

Chapter 2

Current Conditions and Projected Development

This chapter discusses the current water quality conditions in the NEFCO region. It also addresses population and employment changes that have occurred since 1970, changes which have markedly affected water quality in the region. The last section of the chapter discusses the impacts that may be expected to occur given continuation of existing trends in population and employment over the next two decades.

I. Current Water Quality Conditions in the NEFCO Region

Background

The definitive source of information concerning current water quality conditions in the region is the Integrated Water Quality Monitoring and Assessment report prepared by the Ohio EPA on a biennial basis and the Total Maximum Daily Load (TMDLs) reports prepared for individual watersheds. This report satisfies the requirements of Section 305(b) and 303(d) of the federal Clean Water Act. The Clean Water Act which calls for states to submit to the U.S. EPA a biennial report summarizing the status and trends in water quality of both surface and ground waters. The intent is for the 305(b) report to be a routine check on the progress that states are making toward achieving the goals of the Clean Water Act. The 305(b) report also establishes baseline water quality data by which to gauge changes introduced by the implementation of best management practices. The TMDL describes how an impaired water body will meet water quality standards. It includes actions to achieve a measurable goal for attainment of water quality standards. Readers are encouraged to consult the full 305(b) report and 303(d) priority list for additional information. A copy of these reports can be found on Ohio EPA's web page at www.epa.state.oh.us.

The bases for the 305(b) and TMDLs report are the periodic surveys of water quality and aquatic life (biosurveys) that Ohio EPA conducts on each major river system throughout Ohio. State priorities and resource availability to perform the survey work dictate the frequency with which watersheds are assessed.

The Ohio EPA's water quality survey goals are to assess the attainment status of water quality standards, to assess whether assigned use designations are appropriate, to determine if changes in water quality have taken place since previous surveys, and to determine whether or not the changes can be attributed to point and/or nonpoint source controls.

The findings and conclusions of the water quality surveys are published as Water Quality Permit Support Documents (WQPSDs), i.e. Total Maximum Daily Loads (TMDLs) reports, and Biological and Water Quality Studies (BWQS). These documents may be reflected in regulatory actions taken by the Ohio EPA e.g. NPDES permits, Director's Orders, the Ohio

Water Quality Standards (WQS), and are eventually incorporated into the Ohio Water Quality Management Plan, the Ohio Nonpoint Source Assessment, and the Ohio Water Resource Inventory (305(b) Report).

Historical surveys conducted by the Ohio EPA in the Cuyahoga River basin include basin-wide chemical and biological surveys in 1984, 1991, 1996 and 2000. The 1991 and 1996 surveys are documented in the reports titled “Biological and Water Quality Study of the Cuyahoga River and Selected Tributaries Geauga, Portage, Summit, and Cuyahoga Counties (Ohio) dated August 19, 1994 and August 15, 1999” respectively. Mainstem biological surveys between Akron and Lake Erie were conducted in 1985, 1986, 1987, and 1988, and intensive chemical and biological surveys of the Little Cuyahoga River subbasin in 1986 and 1996. The 1996 Little Cuyahoga River survey is reported in the April 14 1998 “Biological and Water Quality Study of the Little Cuyahoga River and Tributaries (Portage and Summit Counties)”. In addition, water quality data has been collected monthly from the Cuyahoga River National Ambient Water Quality Monitoring Network (NAWQMN) stations at Independence (RM 13.18), Lower Harvard Ave (RM 7.10) and West Third Ave (RM 3.26) over the past 20 to 26 years. A new monthly station was added in 1994 at Shalersville (RM 64.3) in Portage County to monitor expected changes in water quality due to anticipated land development as a result of changes in the transportation network in the upper section of the watershed. Biological sampling has also been routinely conducted at the NAWQMN stations over the same period.

Recent Total Maximum Daily Load (TMDL) reports have been completed for the Lower Cuyahoga River (2003), Upper Cuyahoga River (2004), Middle Cuyahoga River (2000), Chagrin River (2007), Upper Grand River (2009), and Black River (2008) (Table 2-1). Headwaters to the Grand River and Chagrin River are found in Portage County. Headwaters to the Black River are in Summit County (Table 2-1).

The Ohio EPA has conducted a number of historic analyses on streams within the Ohio River Basin for the NEFCO region. The Tuscarawas River underwent a biological and sediment survey in 1995. The Sugar Creek had a biological community and toxic impact assessment in 1992 and a biological and water quality study in 1998. A fish tissue study was undertaken for the Tuscarawas River and Sugar Creek in 1995. The Ohio EPA conducted a biological and water quality study of the East Branch of the Nimishillen Creek in 1994 and the Lower Middle Branch of the Nimishillen Creek in 2001. The Upper Killbuck Creek had a biological and water quality study in 1996. The Sandy Creek had biological and water quality studies done between 1995 and 1997. In 1994 the Ohio EPA conducted biological, sediment, and water quality studies for the Tuscarawas River and Wolf Creek.

Recent TMDLs has been completed for Upper Mahoning River (2011), Tuscarawas River (2009), Nimishillen Creek (2009), Sandy Creek (1998), and Sugar Creek (2002). The Killbuck Creek (2009) and Mohican River (2005) are still in preparation.

All but two basins in the NEFCO region have approved TMDLs. Table 2-1 lists these TMDLs and the two that are still in preparation. All these documents are available for review through the Ohio EPA website.

Table 2-1 TMDL Reports and Support Documents	
1.	Total Maximum Daily Loads for the Lower Cuyahoga River, Ohio Environmental Protection Agency, Division of Surface Water, September 2003.
2.	Total Maximum Daily Loads for the Chagrin River Watershed, Ohio Environmental Protection Agency, Division of Surface Water, May 15, 2007.
3.	Total Maximum Daily Loads for the Upper Cuyahoga River Watershed, Ohio Environmental Protection Agency, Division of Surface Water, September 2004.
4.	Total Maximum Daily Loads for the Upper Mahoning River Watershed, Ohio Environmental Protection Agency, Division of Surface Water, August 2011.
5.	Biological and Water Quality Study of the Upper Grand River Watershed. 2007. Ashtabula, Geauga, Portage, and Trumbull Counties, Ohio. OEPA Technical Report DSW/EAS/2009-6-5. June 2009.*
6.	Total Maximum Daily Loads for the Middle Cuyahoga River, Ohio Environmental Protection Agency, Division of Surface Water, March 2000.
7.	Total Maximum Daily Loads for the Tuscarawas River Watershed, Ohio Environmental Protection Agency, Division of Surface Water, July 2009.
8.	Total Maximum Daily Loads for the Black River Watershed, Ohio Environmental Protection Agency, Division of Surface Water, May 2008.
9.	Total Maximum Daily Loads for the Nimishillen Creek Watershed, Ohio Environmental Protection Agency, Division of Surface Water, October 2009.
10.	Biological and Water Quality Study of Sandy Creek, 1996. 1997. Columbiana, Carroll, and Stark Counties, Ohio. Ohio Environmental Protection Agency, Division of Surface Water, March 1998.
11.	Total Maximum Daily Loads for the Sugar Creek Basin, Ohio Environmental Protection Agency, Division of Surface Water, September 2002.
12.	Biological and Water Quality Study of Killbuck Creek Watershed. Ohio Environmental Protection Agency, Division of Surface Water, September 2009.*
13.	Biological and Water Quality Study of the Mohican River and Selected Tributaries. Ohio. Ohio Environmental Protection Agency, Division of Surface Water, 2009.*
*The TMDL Report is in preparation.	

Water Quality Standards Applicable to the NEFCO Region

Protecting the safety of the public is accomplished through the Ohio Water Quality Standards. As articulated in the Ohio Water Quality Standards:

It is the purpose of these water quality standards, Chapter 3745-1 of the Administrative Code, to establish minimum water quality requirements for all surface waters of the state, thereby protecting public health and welfare; and to enhance, improve and maintain water

quality as provided under the laws of the state of Ohio, section 6111.041 of the Revised Code, the federal Clean Water Act, 33 U.S.C. section 1251 et seq., and rules adopted thereunder (Ohio EPA, 1997).

The analysis of biological criteria in a stream recognizes the assimilative ability of a stream and subsequent response by flora and fauna to levels of pollution. In general the more degraded the biological community the greater the threat of a disease-causing condition that could deleteriously affect human health.

Water quality standards consist of numerical standards geared to attainment of designated stream uses. Use designations consist of two broad groups, aquatic life and non-aquatic life uses. There are five different aquatic life uses currently defined in the Ohio WQS that apply to the Region's streams. These include: Warmwater Habitat (WWH), Exceptional Warmwater Habitat (EWH), Coldwater Habitat (CWH), Modified Warmwater Habitat (MWH), and Limited Resource Water (LRW).¹

The vast majority of segments in Northeast Ohio are designated Warmwater Habitat. There are some notable exceptions. The Cuyahoga River basin has numerous streams that are classified as Modified Warm Water Habitat or as Limited Resource Waters. Streams that are in the modified category include portions of the Ohio Canal, Fish Creek, Congress Lake Outlet, and Wahoo Ditch. Limited waters include part of Wahoo Ditch, Kingsbury Run, Morgana Run, the Burke Branch, the Ford Branch of Big Creek, Wood Creek, and Pond Brook.

¹**Warmwater Habitat** (WWH) - this use designation defines the "typical" warmwater assemblage of aquatic organisms for Ohio rivers and streams; this use represents the principal restoration target for the majority of water resource management efforts in Ohio. **Exceptional Warmwater Habitat** (EWH) - this use designation is reserved for waters which support "unusual and exceptional" assemblages of aquatic organisms which are characterized by a high diversity of species, particularly those which are highly intolerant and/or rare, threatened, endangered, or special status (i.e., declining species); this designation represents a protection goal for water resource management efforts dealing with Ohio's best water resources. **Coldwater Habitat** (CWH) - this use is intended for waters which support assemblages of cold water organisms and/or those which are stocked with salmonids with the intent of providing a put-and-take fishery on a year round basis which is further sanctioned by the Ohio DNR, Division of Wildlife; this use should not be confused with the Seasonal Salmonid Habitat (SSH) use which applies to the Lake Erie tributaries that support periodic "runs" of salmonids during the spring, summer, and/or fall. **Modified Warmwater Habitat** (MWH) - this use applies to streams and rivers which have been subjected to extensive, maintained, and essentially permanent hydro modifications such that the biocriteria for the WWH use are not attainable and where the activities have been sanctioned and permitted by state and federal law; the representative aquatic assemblages are generally composed of species which are tolerant to low dissolved oxygen, silt, nutrient, enrichment, and poor quality habitat. **Limited Resource Water** (LRW) - this use applies to small streams (usually less than a three square mile drainage area) and other water courses which have been irretrievably altered to the extent that no appreciable assemblage of aquatic life can be supported; such waterways generally include small streams in extensively urbanized areas, those which lie in watersheds with extensive drainage modifications, those which completely lack water on a recurring annual basis (i.e. true ephemeral streams), or other irretrievably altered waterways.

Tables 2-2 through 2-5 present selected data from the TMDLs that was used to prepare the following maps of water quality conditions in the NEFCO region. The reader is encouraged to reference the TMDLs (Table 2-1) for additional information. Figures 2-2 through 2-5 are reference maps to identify subbasins with jurisdictions.

Figures 2-2 through 2-5 illustrate the NEFCO region HUC 12 digit subbasins and the reference numbers used on Tables 2-2 through 2-5.

Figures 2-6 through 2-9 show the designated uses of streams in HUC 12 digit subbasins in the NEFCO region. Note that multiple levels of uses are found in each subbasin. A stream's designated use reflects conditions in the stream and the immediate drainage area. NEFCO generalized the stream's designated uses to reflect the subbasin.

The Ohio EPA employs biological criteria that have been codified in the Ohio Water Quality Standards (WQS) to ascertain the attainment status of aquatic life uses in streams.² It uses three different indices to measure fish and macroinvertebrate community characteristics and to determine if aquatic life uses are shown to be in FULL, PARTIAL or NON-ATTAINMENT status. Aquatic life uses are in FULL ATTAINMENT if all three indices meet the applicable criteria, PARTIAL ATTAINMENT if at least one of the indices does not attain and biological community performance is at least fair, and NON-ATTAINMENT if all indices fail to attain, or any index indicates poor or very poor performance. PARTIAL ATTAINMENT or NON-ATTAINMENT indicates that the receiving water is impaired and does not meet the designated use criteria specified by the Ohio WQS. Figures 2-10 through 2-13 illustrate the attainment status as generalized across the HUC 12 digit subbasins. It is interesting to note that the increasingly urbanized subbasins are generally unable to attain their designated uses.

Impairments to improving water quality can include nutrients, toxics, stormwater runoff, and changes in the stream corridor. Sources of a single impairment can vary. Nutrients can originate from failed septic tank discharge, point source discharge, and agricultural runoff. Accurate monitoring and assessment are necessary to avoid misguided and expensive best management practices.

Tables 2-2 through 2-5 include the attainment status of streams in the HUC 12 digit subbasins units in Portage, Stark, Summit, and Wayne Counties. The tables also include groups of impairments, urban (U), rural/agriculture (R/A), industrial/commercial (I/C), and stream modification/natural (SM/N). The table presents the frequency the sources of impairments were observed on the subbasins TMDL assessment sheets. This is not meant to be a quantification of the impairment's impact but rather that the impairment was noted by the Ohio EPA as being present. Additional research is needed to further characterize the specific impairments source and pollution contribution.

²Ohio Administrative Code {OAC} 3745-1-07, Table 8-14.

Figures 2-14 through 2-29 illustrate the frequency distribution of groups of sources through the 12 digit HUC watersheds in the NEFCO region. Trends of the sources of impairments become obvious through the region with respect to rural versus urbanization and agricultural versus natural areas.

Figures 2-30 through 2-33 show the Recreation Use Attainment scores for the 12 digit HUC subbasins in the NEFCO region.

The Recreation Assessment provides a way to compare E. coli concentration at sampled sites with a criterion that applies to the site. Sampled sites with E. coli concentration that exceeded the criterion had a low assessment score, while those sites which attained the criteria or only slightly exceeded the criteria had the highest scores. An index score was assigned for each HUC 12 digit basin site having sufficient data to calculate a geometric mean (i.e. two or more samples). Ohio 2010 Integrated Water Quality Monitoring and Assessment Report, Ohio Environmental Protection Agency. Final Report. March 8, 2010.

Ohio EPA adopted new rules on December 15, 2009 that established water quality criteria based on E. coli to replace fecal coliform as E. coli has been shown to be a better prediction of the potential for impacts to human health. The E. coli limits are dependent on the Recreation Use designation (e.g. swimming, boating, and water skiing) of a waterway i.e. bathing waters, primary contact, and secondary contact. For example, streams with primary contact designation for frequent recreational activity have a 30-day average E. coli (county per 100 ml) of 126 and a seven day average of 284.

**Table 2-2
Portage County Subbasins**

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
10	Pond Brook 041100020501	2003 ^①	MWH	✓						None listed	N/C
9	Chagrin River - Aurora Branch 041100030302	2007 ^②	WWH CWH		✓	✓	II	I	II	IIII	50
1	LaDue Reservoir - Bridge Creek 041100020104	2004 ^③	WWH	✓	✓		I	I		II	N/C
8	Black Brook 041100020105	2004 ^③	WWH					II		II	N/C
12	Lake Rockwell - Cuyahoga River 41100020203	2004 ^③	WWH EWH CWH			✓		I	II	IIII	88
7	Eagle Creek Headwater 050301030401	2011 ^④	CWH WWH	✓	✓					I	50
6	Camp Creek - Eagle Creek 050301030403	2011 ^④	CWH WWH	✓	✓				I	I	56
5	Tinkers Creek 050301030404	2011 ^④	WWH		✓	✓		I		I	50
2	Grand River - Headwaters 041100040102	2009 ^⑤	EWH WWH	✓					I	I	52
4	Eagle Creek Mouth 050301030405	2011 ^④	WWH								50
11	Tinkers Creek - Headwaters 04100020502	2003 ^①	WWH		✓		III		I	I	N/C
13	Mahoning River - West Branch Headwaters 050301030302	2011 ^④	WWH	✓				I		II	44
18	Kirwin Reservoir - West Branch Mahoning River 050301030304	2011 ^④	WWH	✓						I	17

Table 2-2 (Continued)

Portage County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
14	Eagle Creek - South Fork 050301030402	2011 ^④	WWH	✓							50
15	Mahoning River - W. Branch Newton Falls 050301030305	2011 ^④	WWH	✓	✓	✓	I			III	46
17	Kale Creek 050301030301	2011 ^④	WWH		✓	✓		I		III	40
19	Barrel Run 050301030303	2011 ^④	WWH	✓		✓				I	38
20	Breakneck Creek - Feeder Canal 041100020202	2004 ^③	WWH LRW MWH					I	II	III	N/C
21	Fish Creek - Cuyahoga River 041100020305	2000 ^⑥	WWH MWH	✓	✓	✓	III		II	III	75
22	Plum Creek 041100020301	2000 ^⑥	WWH			✓	II		III	III	N/C
25	Little Cuyahoga - Mogadore Reservoir 041100020302	2000 ^⑥					II		II	III	N/C
23	Little Cuyahoga - Wingfoot Lake outlet 041100020303	2000 ^⑥	WWH		✓	✓	II		III	III	N/C
24	Tuscarawas River - Headwaters 050400010101	2009 ^⑦	WWH		✓	✓	II			II	55
26	Potter Creek - Breakneck Creek 041100020201	2004 ^③	WWH MWH			✓		I	II	III	N/C
27	Deer Creek 050301030201	2011 ^④	WWH			✓				I	67
29	Mahoning River - Island Cre 050301030204	2011 ^④	WWH		✓			I			50

Table 2-2 (Continued)

Portage County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
28	Willow Creek 050301030202	2011 ^①	WWH	✓	✓				I	I	50
16	Mahoning River - Charley Run 050301030306	2011 ^①	WWH		✓	✓				II	75
30	Mill Creek Watershed 050301030203	2011 ^①	WWH	✓	✓			I		III	15
3	Dead Branch 041100040101	2009 ^⑤	WWH				None listed				75

① Number refers to TMDL report shown in Table 2-1.

