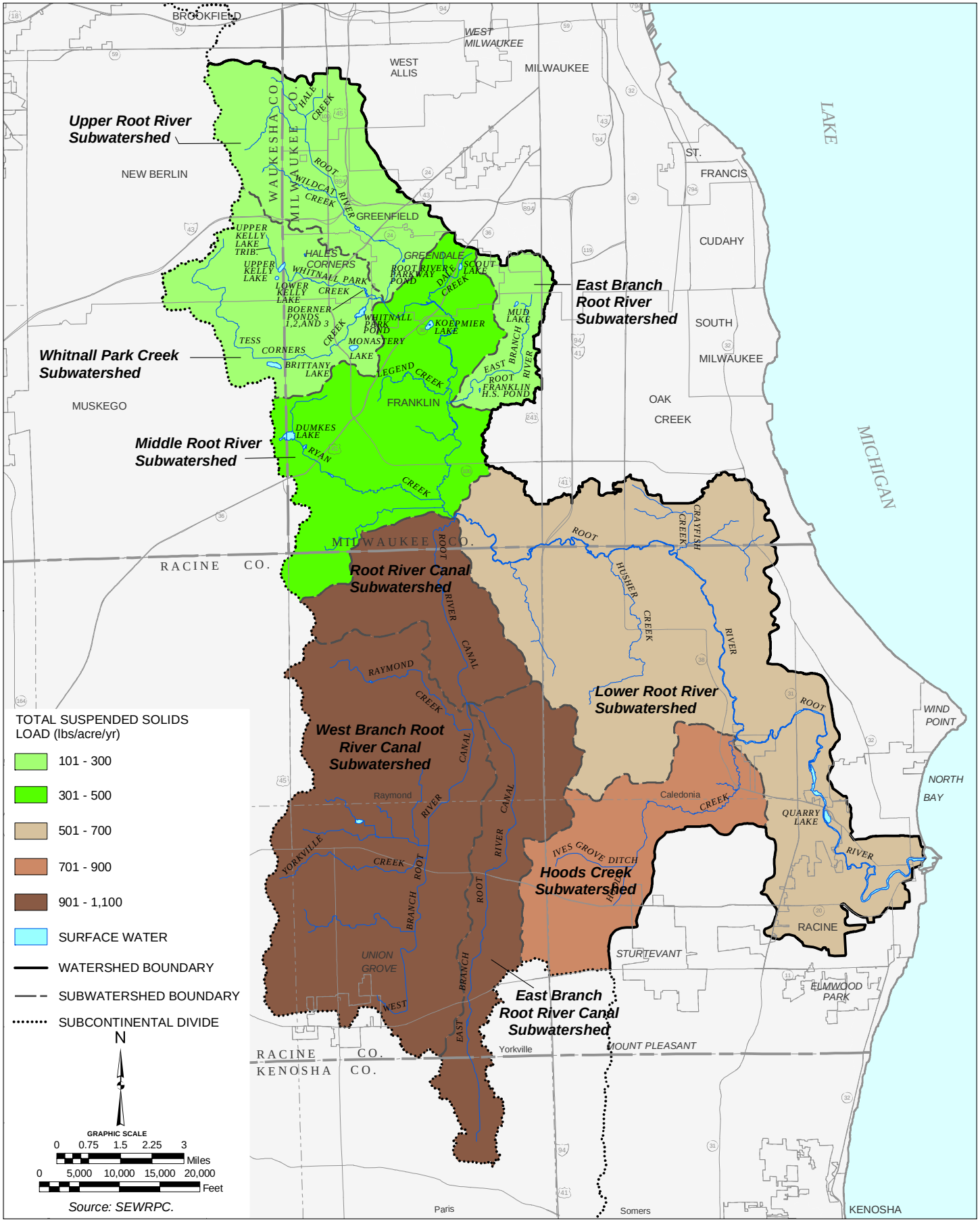
Map H-51

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE ROOT RIVER WATERSHED



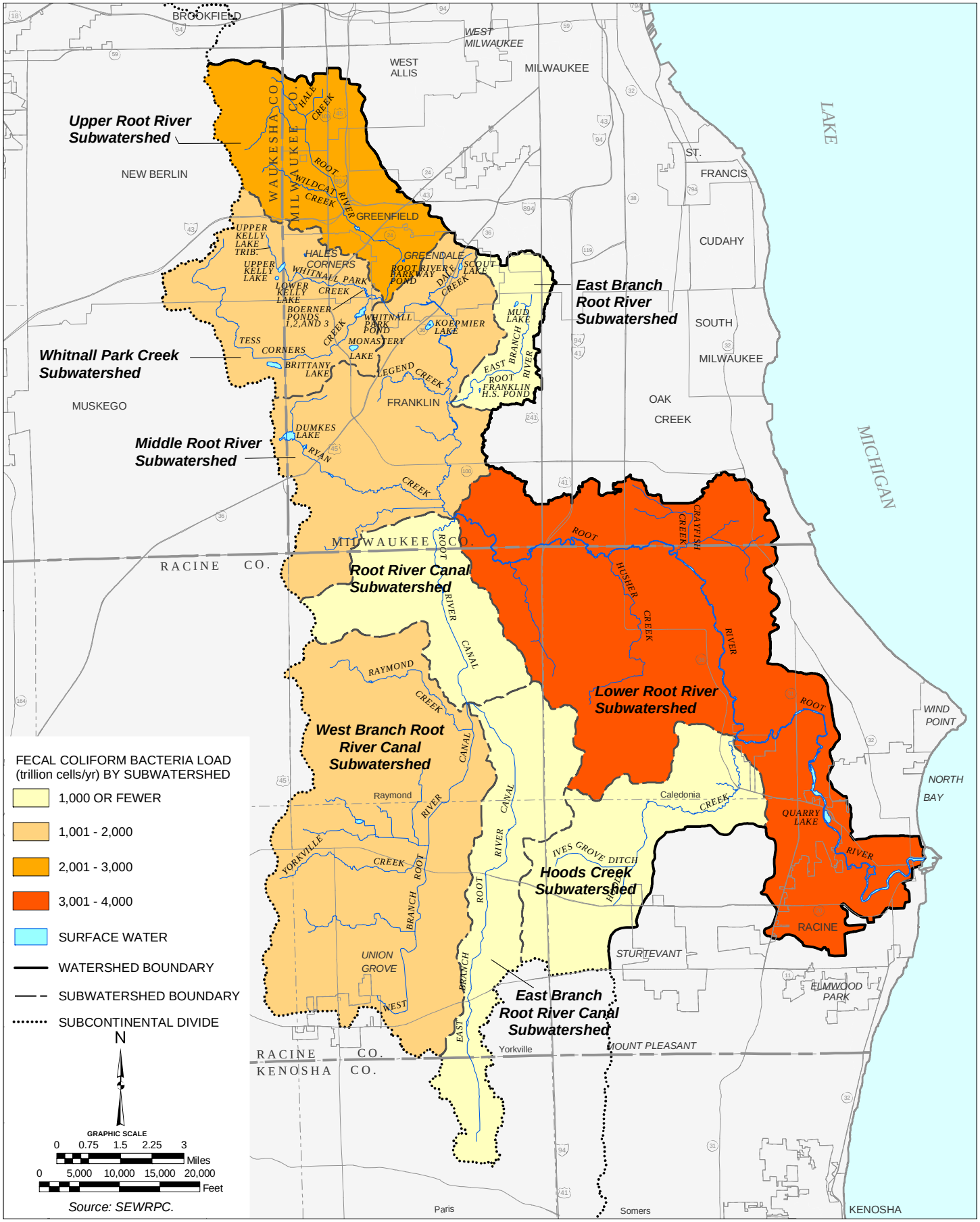
Map H-52

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL SUSPENDED SOLIDS IN THE ROOT RIVER WATERSHED



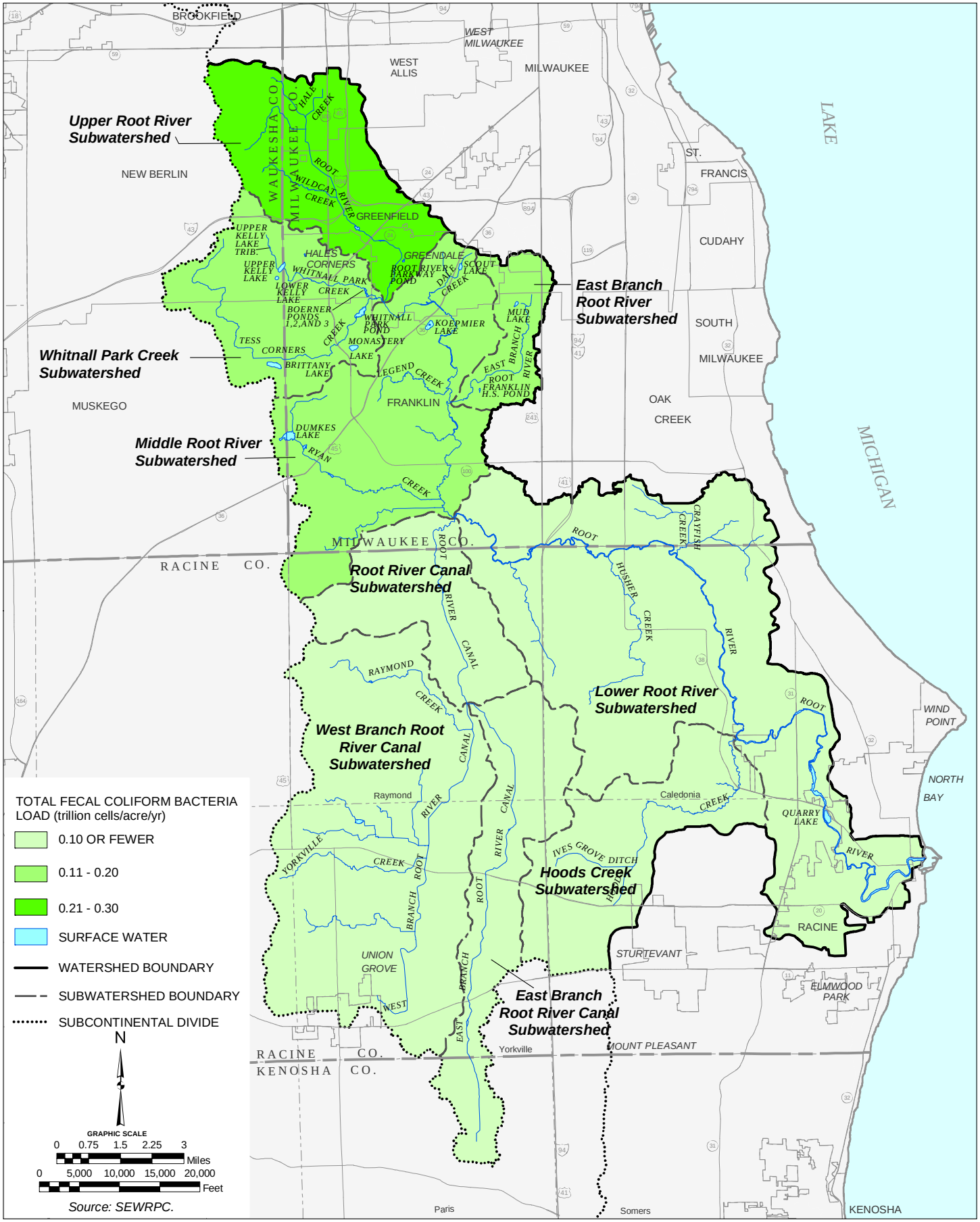