CWH - Cold Water Habitat

EWH - Exceptional Warmwater Habitat

LRW - Limited Resource Water

MWH - Modified Warmwater Habitat

WWH - Warmwater Habitat

U - Urban

R/A - Rural/Agriculture

I/C - Industrial/Commercial

SM/N - Stream Modifications/Natural

**Table 2-3
Stark County Subbasins**

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
33	Tucarawas River - Wolf Creek 050400011203	2009 ^⑦	WWH			✓	I	I		I	35
38	Sugar Creek - Brandywine Creek 050400011105	2002 ^⑩	WWH			✓		I	I	II	N/C
34	Sugar Creek - Beach City Reservoir 050400011103	2002 ^⑩	WWH			✓		III	I	III	N/C
37	Sugar Creek - Lower South Fork 050400011005	2002 ^⑩	WWH MWH		✓	✓		III	I	III	N/C
36	Sugar Creek - Middle Fork Misers Run 050400011102	2002 ^⑩	WWH	✓				III	I	III	N/C
20	Sugar Creek - Brewster 050400010904	2002 ^⑩	WWH			✓	I	II		III	N/C
21	Pigeon Run 050400011201	2009 ^⑦	WWH	✓		✓	I	I	I		75
22	Tuscarawas River - Mass 050400011202	2009 ^⑦	WWH	✓	✓		I				N/C
19	Newmen Creek Headwater 050400010306	2009 ^⑦	WWH		✓	✓	II	II	III	I	42
25	Black Run 050400010603	1998 ^⑩	WWH	✓	✓	✓		I	I	I	N/C
26	Hugle Run 050400010601	1998 ^⑩	WWH	✓	✓	✓		I	I	I	N/C
27	Sandy Creek - Middle Branch 050400010402	1998 ^⑩	WWH	✓	✓	✓					N/C

Table 2-3 (Continued)

Stark County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
28	Sandy Creek Headwaters 050400010406	1998 [®]	WWH	✓	✓	✓					N/C
29	Sandy Creek - Armstrong Run 050400010605	1998 [®]	WWH	✓	✓	✓		I	I	II	N/C
24	Little Sandy Creek 050400010604	1998 [®]	WWH	no data				I	I	II	N/C
30	Sandy Creek Indian Run 050400010606	1998 [®]	WWH	no data				I	I	II	N/C
23	Nimishillen Creek Sherrick Run 050400010505	2009 [®]	WWH LRW		✓		II	I	III	I	100
31	Nimishillen Creek East Sparta 050400010506	2009 [®]	WWH		✓	✓	II	I	III	I	38
32	Sandy Creek - Beal Run 050400010607	2009 [®]	WWH	no data				II	I	II	N/C
8	Mahoning River - Island Creek 050301030204	2011 ^④	WWH			✓		I			50
9	Mahoning River - Fish Creek 050301030103	2011 ^④	WWH	✓	✓	✓	I	I	II	III	39
10	Beech Creek 050301030102	2011 ^④	WWH	✓		✓		II		I	44
7	Deer Creek 050301030201	2011 ^④	WWH		✓					I	67
11	Nimishillen Creek Middle Branch Swartz Ditch 050400010501	2009 [®]	WWH MWH	✓	✓		II	I	III	I	63

Table 2-3 (Continued)

Stark County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
6	Potter Creek - Breakneck 041100020201	2004 [®]	WWH MWH			✓		I	II	III	N/C
5	Tuscarawas River Headwaters 050400010101	2009 ^⑦	WWH		✓	✓	II			II	55
14	Nimishillen Creek West Branch 050400010503	2009 [®]	WWH MWH		✓	✓	III	I	II	I	50
13	Nimishillen Creek Middle Branch City of Canto 050400010504	2009 [®]	WWH	✓	✓	✓	III	I	II	I	56
12	Nimishillen Creek East Branch 050400010502	2009 [®]	WWH		✓	✓	II	I	I	I	33
17	Newman Creek North Lawrence 050400010307	2009 ^⑦	WWH	✓	✓	✓	II	I	III	II	50
18	Fox Run 050400010304	2009 ^⑦	WWH	✓	✓	✓	II	I	III	II	63
2	Tuscarawas River Canal Fulton 050400010305	2009 ^⑦	WWH		✓	✓	II	II	III	II	N/C
3	Nimisila Creek Lake Lucern 050400010303	2009 ^⑦	WWH	✓	✓		II	II	III	II	100
16	Tuscarawas River West Sippo Creek 05040010309	2009 ^⑦	WWH		✓	✓	II	II	III	II	25
15	Sippo Creek 050400010308	2009 ^⑦	WWH			✓	II	II	III	II	0
4	Nimisila Creek Nimisila Reservoir 050400010302	2009 ^⑦	WWH	✓	✓		I	I	III	II	75

Table 2-3 (Continued)

Stark County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
1	Silver Creek - Chippewa Creek 050400010207	2009 ^①	WWH	✓	✓	✓	I	II	III	I	30
35	North Fork - Sugar Creek 050400010903	2002 ^①	WWH	✓	✓			IIIIII		IIII	N/C

① Number refers to TMDL report shown in Table 2-1.

CWH - Cold Water Habitat

EWH - Exceptional Warmwater Habitat

LRW - Limited Resource Water

MWH - Modified Warmwater Habitat

WWH - Warmwater Habitat

U - Urban

R/A - Rural/Agriculture

I/C - Industrial/Commercial

SM/N - Stream Modifications/Natural

**Table 2-4
Summit County Subbasins**

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
4	Pond Brook 041100020501	2003 ^①	MWH	✓							N/C
1	Tinkers Creek - Twinsburg 041100020504	2003 ^①	WWH LRW	✓	✓	✓	II	I	I	I	75
3	Brandywine Creek 041100020404	2003 ^①	WWH	✓	✓	✓	III		II		N/C
2	Willow Lake - Cuyahoga River 041100020505	2003 ^①	WWH LRW	✓			II	I	I	I	N/C
10	Rocky River - East Branch Headwaters 041100010201	2008 ^⑥	WWH				II		II	III	N/C
11	Yellow Creek 041100020402	2003 ^①	WWH	✓			II		III		N/C
9	Furnace Run 041100020403	2003 ^①	WWH	✓	✓		I		I		N/C
8	Cuyahoga River Boston Run 041100020405	2003 ^①	CWH WWH	✓	✓				I	II	31
7	Mud Brook 041100020401	2003 ^①	WWH	✓		✓	II		III		N/C
6	Fish Creek - Cuyahoga River 041100020305	2003 ^① 2000 ^⑥	WWH	✓	✓	✓	I	I	III	III	75
15	Plum Creek 041100020301	2000 ^⑥	WWH				II		III	III	N/C
16	Little Cuyahoga - Wingfoot Lake 041100020303	2000 ^⑥	WWH		✓	✓	II		III	III	N/C

Table 2-4 (Continued)

Summit County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
14	Little Cuyahoga - City of Akron 041100020304	2003 ^①	WWH			✓	II		III	III	N/C
13	Pigeon Creek 050400010102	2009 ^⑦	WWH LRW MWH	✓	✓	✓	II		II	III	33
18	Tuscarawas River Portage Lakes 050400010105	2009 ^⑦	WWH MWH	✓	✓	✓	II		II	III	75
17	Tuscarawas River Headwaters 050400010101	2009 ^⑦	MWH		✓	✓	II			II	55
21	Tuscarawas River Pancake Creek 050400010301	2009 ^⑦	WWH LRW	✓	✓		II	I	III	II	50
12	Wolf Creek Watershed 050400010104	2009 ^⑦	WWH MWH	✓		✓	II		II	III	46
19	Hudson Run 050400010103	2009 ^⑦	WWH MWH	✓	✓	✓	II		II	III	50
20	Silver Creek - Chippewa Creek 050400010207	2009 ^⑦	WWH MWH	✓		✓	I	III	II	I	30
5	Headwaters - Tinkers Creek 041100020502	2003 ^①	WWH			✓	II	I	I	I	N/C
25	West Branch - Nimishillen Creek 050400010503	2009 ^⑧	WWH		✓	✓	II	II	II	I	50
24	Nimisila Reservoir - Nimisila Creek 050400010302	2009 ^⑧	WWH	✓	✓		I	III	III	II	75
23	Lake Lucern - Nimisila Creek 050400010303	2009 ^⑧	WWH	✓	✓		I	III	III	II	100

Table 2-4 (Continued)

Summit County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
22	Town of Canal Fulton Tuscarawas River 050400010305	2009 ^①	WWH	✓	✓		I	III	III	II	N/C
<p>① Number refers to TMDL report shown in Table 2-1.</p> <p>CWH - Cold Water Habitat EWH - Exceptional Warmwater Habitat LRW - Limited Resource Water MWH - Modified Warmwater Habitat WWH - Warmwater Habitat</p> <p>U - Urban R/A - Rural/Agriculture I/C - Industrial/Commercial SM/N - Stream Modifications/Natural</p>											

**Table 2-5
Wayne County Subbasins**

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
7	Tuscarawas River Pancake Creek 050400010301	2009 ^⑦	WWH MWH	✓			I	III	III	I	50
6	Chippewa Creek - Silver Creek 050400010207	2009 ^⑦	WWH MWH	✓	✓		I	III	II	I	30
12	Red Run 050400010206	2009 ^⑦	WWH	✓		✓	I	I	III	I	25
9	Fox Run 050400010304	2009 ^⑦	WWH		✓	✓	II	I	III	II	63
10	Newman Creek - North Lawrence 050400010307	2009 ^⑦	WWH	✓		✓	II	I	III	II	50
11	Newman Creek - Headwaters 050400010306	2009 ^⑦	WWH	✓			II	II	III	I	42
13	Little Chippewa Creek 050400010203	2009 ^⑦	WWH			✓	I	II	III	I	63
4	Chippewa Creek - Tommy Run 050400010205	2009 ^⑦	WWH MWH		✓		I	II	III		13
5	River Styx 050400010204	2009 ^⑦	WWH MWH	✓	✓	✓	I	II	III	I	25
3	Killbuck Creek - Headwaters 050400030501	2009 ^⑫	WWH LRW	✓	✓			III		II	N/C
2	Little Killbuck Creek - Killbuck Creek 050400030502	2009 ^⑫	WWH	✓	✓			I		I	N/C
17	Cedar Run - Killbuck Creek 050400030504	2009 ^⑫	WWH	✓				I		I	N/C
1	Mohican River - Upper Muddy Fork 050400020501	2009 ^⑬	WWH	✓	✓					I	50

Table 2-5 (Continued)

Wayne County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score	
				Full	Partial	Non	U	R/A	I/C	SM/N		
19	Mohican River - Middle Muddy Fork 050400020502	2009 ¹³	WWH	✓								25
20	Mohican River - Lower Muddy Fork 050400020503	2009 ¹³	WWH	✓		✓					II	44
18	Rathburn Run - Little Killbuck Creek 050400030503	2009 ¹²	WWH	✓				I			II	N/C
16	Clear Creek - Killbuck Creek 050400030505	2009 ¹²	WWH	✓				II			II	N/C
15	Little Apple Creek 050400030601	2009 ¹²	WWH		✓	✓	I				I	N/C
23	Apple Creek 050400030602	2009 ¹²	WWH	✓				I			I	N/C
24	Little Sugar Creek 050400010901	2002 ¹¹	WWH	✓	✓	✓	I	IIII			II	N/C
25	Sugar Creek - Town of Brewster 050400010904	2002 ¹¹	WWH	✓	✓	✓	I	III			IIII	N/C
26	Sugar Creek - North Fork 050400010903	2002 ¹¹	WWH	✓	✓		I	IIIIII			III	N/C
27	Sugar Creek/Middle Fork Misers Run 050400011102	2002 ¹¹	WWH	✓				III	I		IIII	N/C
28	Sugar Creek - Middle Fork Headwaters 050400011101	2002 ¹¹	WWH	✓				IIII	II		III	N/C
29	Salt Creek 050400030606	2009 ¹²	WWH	✓				I			I	N/C
30	Salt Creek - North Branch 050400030605	2009 ¹²	WWH		✓			I			I	N/C

Table 2-5 (Continued)

Wayne County Subbasins

Map Reference #	Watershed Unit Name Hydrologic Unit Id	TMDL Year	Designated Uses in the Basin	Attainment Status			Sources of Impairment				Recreation Assessment Score
				Full	Partial	Non	U	R/A	I/C	SM/N	
32	Shreve Creek 050400030603	2009 ^⑩	WWH		✓		I			I	N/C
33	Grab Run 050400020701	2009 ^⑩	WWH	✓							17
34	Mohican River - Mohican Dam Lake Fork 050400020702	2009 ^⑩	WWH	✓		✓		I		II	
8	Tuscarawas River - Canal Fulton 050400010305	2009 ^⑦	WWH		✓	✓	I	III	III	II	N/C
14	Sugar Creek - Smithville 050400010902	2002 ^⑪	WWH			✓		IIII		IIII	N/C
22	Killbuck Creek - Jennings Ditch 050400030604	2009 ^⑩	WWH	✓	✓		I	I		I	N/C
31	Killbuck Creek - Tea Run 050400030607	2009 ^⑩	WWH	✓						II	N/C
21	Mohican River Jerome Fork Glenn Run 05040002606	2009 ^⑩	WWH	✓			none listed				

⑩ Number refers to TMDL report shown in Table 2-1.

CWH - Cold Water Habitat
 EWH - Exceptional Warmwater Habitat
 LRW - Limited Resource Water
 MWH - Modified Warmwater Habitat
 WWH - Warmwater Habitat

U - Urban
 R/A - Rural/Agriculture
 I/C - Industrial/Commercial
 SM/N - Stream Modifications/Natural

Figure 2.1
Principle Watersheds
in the NEFCO Region
Clean Water Plan, 2012

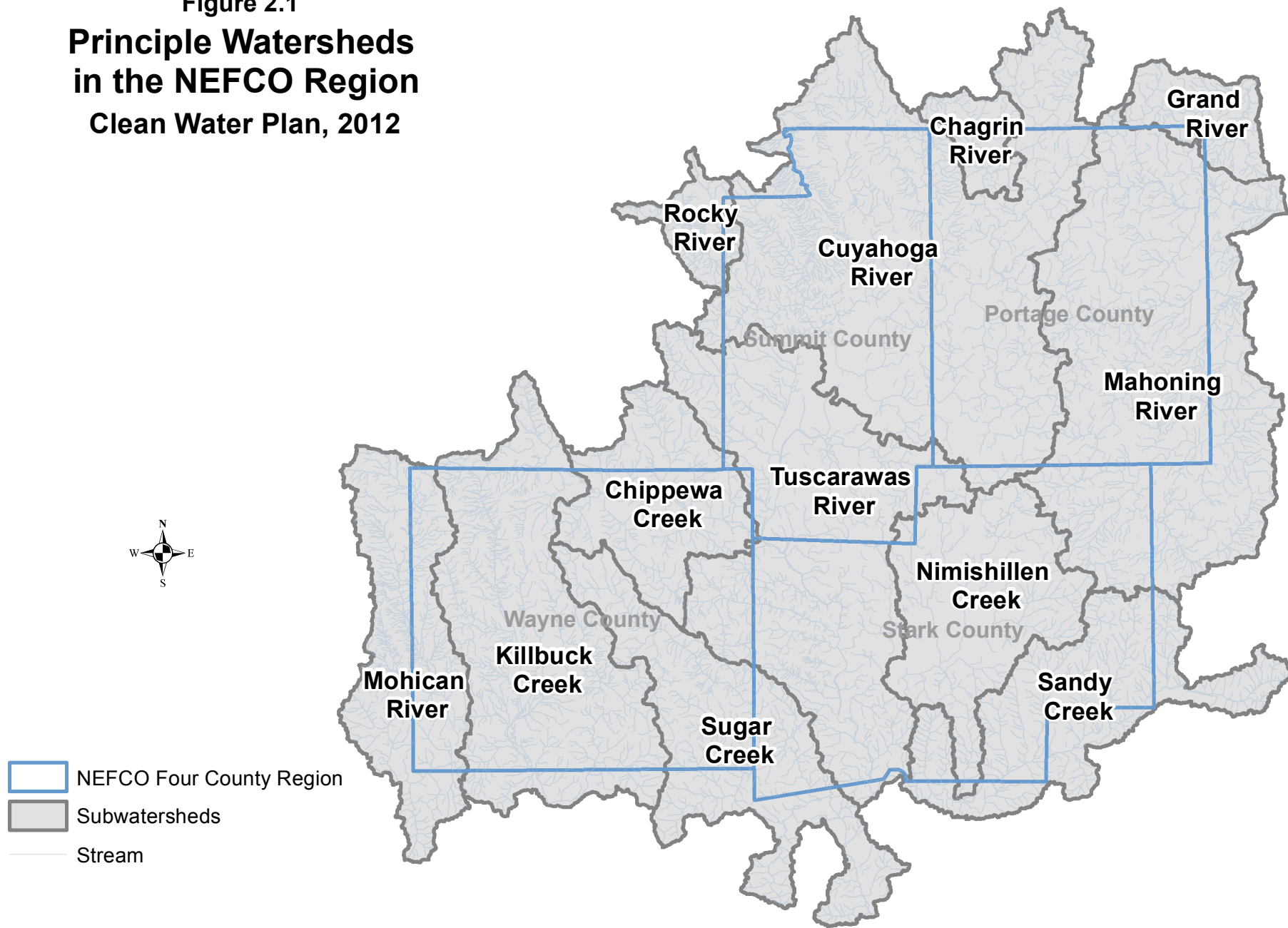
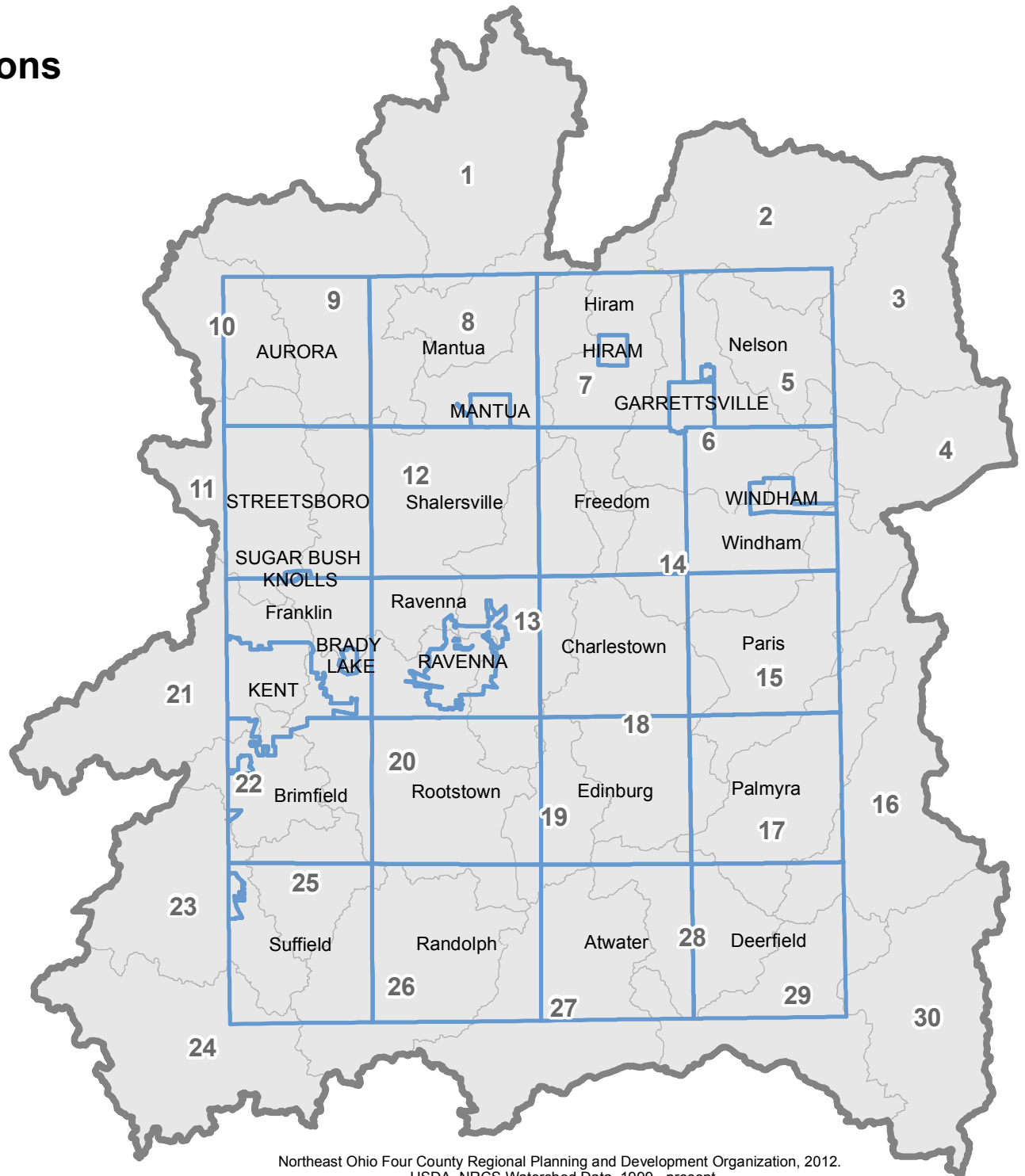
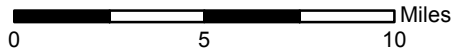


Figure 2.2 Portage County Jurisdictions and Subbasins

Clean Water Plan, 2012

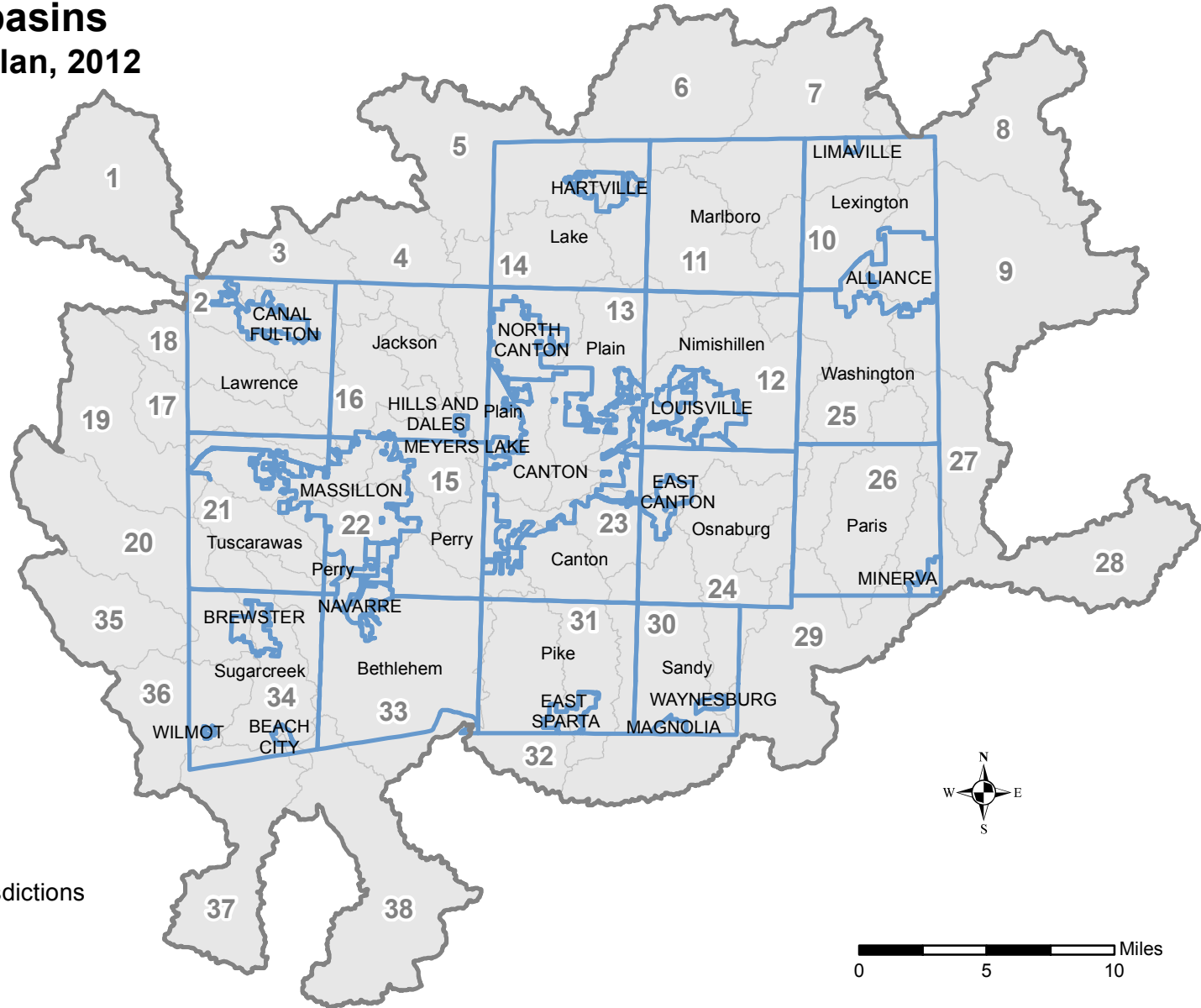


- 1 Subbasins
- Portage County Jurisdictions



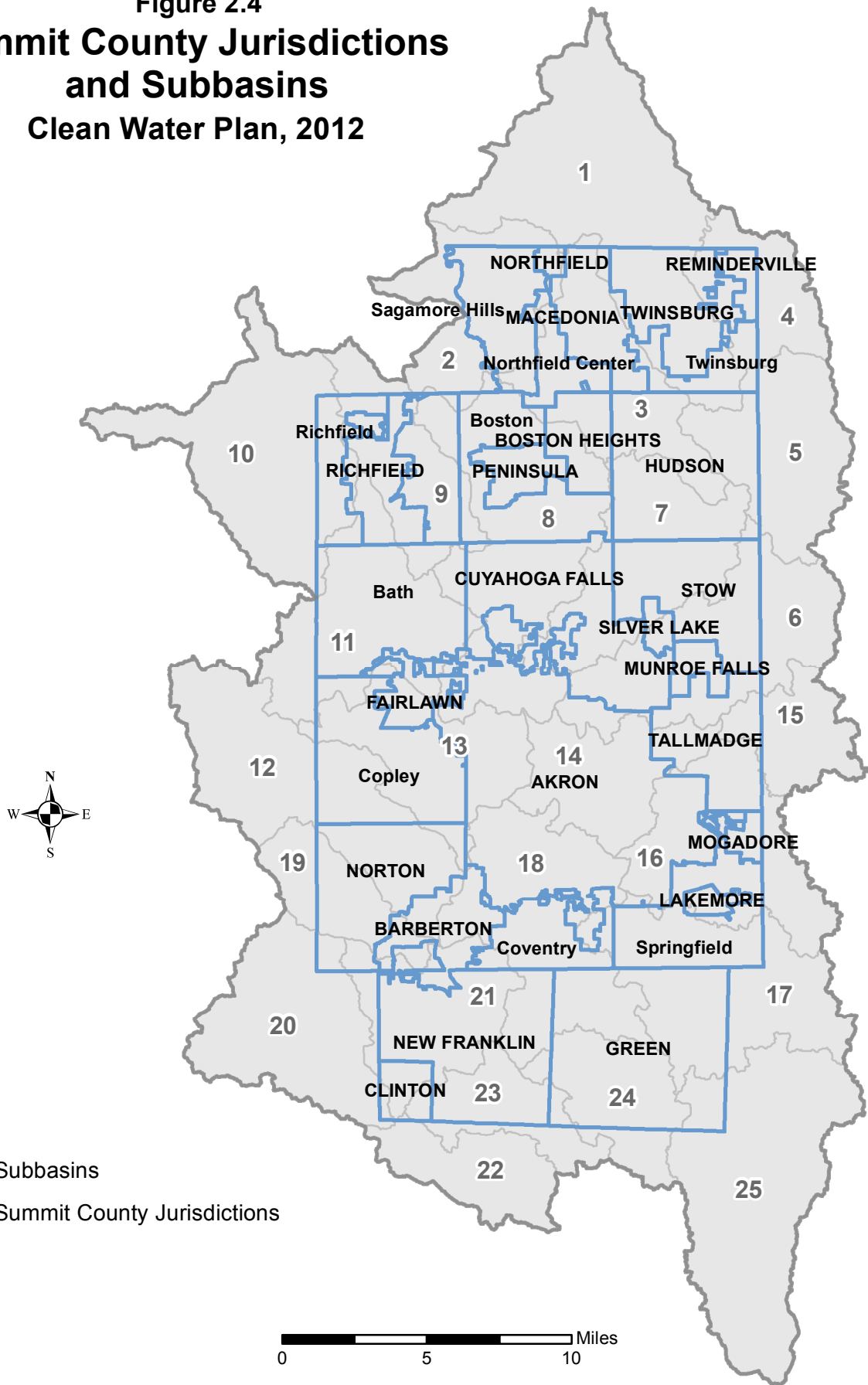
2-21

Figure 2.3
Stark County Jurisdictions
and Subbasins
Clean Water Plan, 2012



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 USDA, NRCS Watershed Data, 1999 - present.

Figure 2.4
Summit County Jurisdictions
and Subbasins
Clean Water Plan, 2012



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 USDA, NRCS Watershed Data, 1999 - present.

Figure 2.5 Wayne County Jurisdictions and Subbasins

Clean Water Plan, 2012

2-24

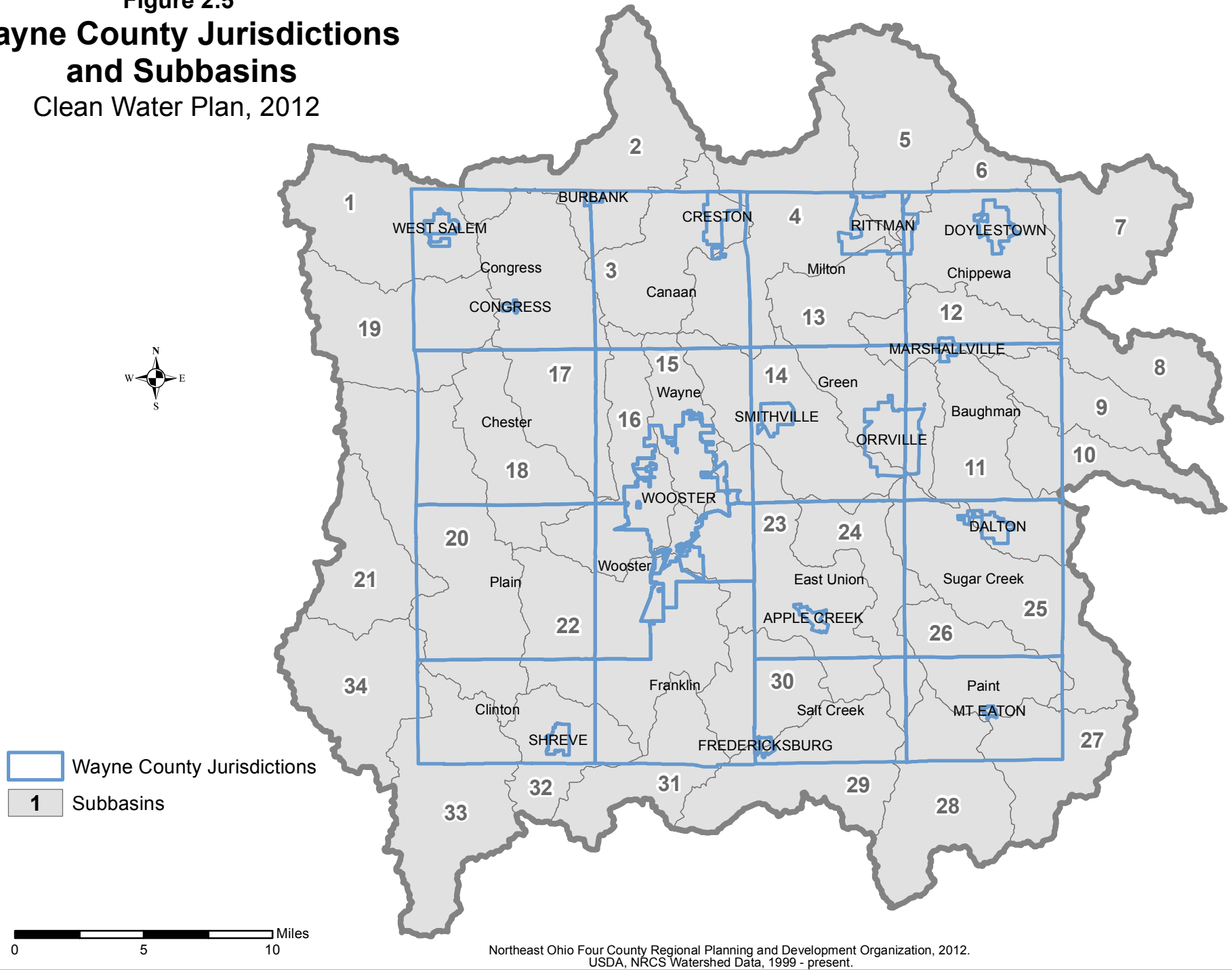


Figure 2.6
Designated Uses for
Portage County Subbasins
 Clean Water Plan, 2012



Designated Uses

- WWH,CWH,EWH
- WWH,EWH
- WWH,CWH
- WWH
- WWH,MWH
- MWH
- WWH,MWH,LRW
- No Data
- 1 Subbasins
- Portage County