Map H-53

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF FECAL COLIFORM BACTERIA IN THE ROOT RIVER WATERSHED



Map H-54

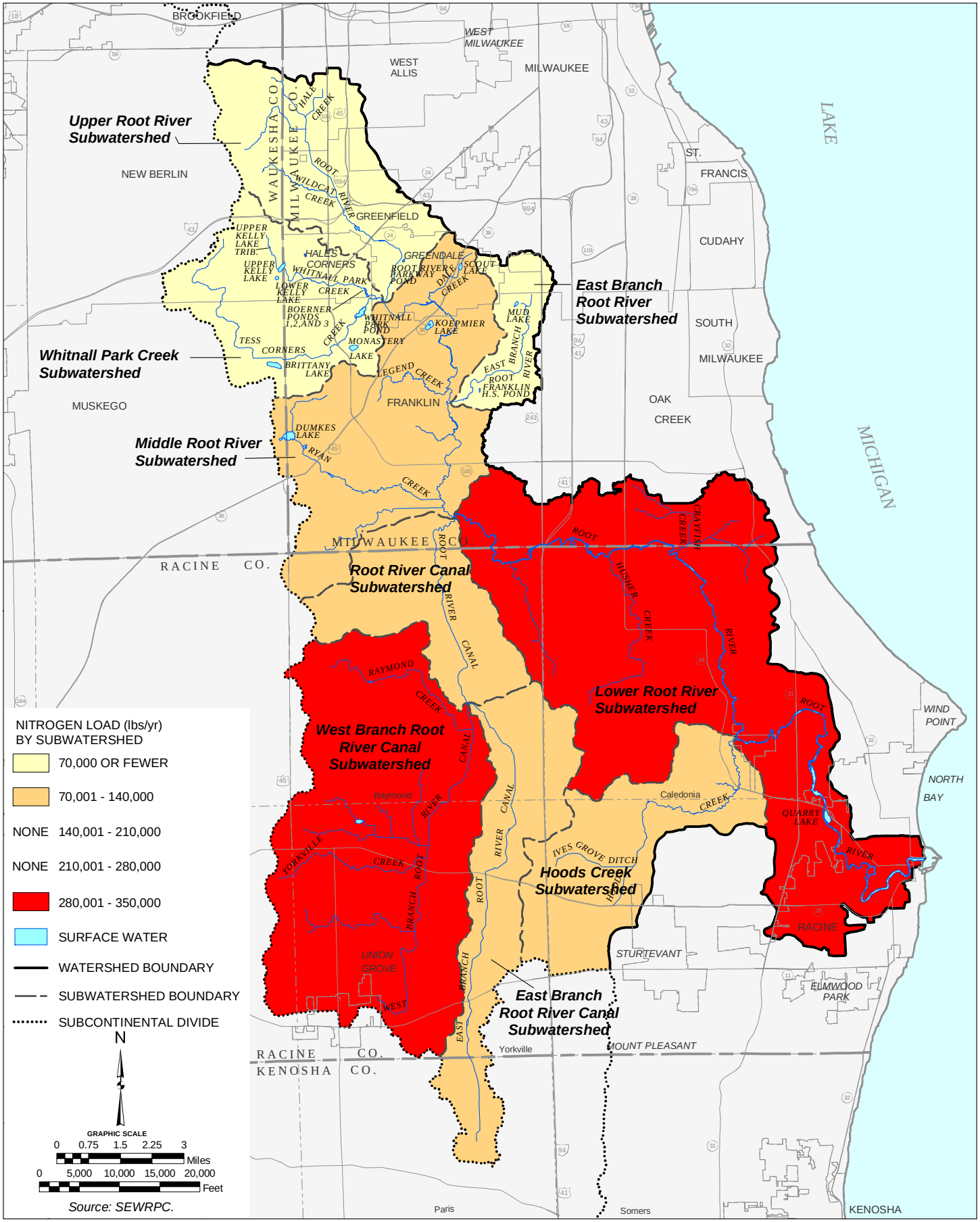
ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL FECAL COLIFORM BACTERIA IN THE ROOT RIVER WATERSHED



Source: SEWRPC.