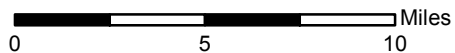
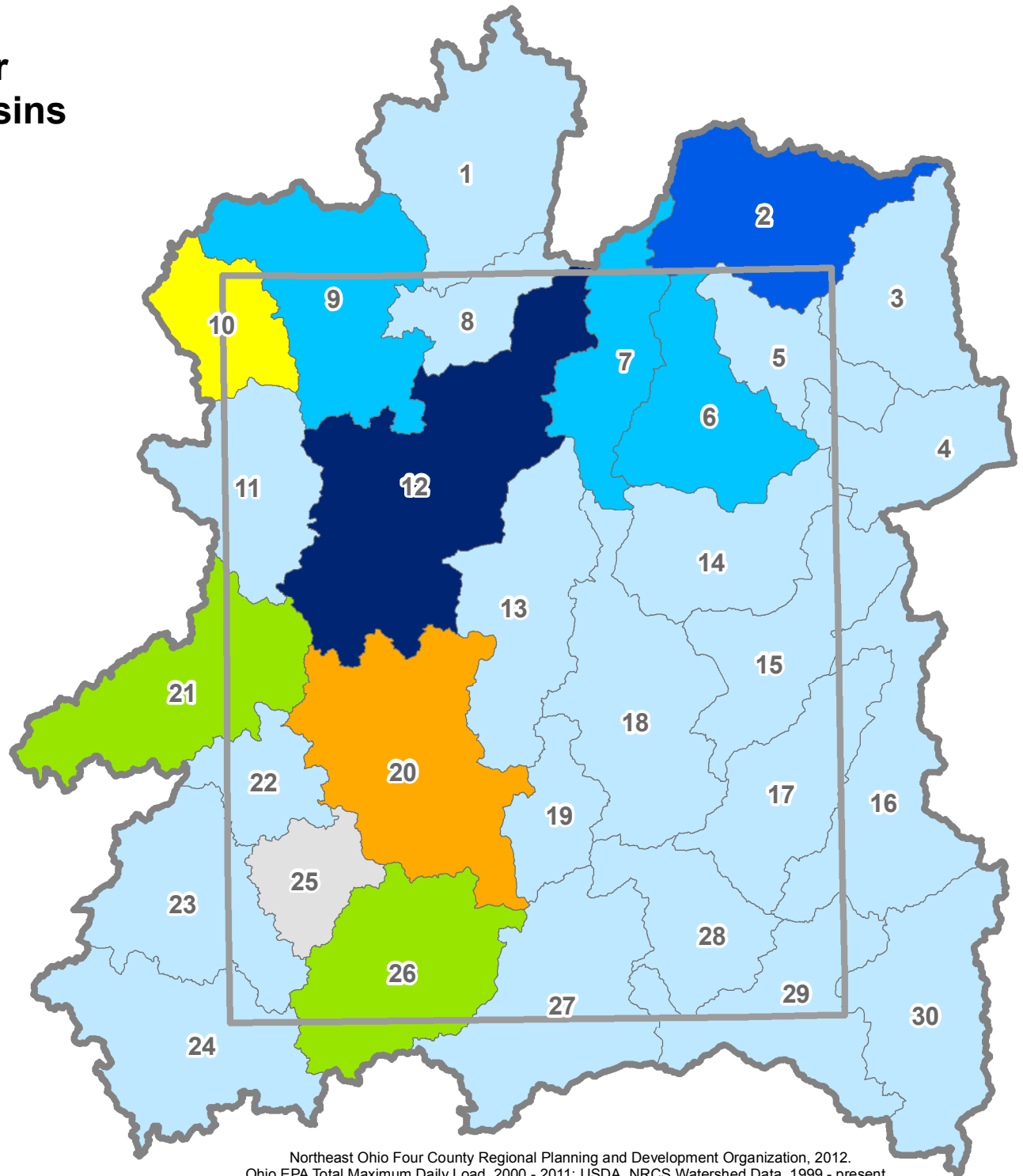
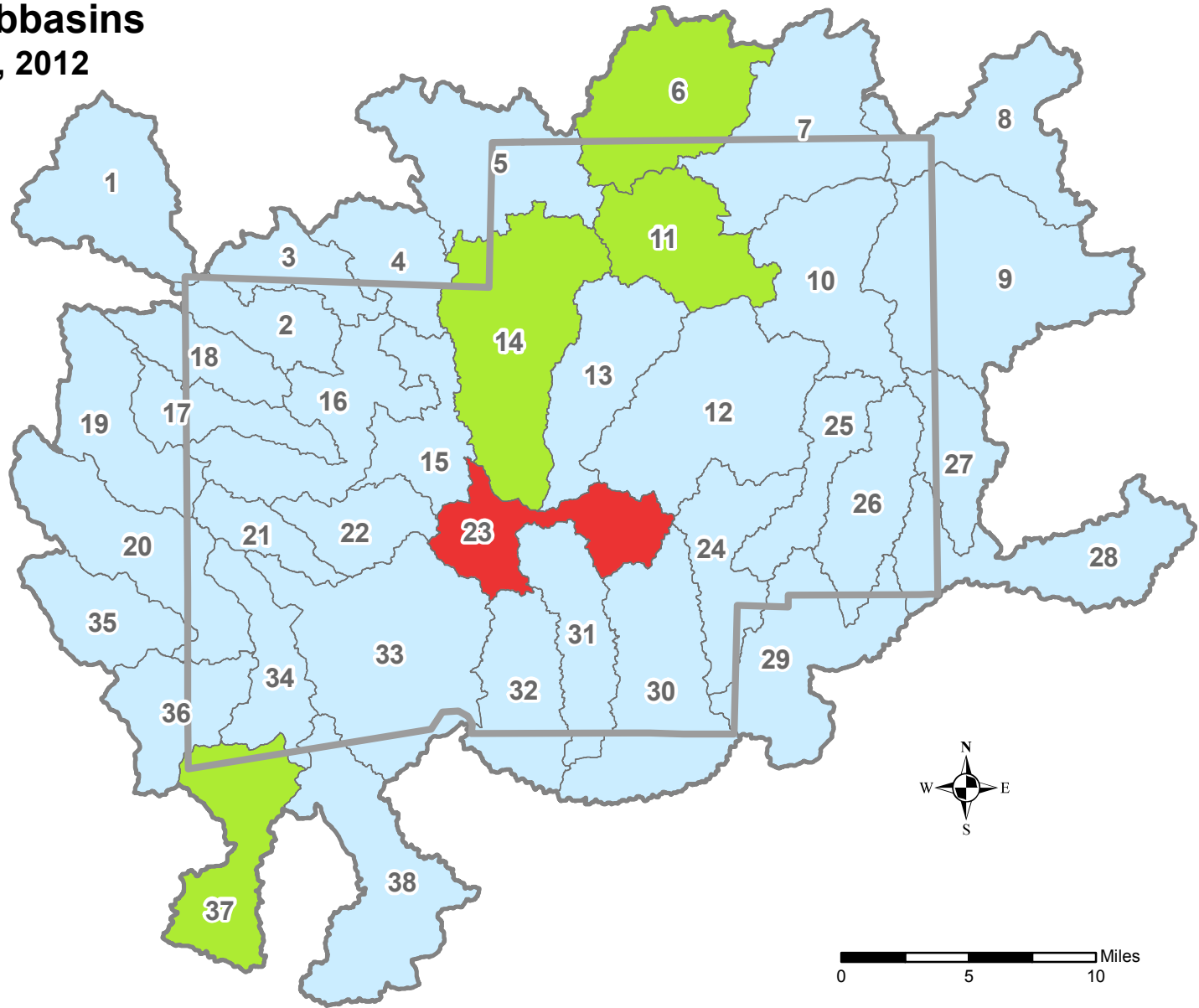


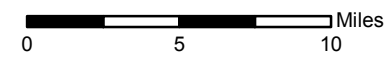
Figure 2.7
Designated Uses for
Stark County Subbasins
Clean Water Plan, 2012



2-26

Designated Uses

- WWH
- WWH, MWH
- WWH, LRW
- 1 Subbasins
- Stark County



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 1998 - 2011; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.8
**Designated Uses for
 Summit County Subbasins**
 Clean Water Plan, 2012



Designated Uses

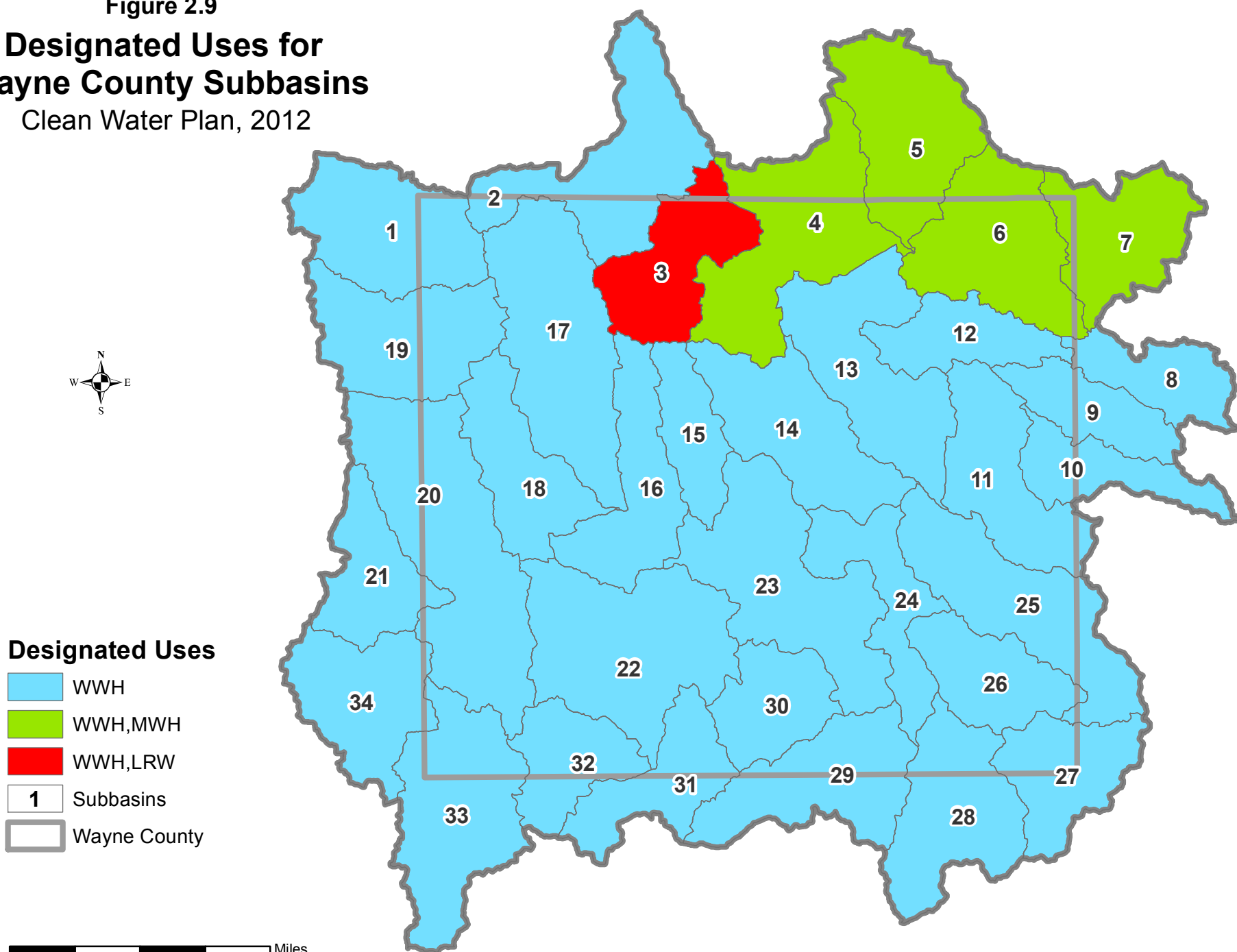
- WWH,CWH
- WWH
- WWH,MWH
- MWH
- WWH,MWH,LRW
- WWH,LRW
- 1** Subbasins
- Summit County



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2000 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.9
Designated Uses for
Wayne County Subbasins
 Clean Water Plan, 2012

2-28



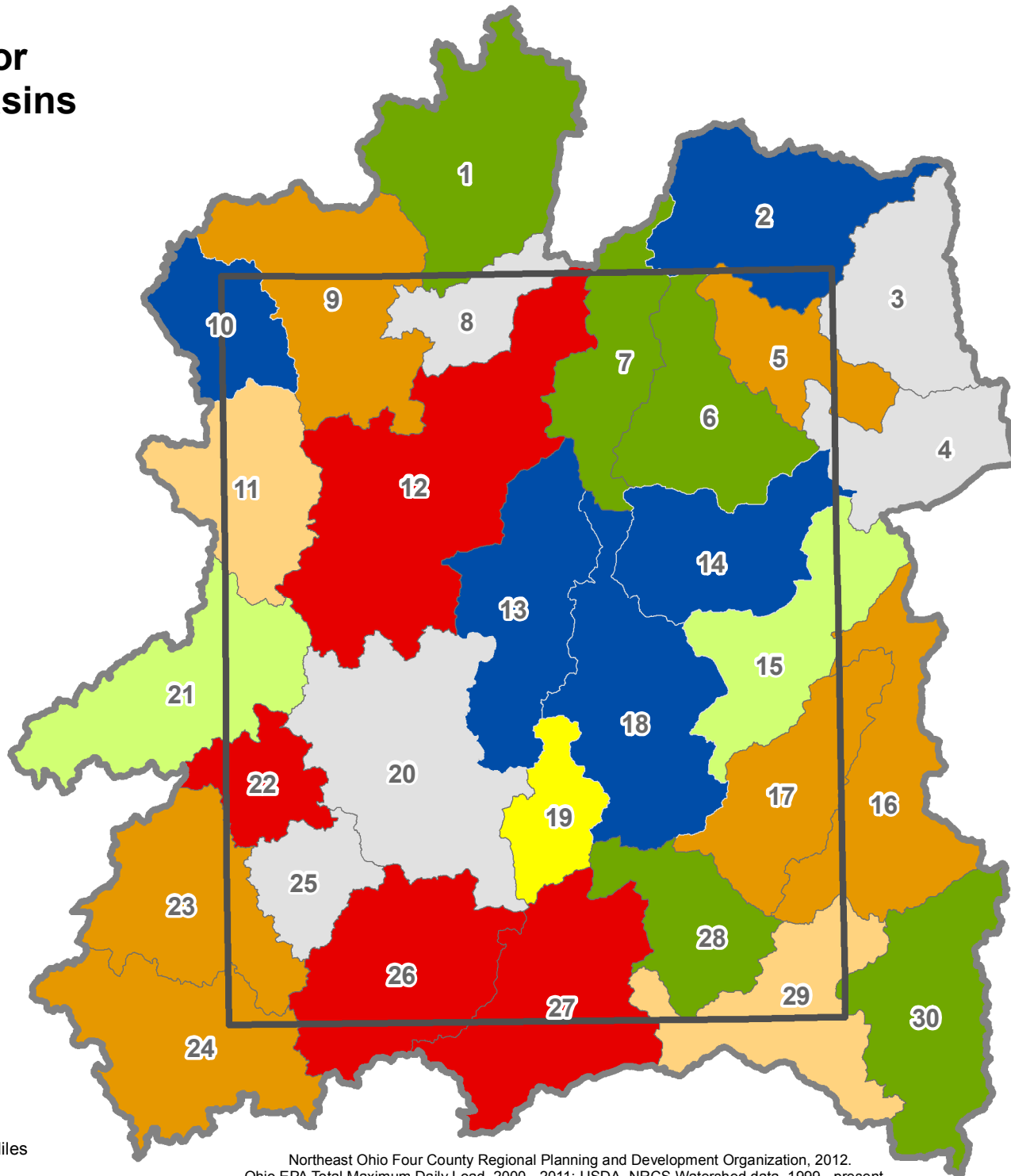
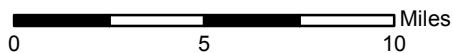
Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2002 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.10
Attainment Status for
Portage County Subbasins
 Clean Water Plan, 2012

2-29

Attainment Status

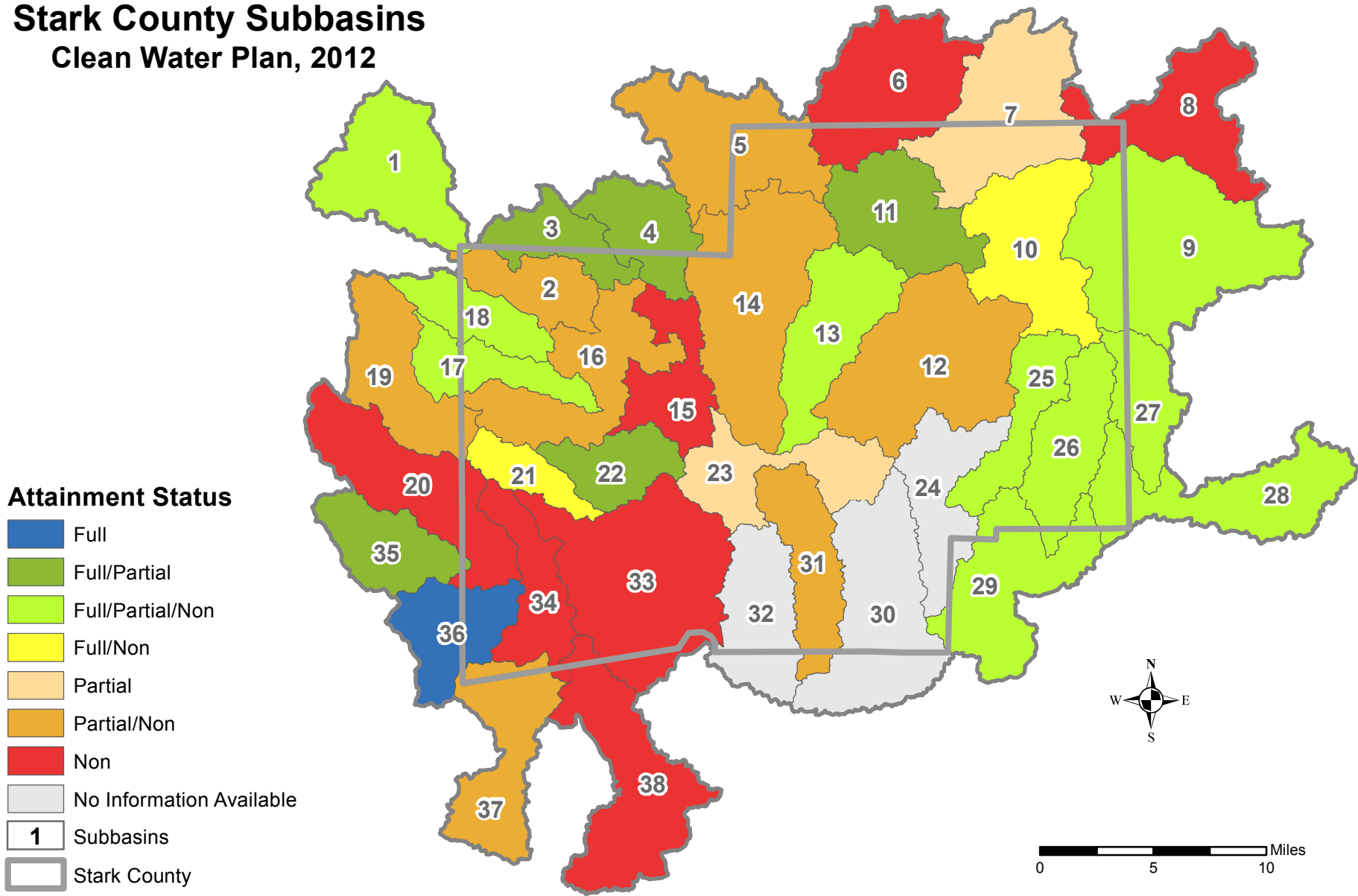
- Full
- Full/Partial
- Full/Partial/Non
- Full/Non
- Partial
- Partial/Non
- Non
- No Information Available
- 1 Subbasins
- Portage County



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2000 - 2011; USDA, NRCS Watershed data, 1999 - present.

Figure 2.11
Attainment Status for
Stark County Subbasins
Clean Water Plan, 2012

2-30



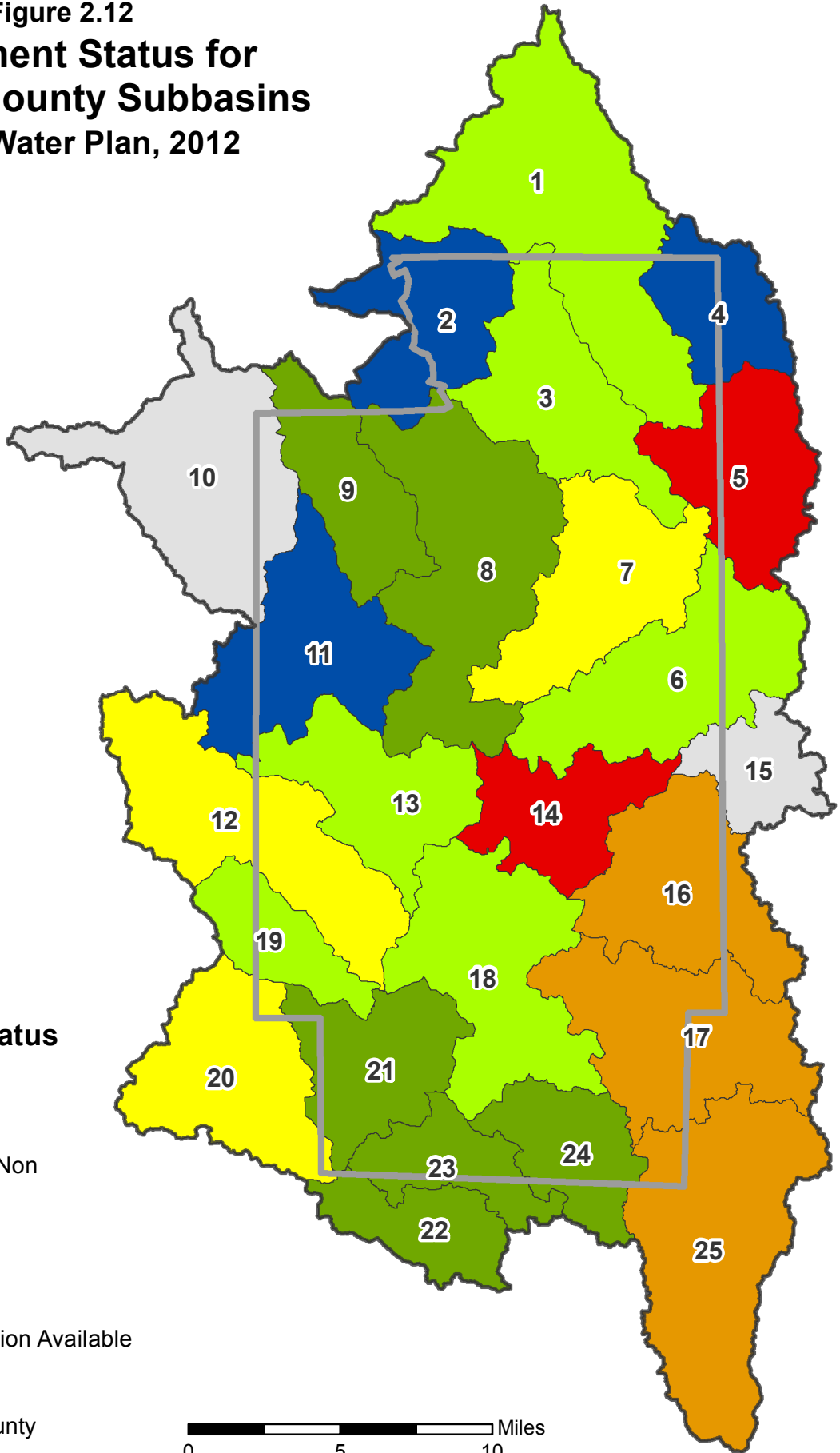
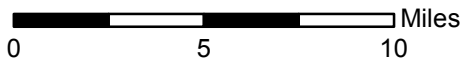
Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 1998 - 2011; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.12
Attainment Status for
Summit County Subbasins
Clean Water Plan, 2012



Attainment Status

- Full
- Full/Partial
- Full/Partial/Non
- Full/Non
- Partial/Non
- Non
- No Information Available
- 1 Subbasins
- Summit County












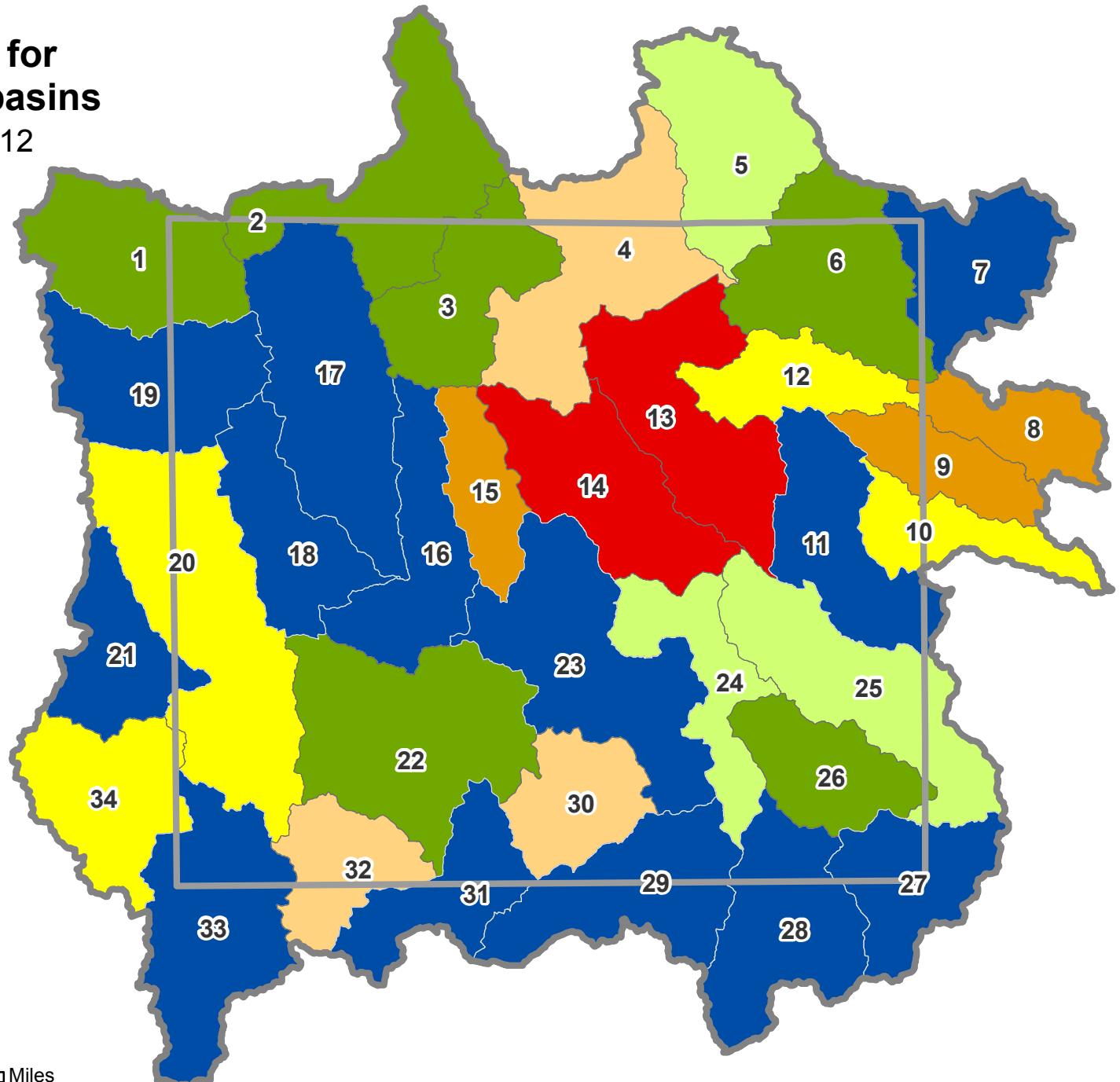
Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2000 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.13
Attainment Status for
Wayne County Subbasins
 Clean Water Plan, 2012

2-32

Attainment Status

-  Full
-  Full/Partial
-  Full/Partial/Non
-  Full/Non
-  Partial
-  Partial/Non
-  Non
-  Subbasins
-  Wayne County



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2002 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.14
Reported Frequency of
Urban Impairments
In Portage County Subbasins
 Clean Water Plan, 2012



Number of References to
Urban Impairments
in the TMDLs

None

1

2

3

1 Subbasins

Portage County

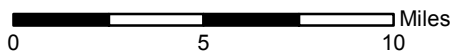
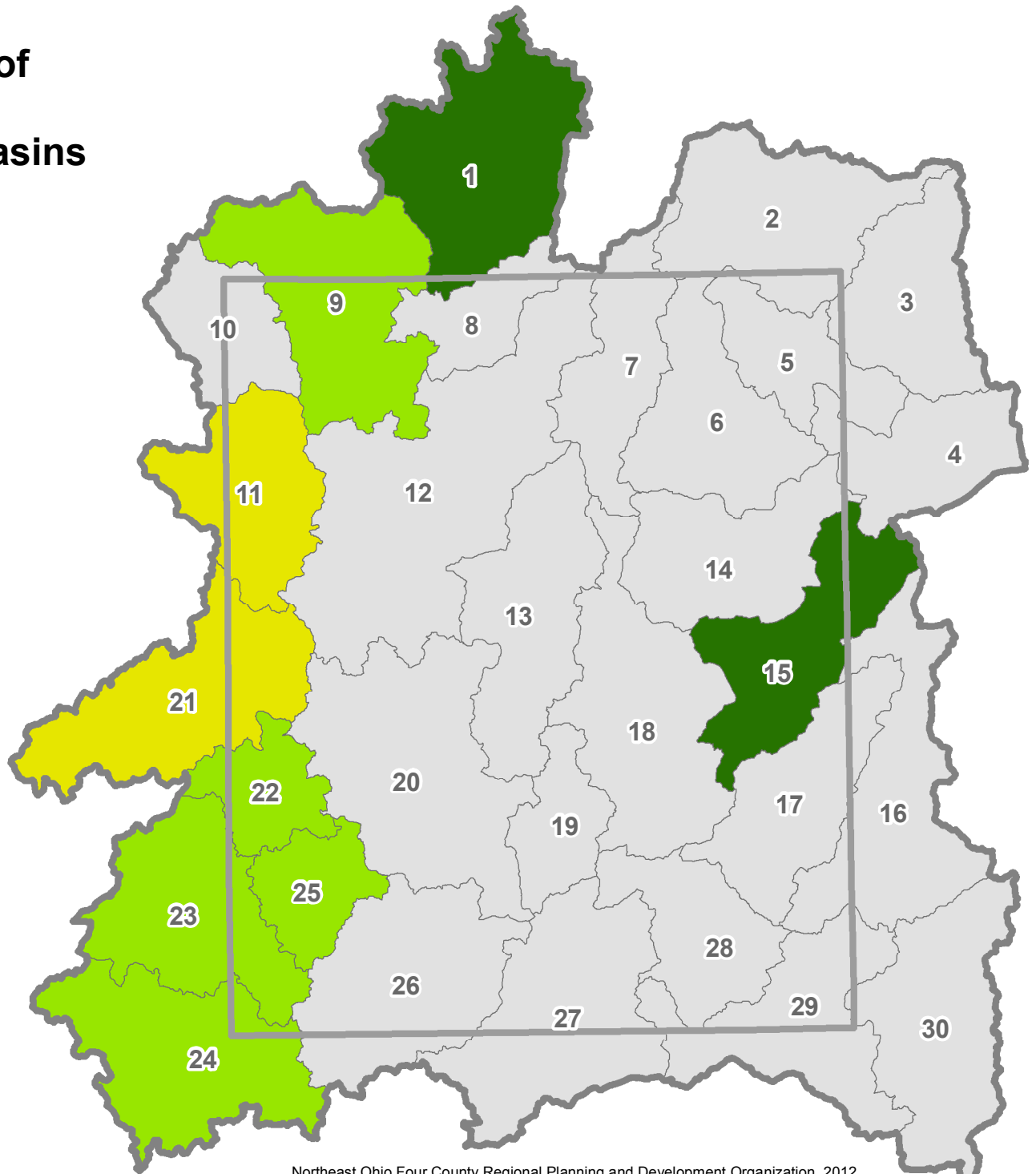
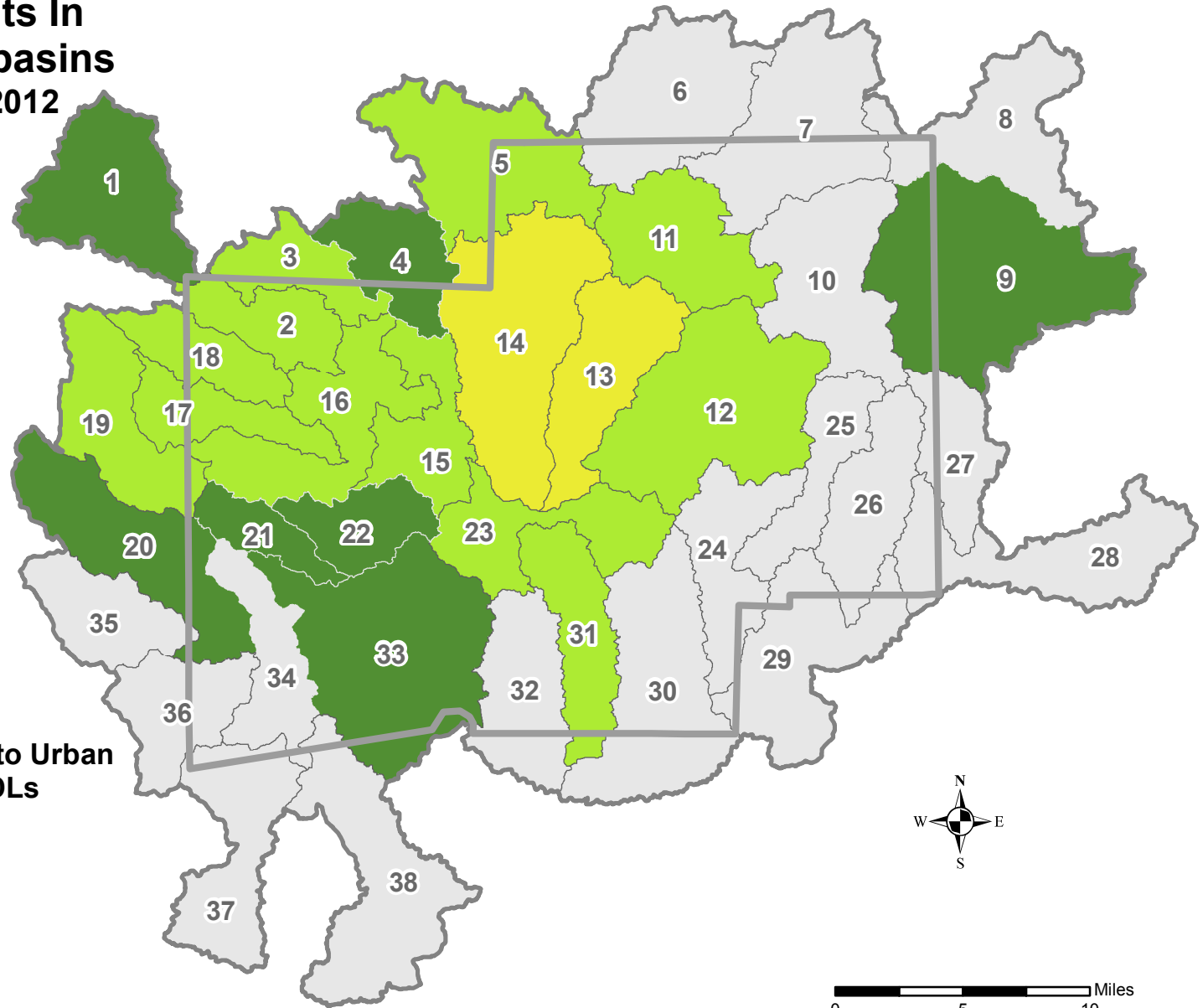


Figure 2.15

Reported Frequency of Urban Impairments In Stark County Subbasins

Clean Water Plan, 2012



Number of References to Urban Impairments in the TMDLs

- None
- 1
- 2
- 3

- 1 Subbasins
- Stark County







0 5 10 Miles

2-34


Figure 2.16
Reported Frequency of
Urban Impairments in
Summit County Subbasins
Clean Water Plan, 2012