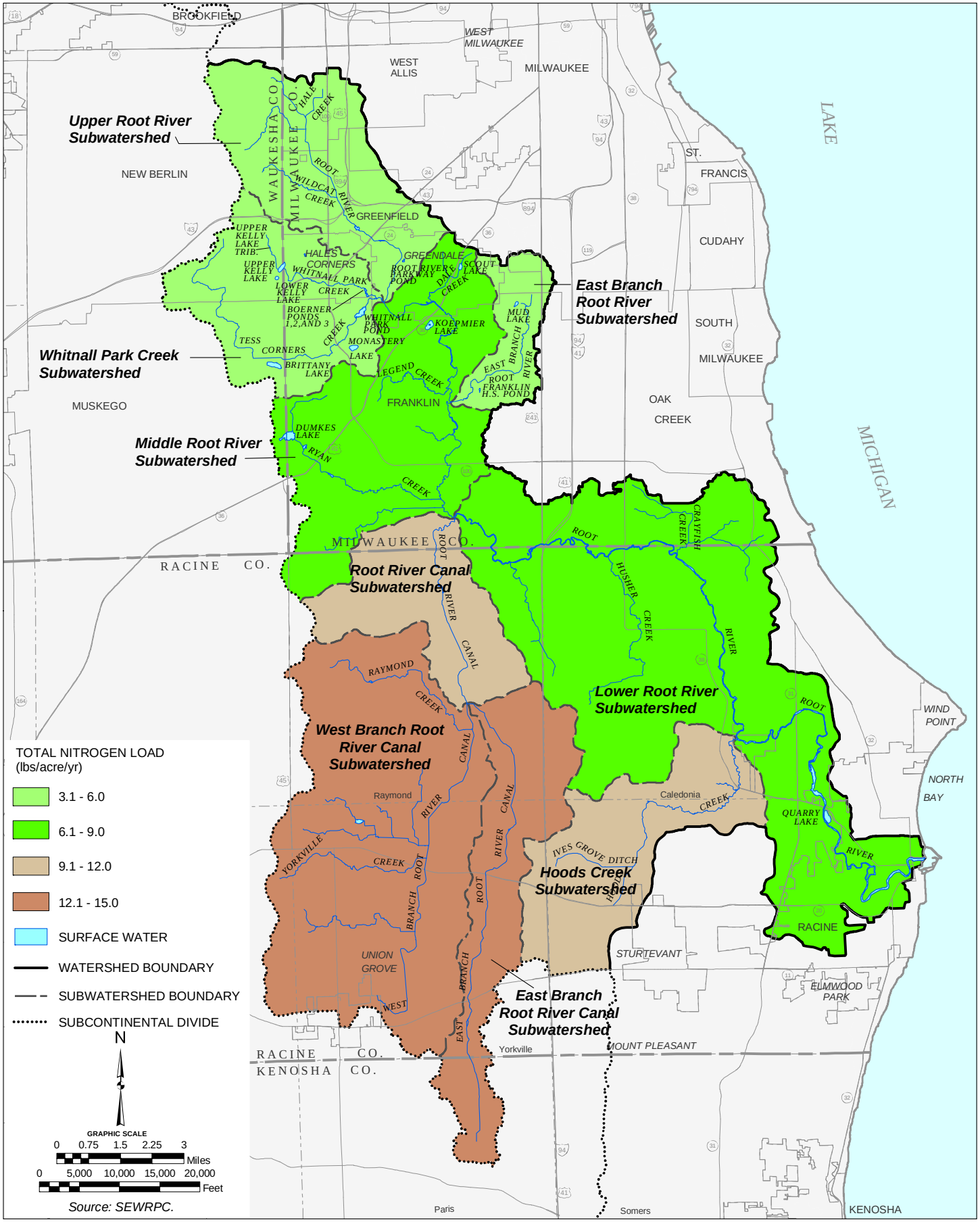
Map H-55

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF NITROGEN IN THE ROOT RIVER WATERSHED



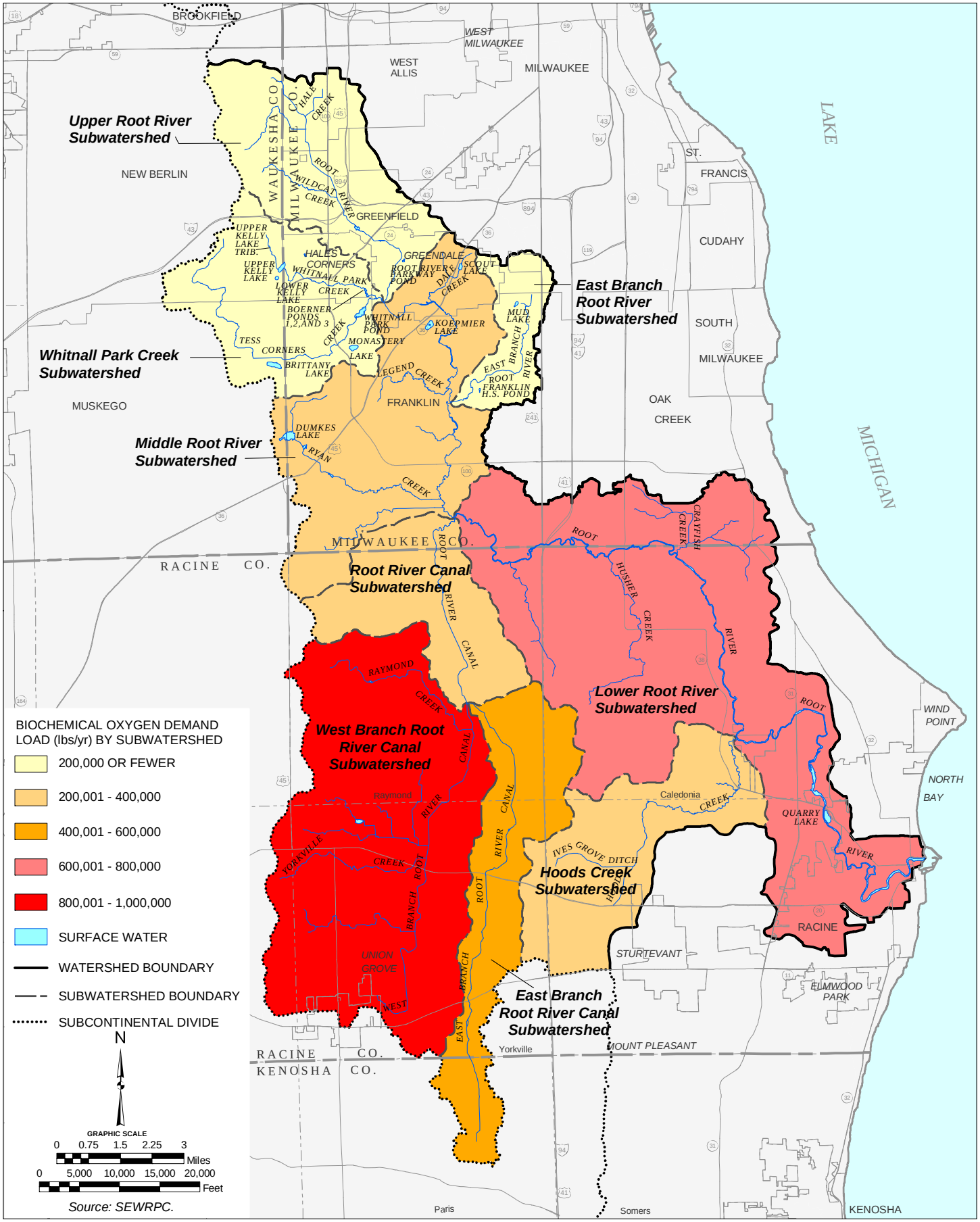
Map H-56

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL NITROGEN IN THE ROOT RIVER WATERSHED