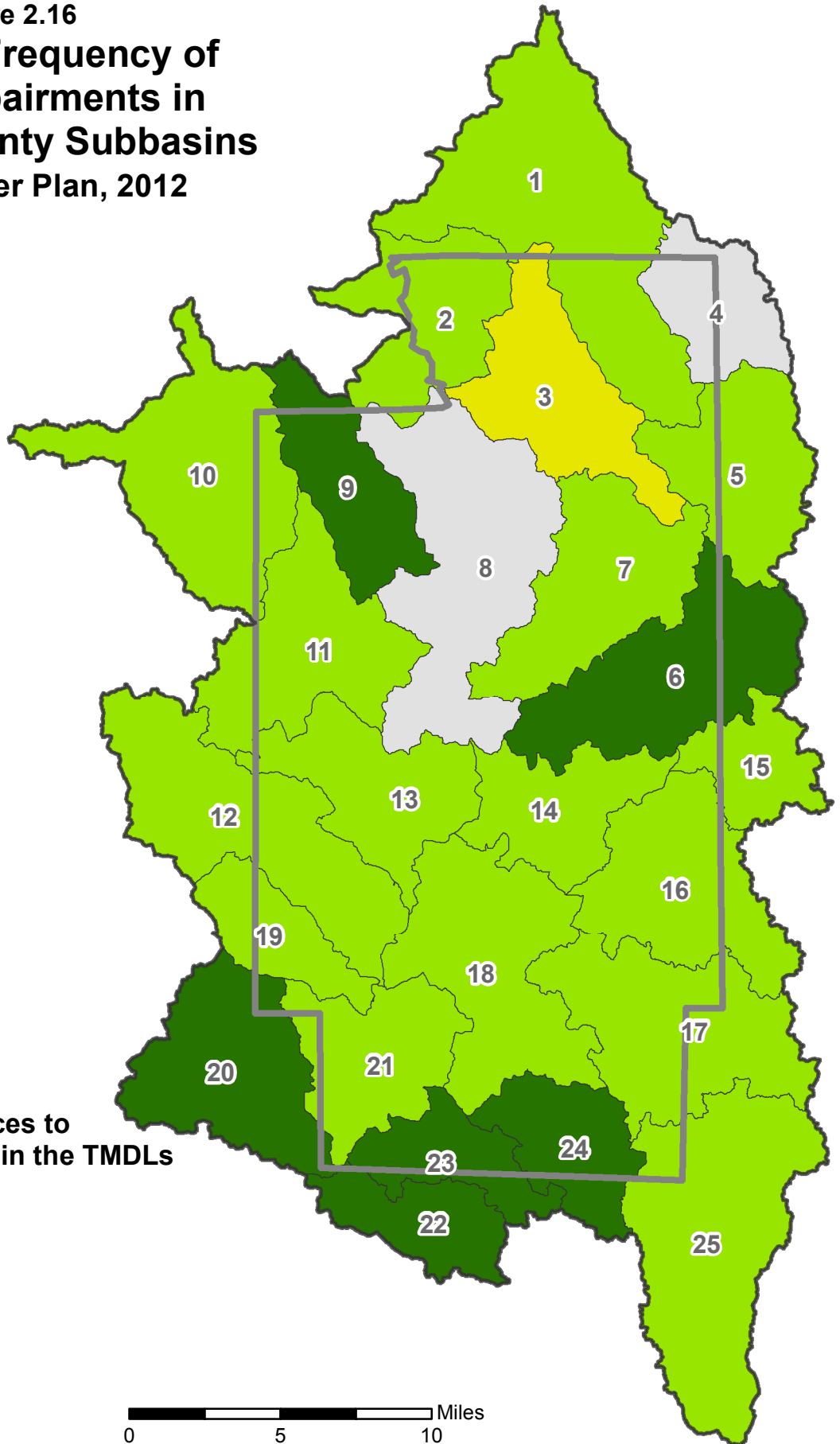
Number of References to Urban Impairments in the TMDLs

-  None
-  1
-  2
-  3

 Subbasins

 Summit County

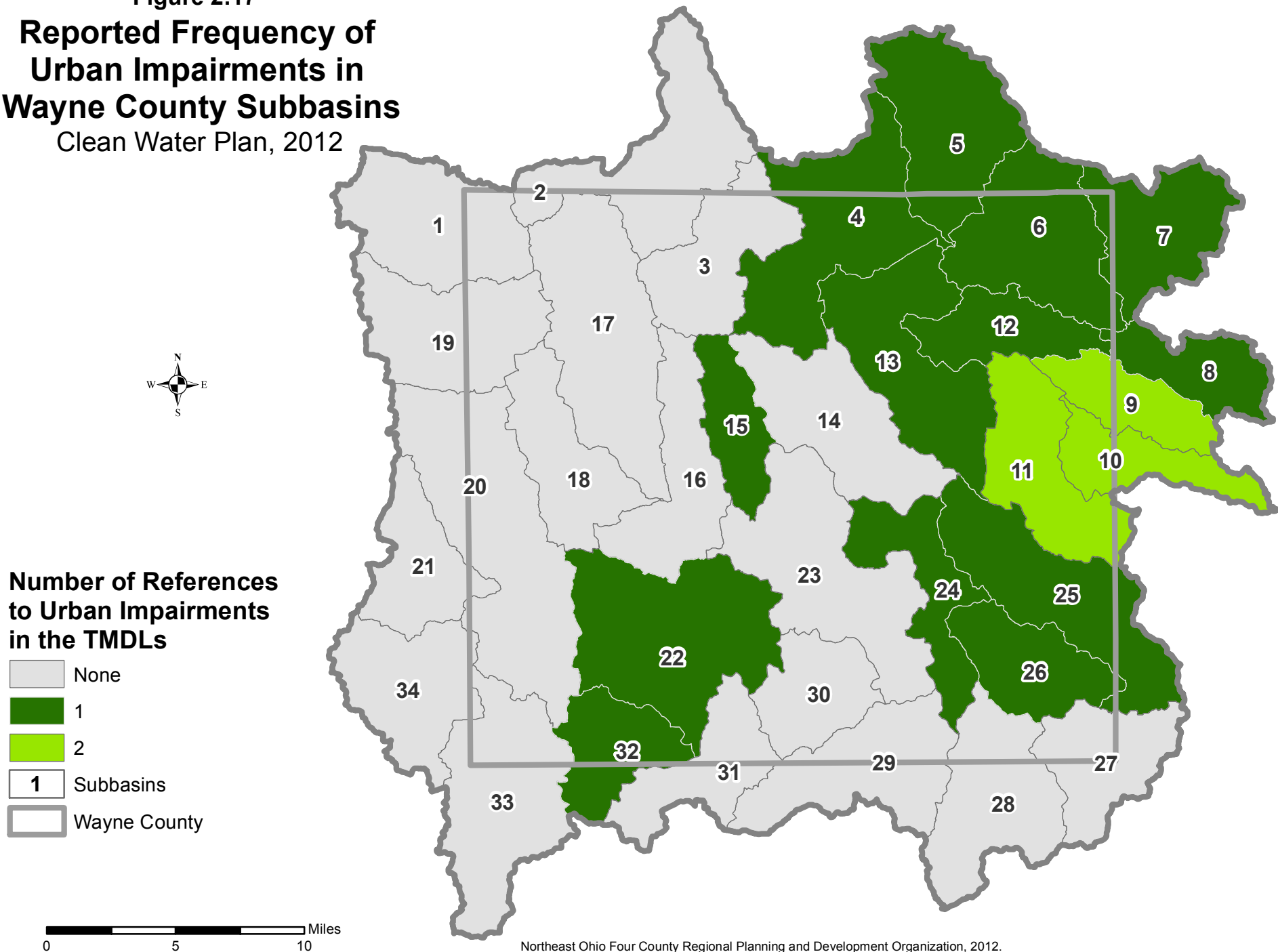
 Miles



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2000 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.17
Reported Frequency of
Urban Impairments in
Wayne County Subbasins
 Clean Water Plan, 2012

2-36



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2002 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.18

Reported Frequency of Industrial/Commercial Impairments In Portage County Subbasins

Clean Water Plan, 2012



Number of References to Industrial/Commercial Impairments in the TMDLs

None

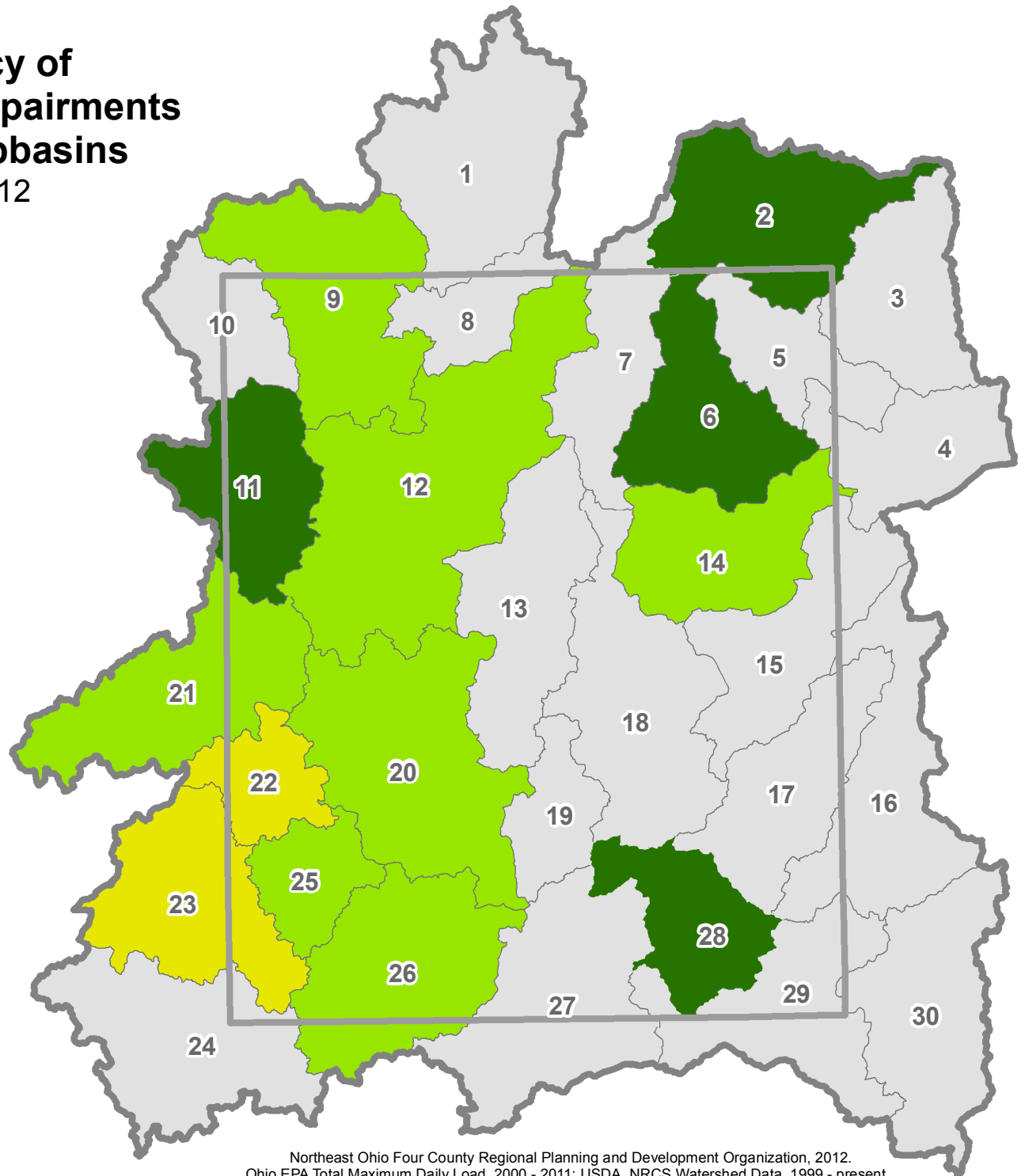
1

2

3

1 Subbasins

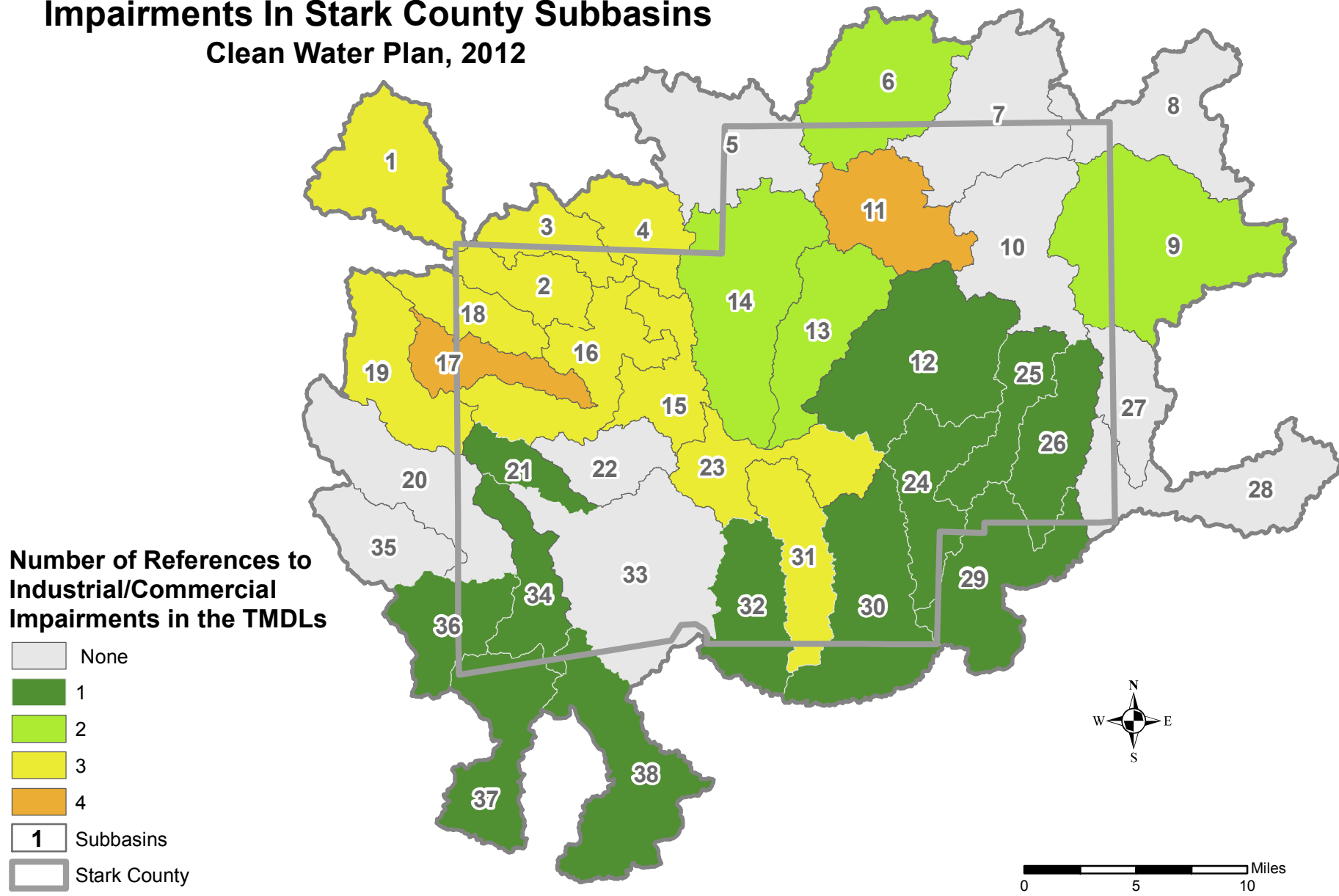
Portage County



0 5 10 Miles

Figure 2.19
Reported Frequency of Industrial/Commercial
Impairments In Stark County Subbasins
Clean Water Plan, 2012

2-38



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 1998 - 2011; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.20
**Reported Frequency of
 Industrial/Commercial Impairments in
 Summit County Subbasins**
 Clean Water Plan, 2012



**Number of References to
 Industrial/Commercial
 Impairments in the TMDLs**

None

1

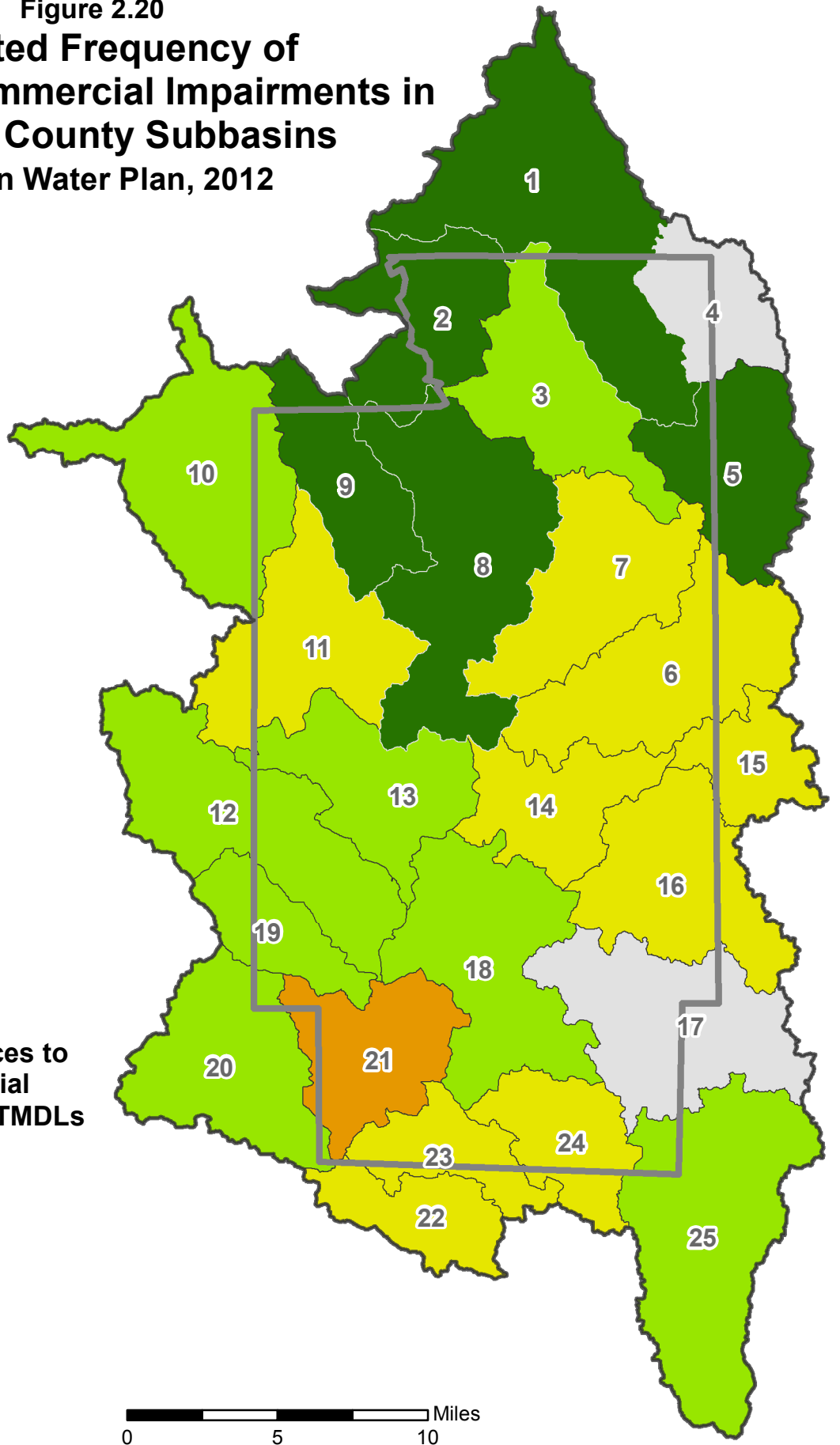
2

3

4

1 Subbasins

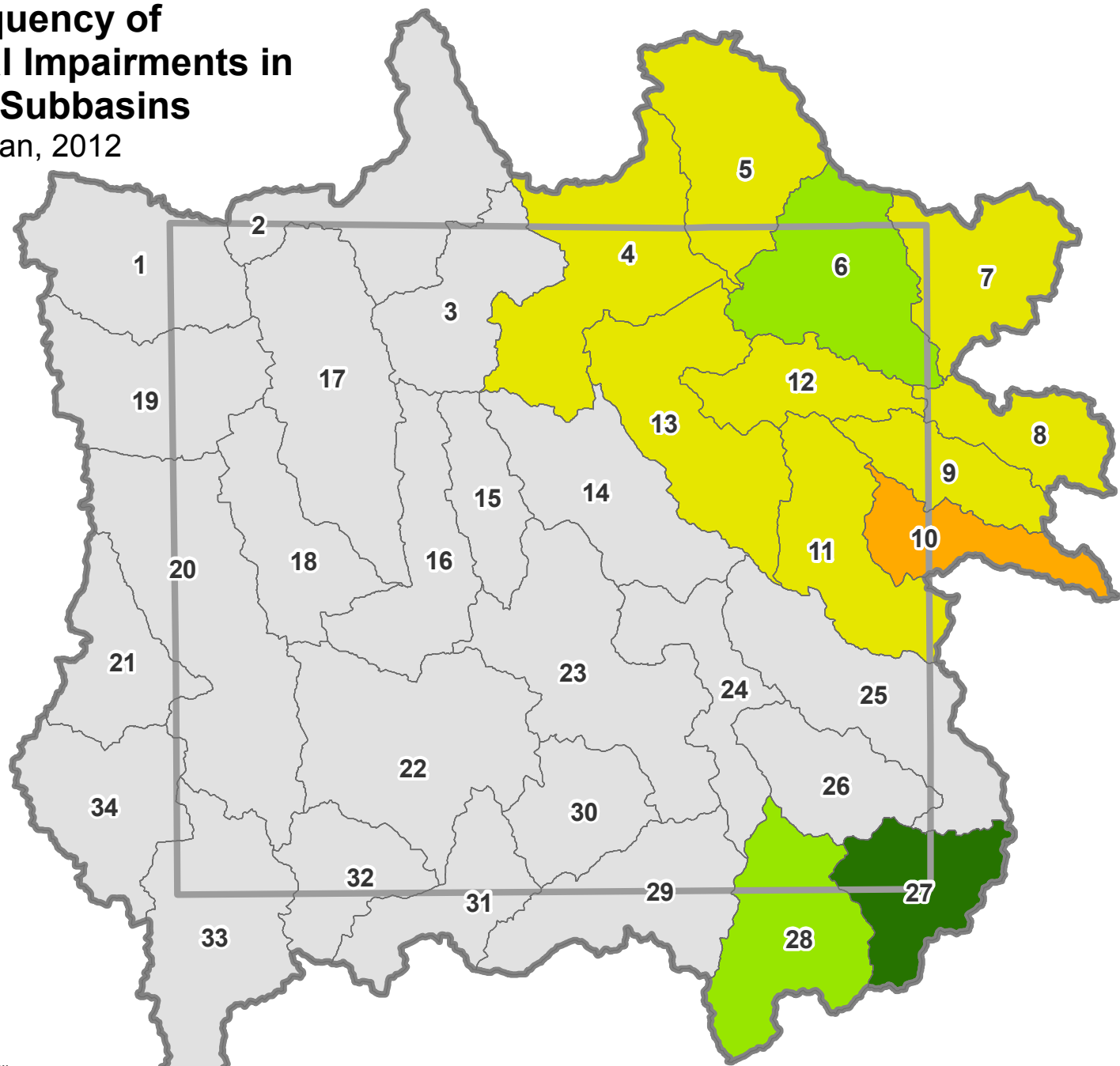
Summit County



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2000 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.21 Reported Frequency of Industrial/Commercial Impairments in Wayne County Subbasins

Clean Water Plan, 2012



**Number of References
to Industrial/Commercial
Impairments in the TMDLs**

None

1

2

3

4

1 Subbasins

Wayne County

0 5 10 Miles






Figure 2.22

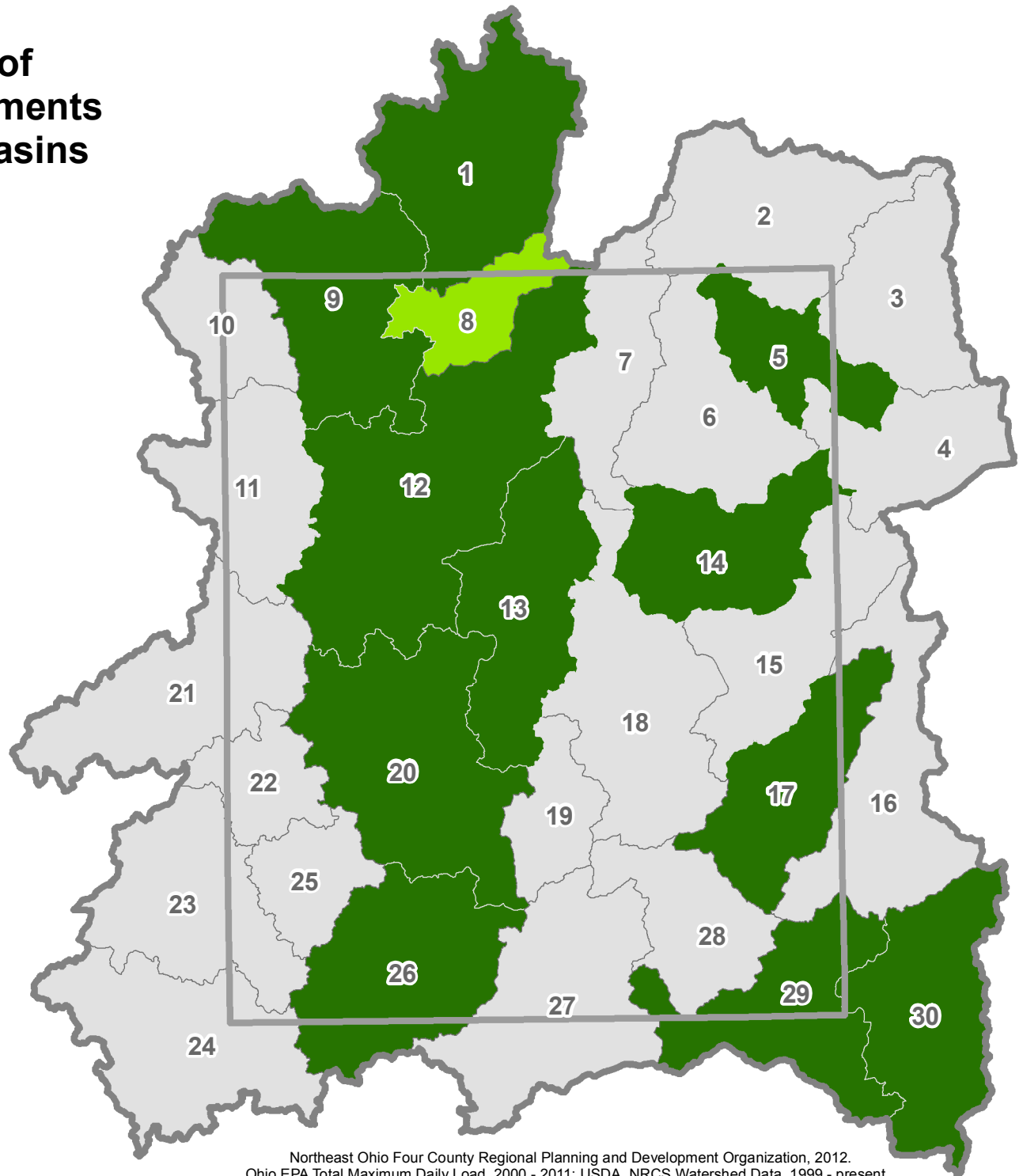
Reported Frequency of Rural/Agricultural Impairments In Portage County Subbasins

Clean Water Plan, 2012



Number of References to Rural/Agricultural Impairments in the TMDLs

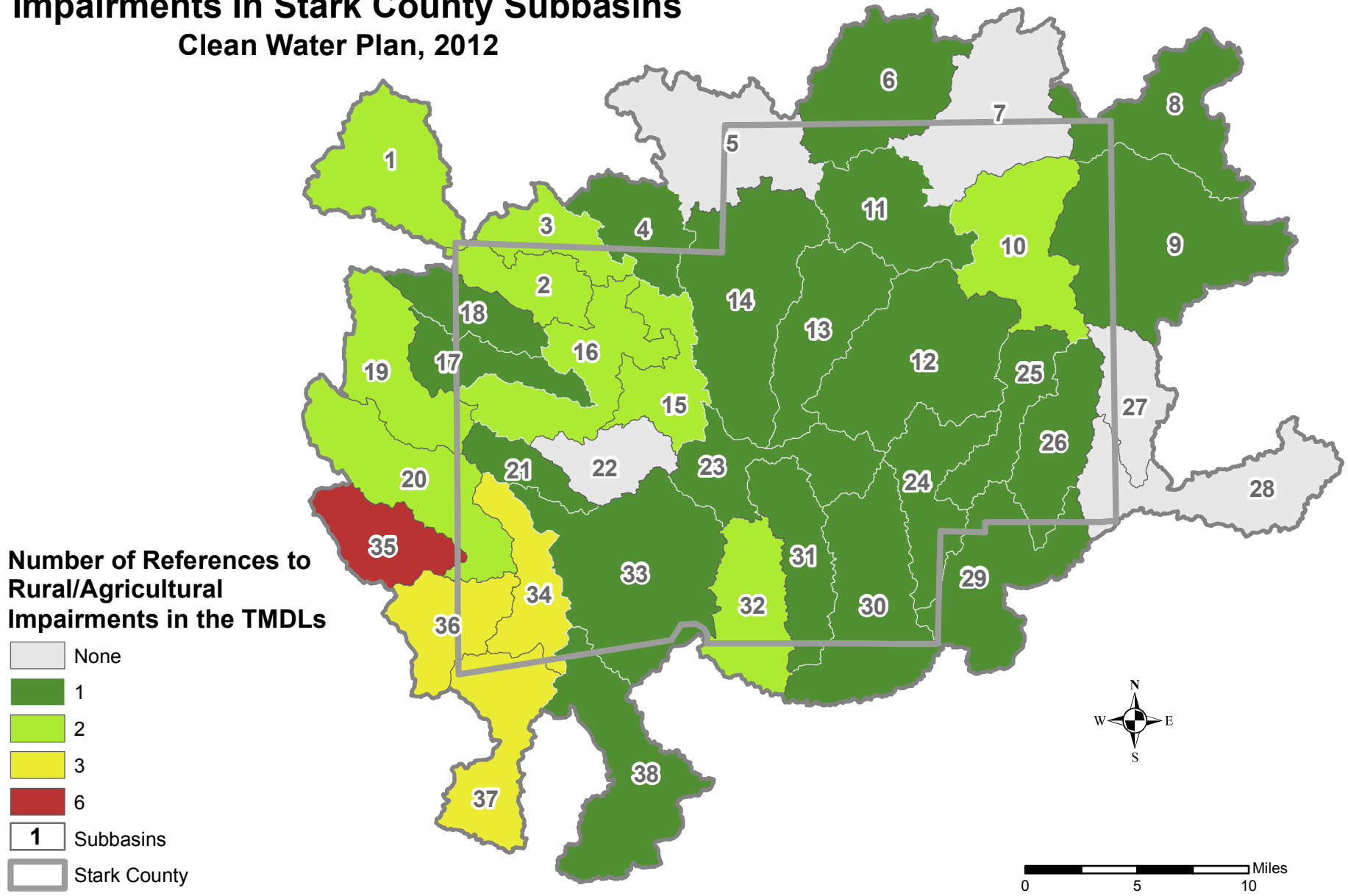
-  None
-  1
-  2
-  Subbasins
-  Portage County



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
Ohio EPA Total Maximum Daily Load, 2000 - 2011; USDA, NRCS Watershed Data, 1999 - present.

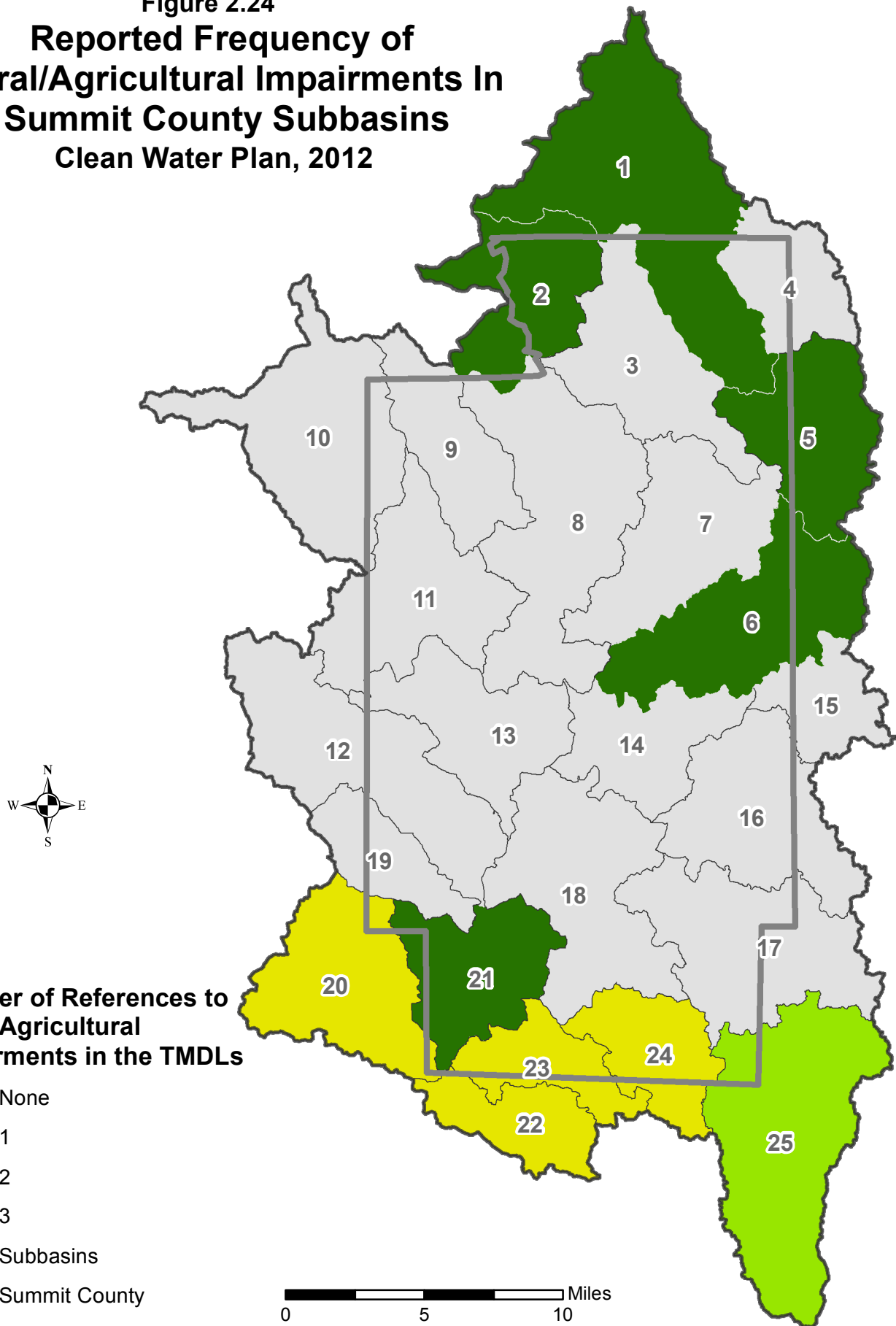
Figure 2.23
Reported Frequency of Rural/Agricultural
Impairments In Stark County Subbasins
Clean Water Plan, 2012

2-42



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 1998 - 2011; USDA, NRCS Watershed Data, 1999 - present.