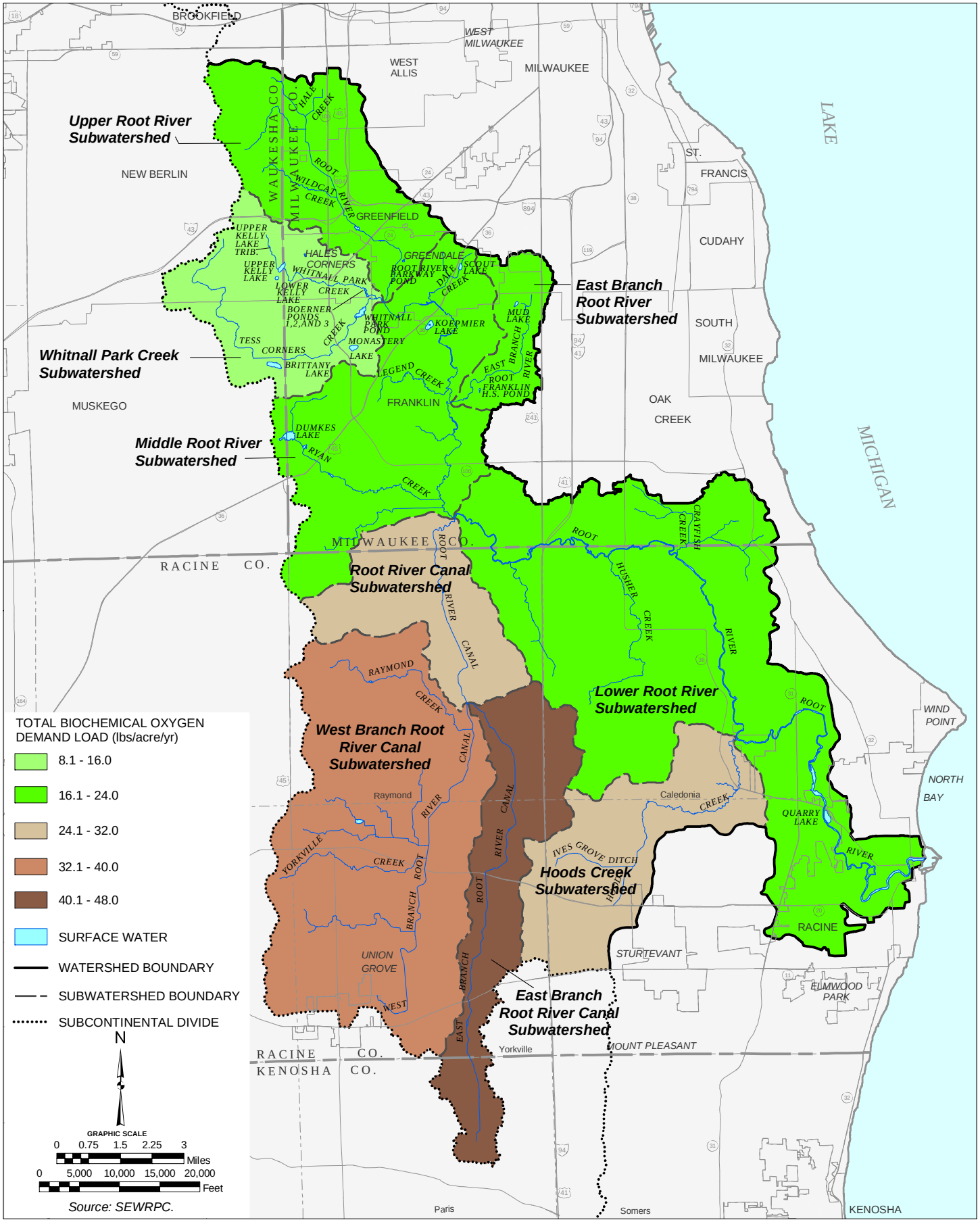
Map H-57

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF BIOCHEMICAL OXYGEN DEMAND IN THE ROOT RIVER WATERSHED



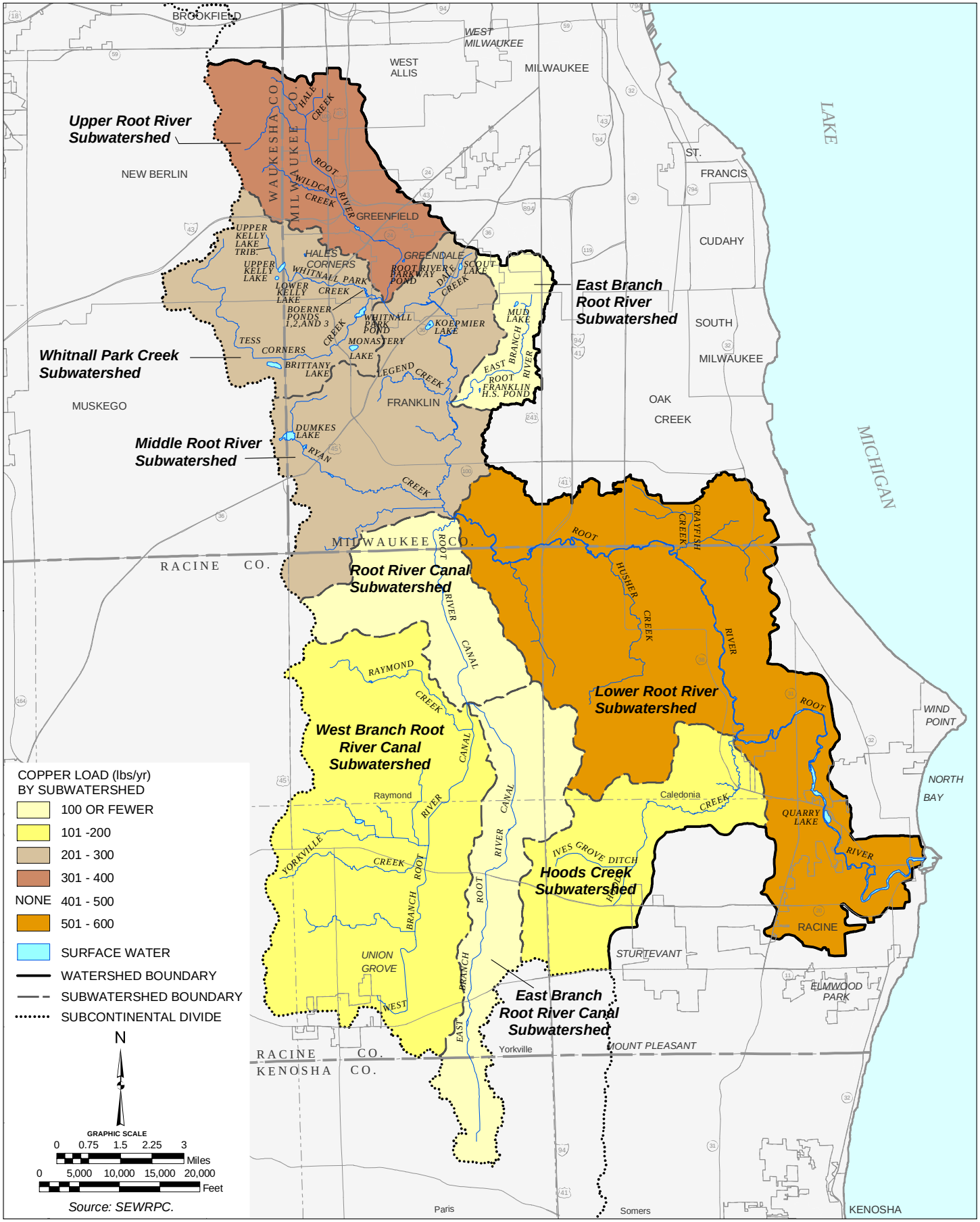
Map H-58

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL BIOCHEMICAL OXYGEN DEMAND IN THE ROOT RIVER WATERSHED



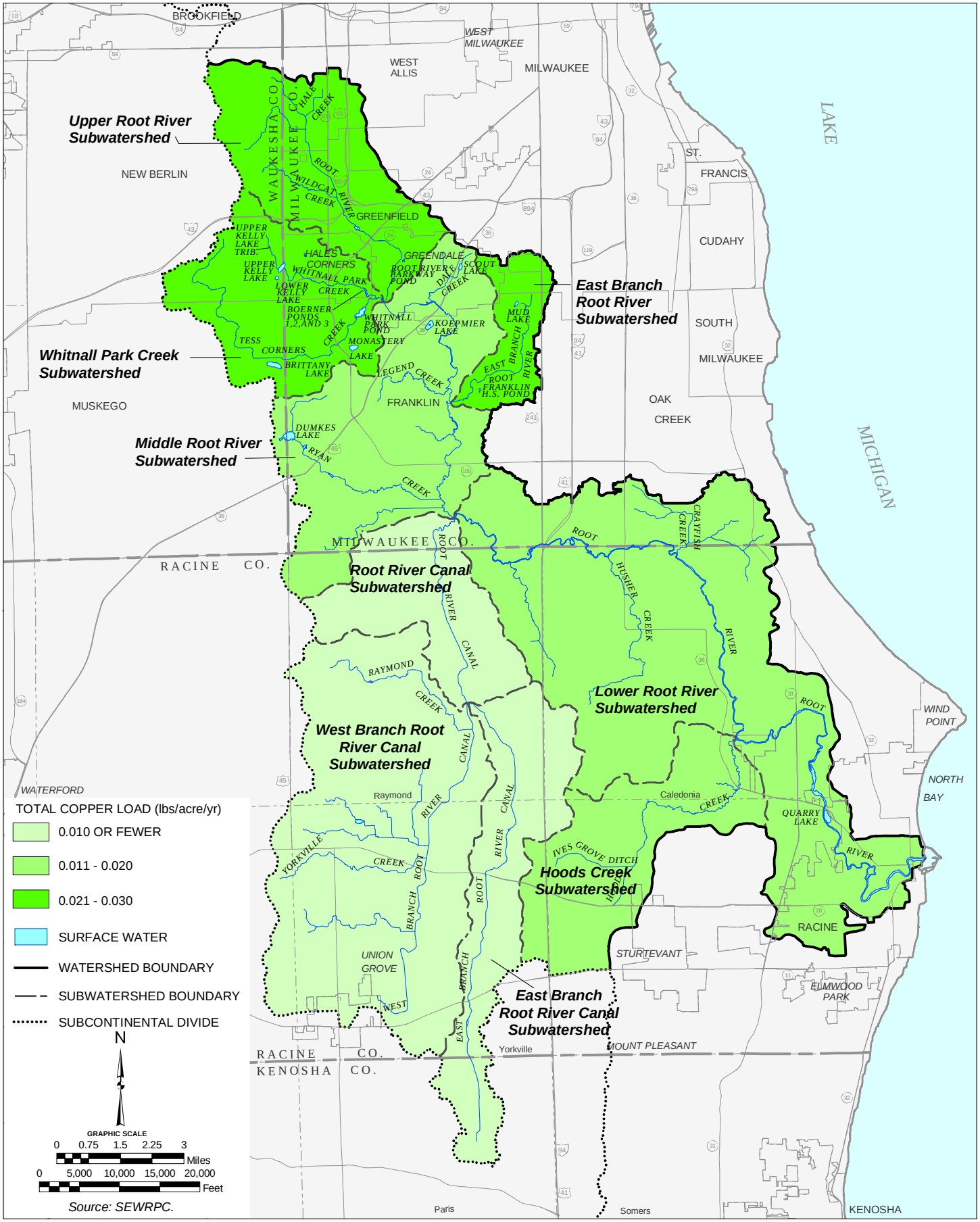
Map H-59

ESTIMATED AVERAGE ANNUAL NONPOINT SOURCE POLLUTION LOADS OF COPPER IN THE ROOT RIVER WATERSHED



Map H-60

ESTIMATED AVERAGE ANNUAL PER ACRE NONPOINT SOURCE POLLUTION LOADS OF TOTAL COPPER IN THE ROOT RIVER WATERSHED



Appendix I

GREAT LAKES AND FISHERIES RELATED NEWSPAPER ARTICLES: 2003-2005

Subject	Title	Subtitle	Publication Date	Newspaper
Great Lakes	Troubled Waters: The St. Lawrence Seaway	We must stop foreign invaders	November 21, 2005	Milwaukee Journal Sentinel
	The Great Lakes are still sick	Scientists' report stresses problems, suggests areas for concerted action	December 9, 2005	The Journal Times
	Great Lakes cleanup plans harbor deep differences	Bush administration task force balks at any new spending for restoration	December 11, 2005	Milwaukee Journal Sentinel
	Partnership's $20 billion plan aimed at saving lakes	- -	December 13, 2005	The Journal Times
	Great Lakes plan set at $20 billion	Government partnership unveils 15-year blueprint to tackle pollution, invasive species, habitat loss	December 13, 2005	Milwaukee Journal Sentinel
	Updating water quality plan next up for Great Lakes	- -	December 17, 2005	The Freeman
	Study looks at ending Great Lakes link	Mississippi connection helps spread invasive species, scientists say	December 28, 2005	Kenosha News
	Upstream battle on Seaway invaders	As shipping season begins, alien species still pose threat, and cure is elusive	March 22, 2006	Milwaukee Journal Sentinel
	Plan urges Great Lakes cleanup	- -	April 6, 2006	Kenosha News
	Goals set for lakes study	Scientists seek to boost trade, kill invaders	May 24, 2006	Milwaukee Journal Sentinel
Invasive Species	Troubled Waters: The Great Invasion	Sea of change	December 19, 2004	Milwaukee Journal Sentinel
	Troubled Waters: The Great Invasion	Intruders at the gate	December 26, 2004	Milwaukee Journal Sentinel
	Carp barrier aid rejected	But St. Lawrence Seaway study on course for funds	November 10, 2005	Milwaukee Journal Sentinel
	Turning Tide on invasive species	Top scientists to study ways to stop intruders on St. Lawrence Seaway	November 13, 2005	Milwaukee Journal Sentinel
	Group to study barriers in Illinois waterway	Aim is keep invaders out of Great Lakes	January 10, 2006	Milwaukee Journal Sentinel
	Bill to halt invasive carp advances	Imports, interstate toting would stop; fish farms opposed	March 30, 2006	Milwaukee Journal Sentinel
	The new invasion: Quagga mussels take over lake	In just a few years, quaggas in Lake Michigan have annihilated their mussel cousin, the zebra – and are poised to bring even more trouble	May 14, 2006	Milwaukee Journal Sentinel

Appendix I (continued)

Subject	Title	Subtitle	Publication Date	Newspaper
Invasive Species (continued)	Quagga mussel set to invade inland lakes soon	- -	June 26, 2006	Kenosha News
	Troubled Waters: Chaos uncorked	An ill conceived plan to clean fouled waters with exotic carp goes awry down South, and now – three decades later – the Great Lakes could pay the price	October 15, 2006	Milwaukee Journal Sentinel
	Troubled Waters: Unwanted Bounty	As fast-growing fish overwhelm nearby rivers, a wobbly Great Lakes ecosystem looks particularly vulnerable	October 16, 2006	Milwaukee Journal Sentinel
	Troubled Waters: Last line of defense	A beefed-up electrical barrier to keep Asian carp out of Lake Michigan runs into money and safety trouble and can't be turned on. Flooding could render it useless. Is ecological disaster inevitable?	October 17, 2006	Milwaukee Journal Sentinel
Fish Management	Troubled Waters: The Great Invasion	Paradise in peril	December 12, 2004	Milwaukee Journal Sentinel
	Coho fever: Lure of salmon burned hot in the '60s – so hot it was dangerous	- -	December 12, 2004	Milwaukee Journal Sentinel
	Perch Scarcer now, but catching them still a family tradition	- -	December 19, 2004	Milwaukee Journal Sentinel
	Walleyes no longer fish out of water	Species makes comeback in Milwaukee River as conditions improve	January 16, 2005	Milwaukee Journal Sentinel
	Yellow perch might be recovering from decimation	Fish count for Lake Michigan jumps in 2005 after 90% plunge	March 14, 2005	Milwaukee Journal Sentinel
	Fishing for solution to salmon troubles	Biologists discuss need to cut back on stock in Lake Michigan	September 25, 2005	Milwaukee Journal Sentinel
	States to slash salmon stocking in Lake Michigan	Dwindling food supply, evidence of reproduction cited in 25% cut	November 16, 2005	Milwaukee Journal Sentinel
	Shippers fear laws will sink industry	Great Lakes states try to restrict overseas' vessels ballast water	January 5, 2006	Milwaukee Journal Sentinel
	Great Lakes battle plan needs Congress' support	- -	April 16, 2006	The Journal Times
	Anglers perched along 'Boils'	Fish population has been improving	July 9, 2006	Milwaukee Journal Sentinel

Source: SEWRPC.

Appendix J

EVALUATION OF CONTAMINATION POTENTIAL OF SHALLOW GROUNDWATER

DESCRIPTION OF THE EVALUATION METHOD

Vulnerability of shallow groundwater in any given area of southeastern Wisconsin is essentially dependent on three parameters: distance from the land surface to the aquifer, properties of materials through which contaminants have to pass to reach the aquifer, and rates at which such contaminants can travel. The uppermost bedrock aquifer in southeastern Wisconsin is almost uniformly dolomite, so differences in the type of bedrock are not a significant factor.

The first parameter, distance from land surface to the shallow aquifer, was assessed in this study according to the position of the water table. If the water table is below the top of a bedrock or sand and gravel aquifer, then the most vulnerable areas are considered to be those where the top of the bedrock or sand and gravel is located closest to the land surface. Otherwise, distance to the aquifer is depth to the water table. The second parameter—properties of materials—was assessed by estimating vertical permeability of the materials in the unsaturated zone. The third parameter—travel time—was the most difficult to assess, and in the case of soluble contaminants, is best represented by groundwater recharge, which is a complex process. However, for contamination potential mapping, the most important aspect of recharge is direct infiltration or soil percolation, which can be estimated or mapped based on soil classification.

Source maps used to generate the maps of contamination potential are listed in Table J-1. The first parameter is commonly represented by contour maps of the depth to bedrock and depth to the water table. Maps of the second and third parameters are derived from existing maps such as Pleistocene geology maps or soil classification maps (see Table J-1).

Vertical permeability of the unsaturated zone was estimated from Pleistocene geology maps, geologic cross sections, water table elevations, and existing field data on hydraulic conductivity of Pleistocene materials in Wisconsin. Materials were assigned estimated hydraulic conductivities by type of material over a range of 1×10^{-7} to 1×10^{-2} centimeters per second (cm/s). Geologic cross sections were then used to estimate overall vertical permeability of each Pleistocene map unit above the water table by weighting the conductivity of each material type by its thickness in profile.[1] Finally, generalized Pleistocene geology map units were classified into three categories of estimated vertical permeability, as shown in Table J-2.

[1] *R.A. Freeze, and J.A. Cherry,* Groundwater*, Englewood Cliffs, NJ, Prentice-Hall, 1979.*

Table J-1

COMPONENT MAPS FOR CONTAMINATION POTENTIAL ASSESSMENT OF SOUTHEASTERN WISCONSIN

- Depth to bedrock (contoured)
- Depth to the water table (contoured)
- Permeability of the unsaturated zone (derived)
- Soil percolation (derived)

Source: Wisconsin Geological and Natural History Survey.

Table J-2

VERTICAL PERMEABILITY OF PLEISTOCENE UNITS IN SOUTHEASTERN WISCONSIN

Class	Material	Estimated Permeability
High	Sand and gravel/outwash	More than 1 x 10^{-3} cm/s
Moderate	Sandy silt till/ glaciolacustrine	Less than 1 x 10^{-3} to more than 1 x 10^{-5} cm/s
Low	Silt and clayey silt till	Less than 1 x 10^{-5} cm/s

Source: Wisconsin Geological and Natural History Survey.

Soil percolation rates were estimated by analyzing water budgets for different soil textures in several subwatersheds with different land uses, using a modified U.S. Environmental Protection Agency (USEPA) method of calculating leachate generation from landfills.[2] The results were generalized to three classes of soil percolation, and applied on a regional basis using the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) Hydrologic Soil Group (HSG) classification[3] and a similar soil classification for attenuation of contaminants developed at the Wisconsin Geological and Natural History Survey.[4] Urban areas were assigned a low percolation rating regardless of soil, due to the extent of impervious surfaces. Estimated values of soil percolation are presented in Table J-3, and represent approximately from less than 9 percent to more than 19 percent of annual precipitation, which is about 32 inches per year in southeastern Wisconsin.

MAPPING METHOD

For the evaluation and mapping of contamination potential of shallow groundwater a two-step procedure was developed, using a geographic information system (GIS) computerized analysis. The four maps listed in Table J-1 were superimposed, using a GIS, to evaluate contamination potential for different areas. The digital intersection of these maps results in a new network of polygons, each having four attributes corresponding to the classes of the component maps. Subsets of these polygons can then be selected using Boolean logic to evaluate the contamination potential of different areas. Because each map has only three classes, this GIS operation can be more readily understood as a conceptual two-step procedure using three by three matrices.

In the first step, a GIS coverage of three classes of estimated vertical permeability of materials in the unsaturated zone is digitally combined with three classes of the depth to aquifer to produce the initial vulnerability matrix (see Table J-4). Depth to aquifer is represented by mapped ranges of depth to either the water table, or bedrock, or sand and gravel aquifers. Three classes were considered: zero to 25 feet, 25 to 50 feet, and greater than 50 feet. In assessing the depth to aquifer parameter, the most vulnerable situation—i.e., the shallowest depth—is selected, depending on the position of the water table. Since in practice, it is difficult to map areas of buried sand and

[2] *T.T. Eaton, "Estimating Groundwater Recharge Using a Modified Soil-Water Budget Method," 40th Annual Midwest Groundwater Conference, Columbia, MO, Program and Abstracts, Missouri Department of Natural Resources, 1995.*

[3] *U.S. Department of Agriculture, Soil Conservation Service,* Urban Hydrology for Small Watersheds*, USDA Soil Conservation Service Technical Release 55, (2nd Edition), 1986.*

[4] *K. Cates, and F. Madison, "Worksheet #11: Site Evaluation, Farm-A-Syst," University of Wisconsin-Extension, Madison, WI, G3536-11W, 1991.*

Table J-3

ESTIMATED VALUES OF SOIL PERCOLATION RATE IN SOUTHEASTERN WISCONSIN

Percolation Class	HSG	Soil Texture	Estimated Percolation
High	A	Fine sand/sandy loam	>6 inches per year
Moderate	B	Silty loam/loam	3-6 inches per year
Low	C,D	Clay loam/clay	<3 inches per year

Source: Wisconsin Geological and Natural History Survey.

Table J-4

INITIAL VULNERABILITY MATRIX

Estimated Permeability of Unsaturated Zone	Depth to Aquifer: Water Table or Bedrock or Sand and Gravel Aquifer		
	<25 Feet	25-50 Feet	>50 Feet
High Permeability	H	H	M
Moderate Permeability	H	M	L
Low Permeability	M	L	L

Source: Wisconsin Geological and Natural History Survey.

gravel aquifers, the assumption was made that any area classified as highly permeable contains a sand and gravel aquifer less than 25 feet below the surface, and moderate to low permeability areas do not. A qualitative rating of High (H), Moderate (M), or Low (L) was symmetrically distributed in the body of the matrix such that cross-referencing permeability (left column) and depth to aquifer (top row) provided a High (H), Moderate (M), or Low (L) initial vulnerability of the shallow aquifer. This allowed an initial vulnerability rating to be assigned to any area on the basis of aquifer depth and estimated permeability.

The second step involved digital combination of the initial vulnerability ratings of High, Moderate, or Low from Table J-4 with three classes of the final parameter, the estimated soil percolation (see Table J-5). Cross-referencing the columns and rows of this matrix provided the final contamination potential ranking of High (H), Moderate (M), or Low (L) in the body of the matrix (see Table J-5) for each area under consideration.

The two-step matrix procedure was designed to conceptually illustrate the Boolean logic operations that are actually used to select the final contamination potential rankings using the GIS-assisted analysis. The GIS procedures perform the operations on all the polygons in the mapped area at the same time, rather than individually as the matrices assume.

Since there are three classes for each of the three characteristics considered in this procedure, there are 27 possible different combinations of these classes, as shown in Table J-6. One of the three final contamination potential rankings: High, Moderate, or Low, is assigned to each combination on the basis of the two-step procedure using the matrices in Tables J-4 and J-5. This results in an "averaging" of the vulnerability factors associated with each parameter. For instance, in the case of depth to aquifer greater than 50 feet, low permeability, and low soil percolation, the Boolean logic operation would take the form: "Select all polygons such that depth to water table >50 ft *or* depth to bedrock >50 ft *or* permeability not equal to H; then select from that subset all polygons such that permeability = L *and* soil percolation = L."

Because of the "*or*" operators in the first part of the Boolean logic operations and in Table J-4, the resulting sets of polygons meeting each combination of vulnerability criteria are not always mutually exclusive. Therefore, the GIS-assisted analysis procedure of selecting each of these subsets causes some reclassification, and the order of selection for contamination potential ranking is important. All combinations corresponding to a Low ranking must be selected first, then all combinations corresponding to a Moderate ranking, and finally all combinations corresponding to a High ranking, in the same order as presented in Table J-6.

Once ranked, the resulting sets of polygons—or map areas—are represented in different colors: red for High, yellow for Moderate, and green for Low, to indicate areas of differing vulnerability of the shallow aquifer. Labels corresponding to the letter-number designation of each final contamination potential ranking—such as L1, M1, or H1—were used to identify the different areas on the map (Map 147 in Chapter XI of this report). However, not all of the possible combinations of parameters occur in the study area (see Table J-6).

Table J-5

CONTAMINATION POTENTIAL MATRIX

Initial Vulnerability (Table J-4)	Estimated Soil Percolation Rate		
	< 3 Inches per Year	3-6 Inches per Year	> 6 Inches per Year
High	M	H	H
Moderate	L	M	H
Low	L	L	M

Source: Wisconsin Geological and Natural History Survey.

Table J-6

COMBINATIONS OF PARAMETERS FOR CONTAMINATION POTENTIAL MAPPING

Depth to Aquifer	Estimated Permeability	Estimated Soil Percolation	Final Contamination Potential Ranking
>50 Feet	Low	Low	L9: Low[a]
>50 Feet	Low	Moderate	L8: Low[a]
>50 Feet	Moderate	Low	L7: Low[a]
>50 Feet	Moderate	Moderate	L6: Low[a]
>50 Feet	High	Low	L5: Low[a]
25-50 Feet	Low	Low	L4: Low
25-50 Feet	Low	Moderate	L3: Low
25-50 Feet	Moderate	Low	L2: Low
<25 Feet	Low	Low	L1: Low
>50 Feet	Low	High	M9: Moderate[a]
>50 Feet	Moderate	High	M8: Moderate[a]
>50 Feet	High	Moderate	M7: Moderate[a]
25-50 Feet	Low	High	M6: Moderate
25-50 Feet	Moderate	Moderate	M5: Moderate
25-50 Feet	High	Low	M4: Moderate[a]
<25 Feet	Low	Moderate	M3: Moderate
<25 Feet	Moderate	Low	M2: Moderate
<25 Feet	High	Low	M1: Moderate
>50 Feet	High	High	H9: High[a]
25-50 Feet	Moderate	High	H8: High
25-50 Feet	High	Moderate	H7: High[a]
25-50 Feet	High	High	H6: High[a]
<25 Feet	Low	High	H5: High
<25 Feet	Moderate	Moderate	H4: High
<25 Feet	Moderate	High	H3: High
<25 Feet	High	Moderate	H2: High
<25 Feet	High	High	H1: High

[a]*Not present in southeastern Wisconsin.*

Source: Wisconsin Geological and Natural History Survey.

Labeling each polygon enables the user of the map to identify the reasons for which any area was ranked, by referring to Table J-6. All final rankings are understandable in terms of the three original groundwater vulnerability factors previously identified—depth to aquifer, vertical permeability of materials in the unsaturated zone, and soil percolation. As with any GIS polygon intersection operation, small meaningless "sliver" polygons were generated in this assessment, and polygons smaller than 0.25 square mile were deleted for the final published map.

Any method for assessing and mapping of contamination potential should be evaluated. However, developing a conclusive verification procedure is difficult. The distribution of actual groundwater contamination is more a consequence of various land use activities or spill events than of any geologic or hydrogeologic factors. Furthermore, available data on groundwater quality tend to be concentrated at contamination sites and would not be representative of groundwater quality on a regional basis. For these reasons, correlative analyses would be misleading. Conclusive verification of the method used was beyond the scope of the study set forth in SEWRPC Technical Report No. 37, *Groundwater Resources of Southeastern Wisconsin*. Nevertheless, the correspondence of high contamination potential areas with local geologic, hydrogeologic, and soil characteristics conducive to groundwater vulnerability, and vice versa, provide a level of confidence in the internal consistency of the method. This method, however, is not a replacement for site-specific field studies, but rather is intended to be used as a guide to the conduct of such studies and as a sound basis for more general land use and facility planning.

Appendix K

SOIL SERIES IN SOUTHEASTERN WISCONSIN LISTED BY ATTENUATION POTENTIAL

In SEWRPC Technical Report No. 37, *Groundwater Resources of Southeastern Wisconsin,* soils in the Region were evaluated as to their potential for attenuating contaminants and grouped, based on the numerical score, into four soil associations that reflect different attenuation potential.

Soils Potential to Attenuate Contaminants	Total Score	Percent of Total Land*
Least Potential	0-30	16
Marginal Potential	31-40	27
Good Potential	41-50	49
Best Potential	51	6

**The remaining 2 percent include miscellaneous areas which could not be categorized due to land use or lack of soils data.*

Soils that have similar soil profiles make up a soil series. However, soils of one series can differ in texture of the surface horizon or of the subsoil horizon. They can also differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of these differences, a soil series is divided into soil phases. As examples, a Hochheim loam, 2 to 6 percent slope, eroded, is a phase of the Hochheim series and a Casco sandy loam, 2 to 6 percent slope or a Casco loam, 6 to 12 percent slope are phases of the Casco series.

Soil phases often received different scores in the soil attenuation potential ranking but remained in the same overall soil attenuation potential category (least, marginal, good, best). Occasionally, different phases fell into more than one attenuation potential category. When this situation occurred, the portion of the soil phase that affected the scoring was added in parentheses next to the soil series name. For example, the Aztalan series falls into two attenuation potential categories, least and marginal. Surface textural differences, sandy loam versus loam, affect the ranking of these soil phases. The coarser-textured, sandy loam soil ranks in the least potential category and the medium-textured, loam soil in the marginal category. Therefore, Aztalan (sandy loam) was listed in the least potential category and Aztalan (loam) was in the marginal category. In most situations, like the ones described, it was the difference in surface texture that created the ranking differences, although variations in the subsoil, soil depth, and degree of erosion also affected the rank.

Soil complexes are also listed (i.e., Rodman-Casco complex). A soil complex consists of two or more soils that cannot be shown separately on the soil map because of their small size or intricate pattern. They were ranked on the basis of the lowest scoring soil series.

Least Potential (0 - 30)

Adrian
Aztalan (sandy loam)
Boyer (loamy sand, eroded)
Boyer complex
Casco-Rodman complex
Chelsea
Darroch (fine sandy loam)
Fabius
Gilford
Granby
Hochheim-Hennepin complex
Houghton
Keowns
*Knowles (silt loam, mottled subsoil)
Matherton (sandy loam)
Matherton (loam)
Matherton (silt loam)
Muskego
Mussey
Ogden
Palms
*Pella (silt loam, moderately shallow variant)
*Ritchey (silt loam, mottled subsoil variant)
Rodman-Casco complex
Rollin
Sebewa (silt loam)
Wallkill
Wasepi
Yahara

Acreage: 256,484
Percent of Total Land: 16 Percent

Marginal Potential (31 - 40)

Ashkum
Aztalan (loam)
Beecher
Blount
Boyer (loamy sand)
Boyer (sandy loam)
Brookston
Casco (sandy loam)
Casco (loam, eroded)
Casco (soils)
Casco-Fox
Casco-Miami
Colwood
Conover
Darroch (silt loam)
Drummer
Elburn
Elliot
Flagg (silt loam, mottled subsoil variant)
Fox (sandy loam)
Griswold (silt loam, mottled subsoil variant)
Hebron (sandy loam)
Hochheim-Sisson-Casco complex
Kane
Kendall
*Knowles (silt loam, eroded)
Lamartine
Lawson (silt loam, calcareous variant)
Lorenzo-Rodman complex
Manawa
Martinton
Matherton (loam, clayey substratum)
Mequon
Miami (sandy loam, sandy loam substratum, eroded)
Mundelein
Navan
Nenno
Oshtemo
Otter
Pella (silt loam)
Pistakee
Radford
*Ritchey (silt loam)
Sawmill
Sebewa (silt loam, clayey substratum)
Sisson (fine sandy loam, eroded)
Sisson-Casco-Hochheim complex
Virgil
Warsaw (sandy loam)
Warsaw (loam, eroded)

Acreage: 435,262
Percent of Total Land: 27 Percent

**Bedrock less than five feet from surface.*

Good Potential (41 - 50)

Casco (loam)
Dodge
Dorchester
Dresden
Fox (loam)
Fox (silt loam)
Grays
Griswold (silt loam)
Griswold (loam)
Hebron (loam)
Hennepin-Miami
Hochheim
Juneau
Kewaunee
*Knowles (silt loam)
Lawson (silt loam)
Lorenzo
Markham
Mayville
McHenry
Metea
Miami (sandy loam)
Miami (loam)
Miami (silt loam)
Montgomery
Morley
Ozaukee
Poygan
Ringwood
St. Charles
Saylesville
Sisson (fine sandy loam)
Theresa
Warsaw (loam)
Warsaw (silt loam)
Worthen
Zurich

Acreage: 794,407
Percent of Total Land: 49 Percent

Bedrock less than five feet from surface.

Best Potential (51+)

Flagg (silt loam)
Pecatonica
Plano
Symerton
Troxel
Varna
Warsaw (loam, clayey substratum)
Westville

Acreage: 91,422
Percent of Total Land: 6 Percent

Miscellaneous Land Type Acreage: 44,481
Percent of Total Land: 2 Percent

Total Acres: 1,622,056

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Appendix L

COMPARISONS OF ARTIFICIAL RECHARGE TECHNOLOGIES

Technology	Description	Advantages	Limitations	Aquifer Suitability
Surface Infiltration (general comments apply to all technologies within this category)	- -	• Initial low capital construction cost • Maintenance can be simple and low cost • Low operation and maintenance costs • Can use untreated surface water • Can co-exist with recreation use or wildlife habitat	• Require near-surface aquifer • Require permeable soil profile/high vertical permeability • Require frequent maintenance to prevent clogging • Evaporation losses can be high • Vulnerable to surface contamination • Land availability and cost • May be incompatible with nearby land uses • Regulatory considerations	All of the technologies listed under the "Surface Infiltration" heading have the following suitability characteristics: • Unconfined aquifers with surface exposure • Alluvium • Semi-consolidated sediments at outcrop • Highly fractured bedrock
Infiltration Ponds and Basins Spreading Basins	Engineered off-channel structures (rectilinear)	• Can adapt former gravel pits and quarries	• Can require large tracts of land	See list for "Surface Infiltration"
Selected Stormwater Management Measures	Grassed swale drainage systems, including grassed roadway drainage ditches, bioretention basins, surface sand filters, and rain gardens	• Commonly used practices • Serve multiple purposes by reducing runoff rates and volumes and potentially reduce nonpoint source pollution	• Limited in areas with poorly drained soils • Requires water quality impact evaluation	See list for "Surface Infiltration" • Unconfined aquifers with surface exposure • Alluvium
Leaky Ponds and Reservoirs	Allow existing structure to leak	• Can utilize existing structures	• Very site-specific	See list for "Surface Infiltration"
Infiltration Ditches Ditch/Furrow	Engineered off-channel structures (linear)	• Adapt to irregular topography	• Very site-specific	See list for "Surface Infiltration"
Leaky Ditches	Allow existing structure to leak	• Utilize existing structure	• Very site-specific	See list for "Surface Infiltration"
Dry Stream Channels	Divert flow into the natural channel of an ephemeral stream	• Utilize natural topographic feature	• Very site-specific • Environmental concerns	See list for "Surface Infiltration"

Appendix L (continued)

Technology	Description	Advantages	Limitations	Aquifer Suitability
Closed Depressions, Including Kettles	Use natural depressions that catch water in wet cycles	• Utilize natural topographic feature	• Very site-specific • Require soil modification to break-up/remove native low permeability soils	See list for "Surface Infiltration"
Land Application	Surface irrigation at rates that exceed crop consumptive use	• Combine with agricultural or recreational land use • Generate revenue from crops or recreational fees	• Require large tracts of land	See list for "Surface Infiltration"
Subsurface Infiltration (general comments apply to all technologies within this category)	- -	• Can be used where surface layers of low permeability preclude surface infiltration • Can co-exist with other surface urban uses such as parking lots and recreation facilities • Minimize evaporation losses	All of the technologies listed under the "Subsurface Infiltration" heading have the following limitations: • Higher initial capital costs • Limited aerial extent • Difficult to clean/maintain • Dependent upon near-surface geology	All of the technologies listed under the "Subsurface Infiltration" heading have the following suitability characteristics: • Unconfined aquifers • Alluvium • Semi-consolidated sediments at outcrop • Highly fractured bedrock
Infiltration Trenches	Perforated pipe embedded in a gravel-filled ditch	• Compatible with urban land uses	See list for "Subsurface Infiltration"	See list for "Subsurface Infiltration"
Infiltration Galleries	Similar to trenches, except in arrays	• Can cover larger areas	See list for "Subsurface Infiltration"	See list for "Subsurface Infiltration"
Dry wells	Wells completed above the water table	• Can be used where space is limited	See list for "Subsurface Infiltration"	See list for "Subsurface Infiltration"
Infiltration Pits/Shafts	Large diameter bore or excavation to penetrate near-surface low-permeability soils	• Can be used where space is limited	See list for "Subsurface Infiltration"	See list for "Subsurface Infiltration"
Direct Injection (general comments apply to all technologies within this category)	- -	• Can be used where vertical permeability is limited • Occupy small surface areas • Can fit in with most land-use patterns • Can utilize existing water supply infrastructure	• Require pre-treatment to drinking water standards • Require tight control over source water quality • High capital costs, when existing infrastructure is not available	• Unconfined aquifers with limited surface exposure • Confined aquifers • Deep alluvium • Sedimentary bedrock aquifers

Appendix L (continued)

Technology	Description	Advantages	Limitations	Aquifer Suitability
Direct Injection (continued)	- -	- -	• High energy requirements, high operation and maintenance costs • Require frequent pumping to remove clogging • Contamination from recharge would be difficult to remediate	- -
Injection Wells/Aquifer Storage and Recovery (ASR) Wells	Wells that are either used solely for injecting water (injection wells) or both injection and recovery (ASR wells)	• Can be used for deep aquifers • Low capital costs, when existing infrastructure is available	• High capital costs • Potential reactions between injected water and native formation or groundwater	• All of above • Abandoned mines • Karst, caverns
River Bank Filtration and Induced Recharge (general comments apply to all technologies within this category)	Well or well field completed near or under a surface waterbody designed to induce groundwater recharge	• Can increase the source of supply available • Reduces demand on groundwater • Provides significant improvement in source water quality	• Requires surplus surface water • Requires permeable connection between surface water and wells • Plugging of surface waterbed reduces yield over time • Higher level of treatment required than for most groundwater sources	• Shallow aquifers in direct connection with surface water
Radial Collection Wells (Raney well)	Large diameter collector well with horizontal radial bores	• High infiltration rates from a single point	• High initial capital costs	• Unconsolidated aquifers
Horizontal Wells	Small diameter well that deviates from vertical to horizontal with depth	• High infiltration rates from a single point	• High initial capital costs • Unproven technology	• All of above
Enhanced Recharge	Modification of land use or vegetation to increase recharge	• Low input and low maintenance	• Limited potential to increase recharge	• Unconfined aquifers
Other Artificial Recharge Technologies Detention Dams, Dikes and Weirs	Engineered structures in the channel of a stream to catch natural flow and enhance natural recharge	• Low operation and maintenance costs	• Very site-specific • Environmental concerns	• Unconfined aquifers with surface exposure • Alluvium • Semi-consolidated sediments at outcrop • Highly fractured bedrock

Appendix L (continued)

Technology	Description	Advantages	Limitations	Aquifer Suitability
Other Artificial Recharge Technologies (continued)	- -	- -	- -	- -
Groundwater Dams	Structures in the aquifer that intercept or obstruct natural groundwater flow	• Do not necessarily require outside source of water • Low operation and maintenance costs • Low evaporation losses	• Site-specific and limited to shallow aquifers with small cross-sectional areas • High construction costs for larger, deeper aquifers	• Unconfined aquifers with surface exposure • Alluvium
Adits/Shafts/Natural Openings	Allow water to flow into cavern or mine using open shaft	• High recharge rates	• Vulnerability to contamination • Site-specific	• Abandoned coal and metal mines, caverns • Karst • Caverns

Source: Modified from Topper et. al., Colorado Geological Survey Department of Natural Resources, Artificial Recharge of Ground Water In Colorado - A Statewide Assessment*, 2004.*