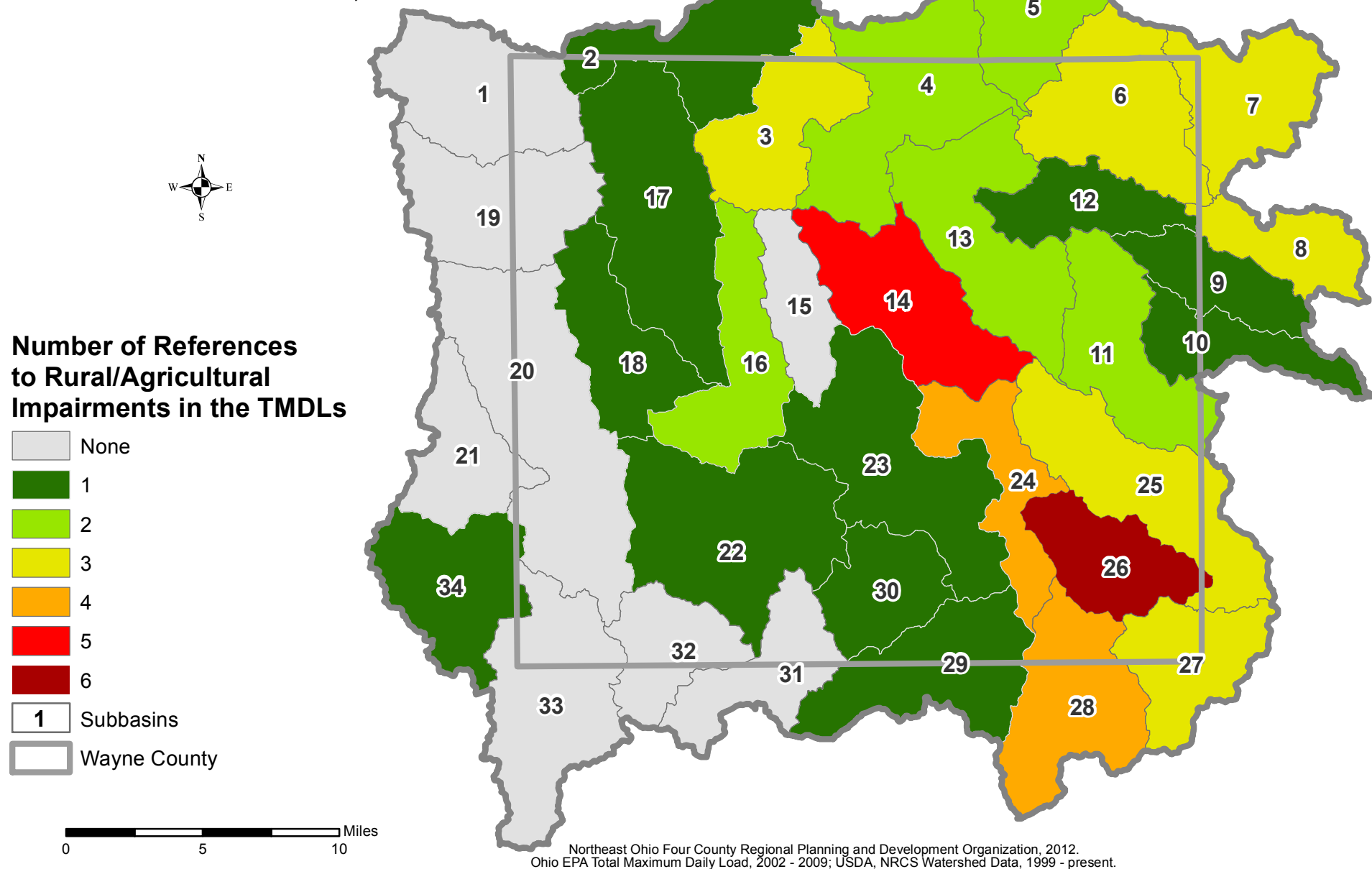
Figure 2.24
Reported Frequency of
Rural/Agricultural Impairments In
Summit County Subbasins
Clean Water Plan, 2012



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2000 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.25
Reported Frequency of
Rural/Agricultural Impairments in
Wayne County Subbasins
 Clean Water Plan, 2012

2-44



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2002 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.26

Reported Frequency of Stream Modifications/Natural Area Impairments In Portage County Subbasins

Clean Water Plan, 2012



Number of References to Stream Modification/Natural Area Impairments in the TMDLs

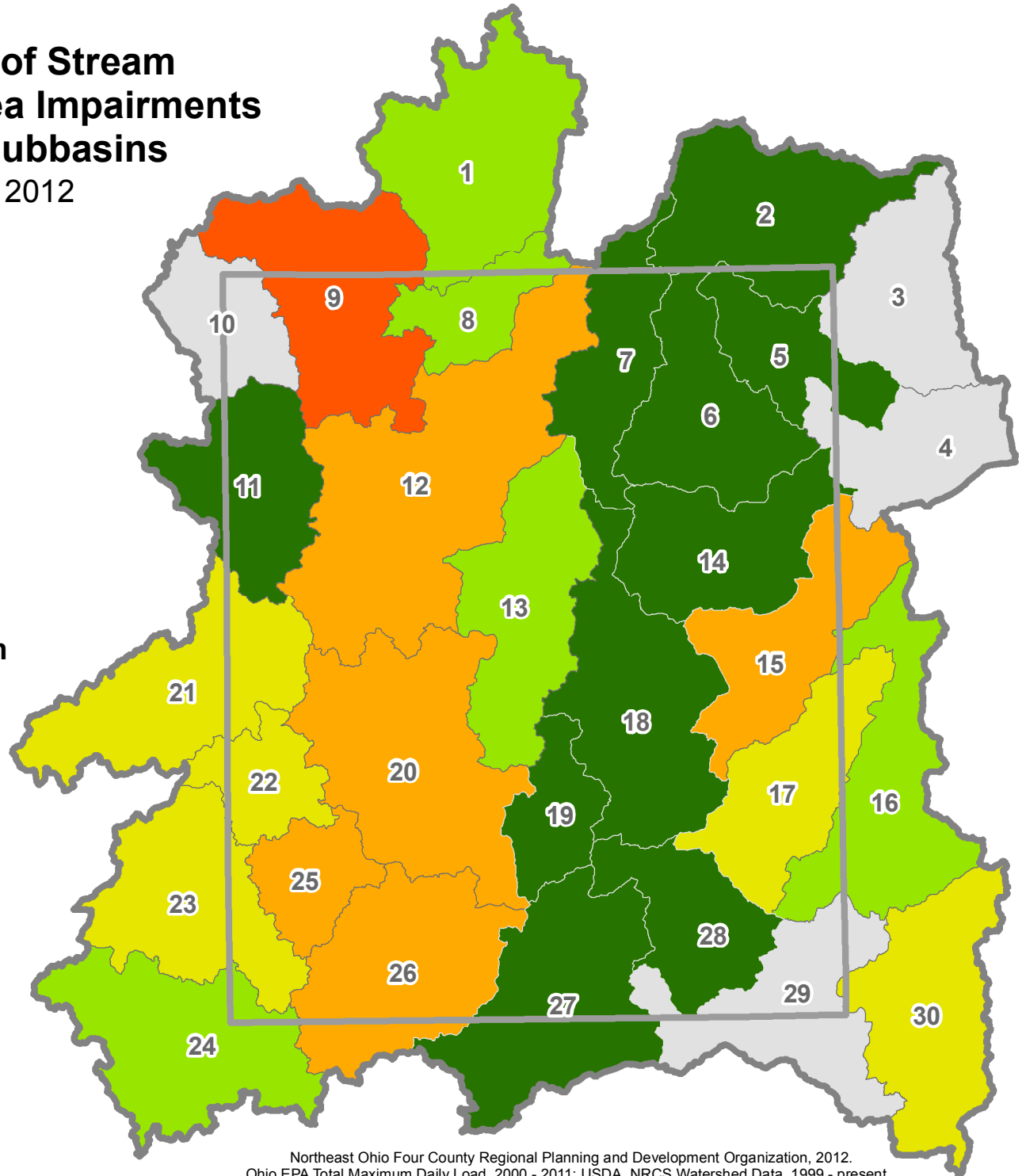
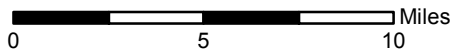
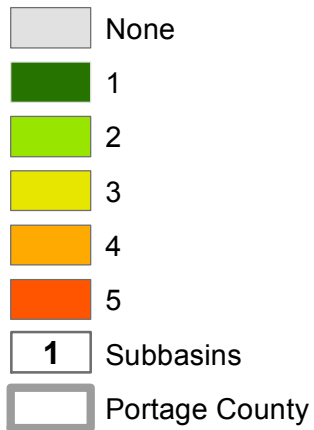
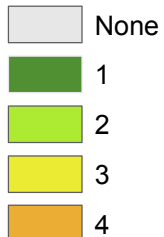


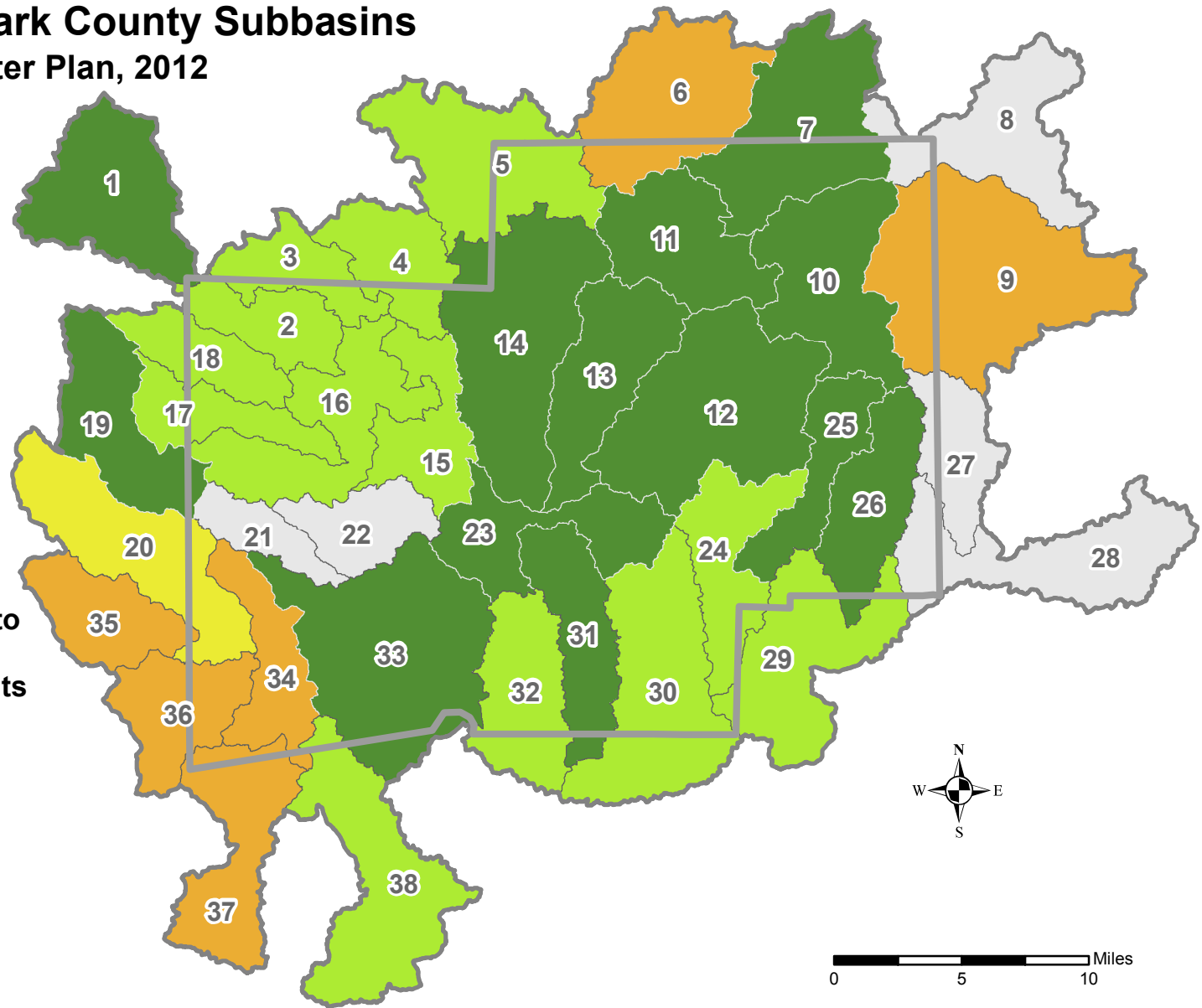
Figure 2.27
**Reported Frequency of Stream
 Modifications/Natural Area
 Impairments In Stark County Subbasins**
 Clean Water Plan, 2012

2-46

**Number of References to
 Stream Modifications/
 Natural Area Impairments
 in the TMDLs**



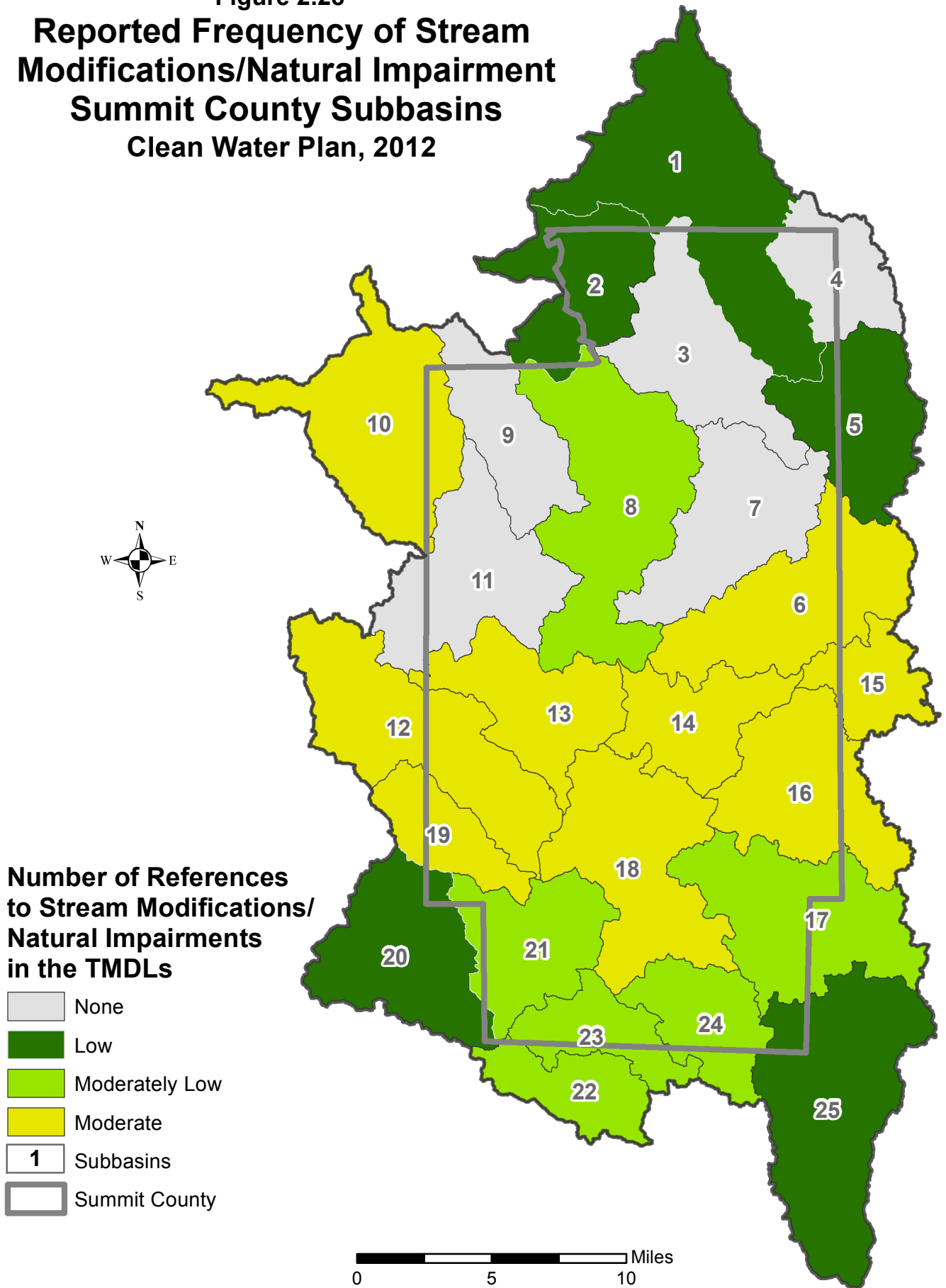
1 Subbasins
 Stark County



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 1998 - 2011; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.28

Reported Frequency of Stream Modifications/Natural Impairment Summit County Subbasins Clean Water Plan, 2012



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
Ohio EPA Total Maximum Daily Load, 2000 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.29
Reported Frequency of
Stream Modification/Natural
Area Impairments in
Wayne County Subbasins
 Clean Water Plan, 2012



Number of References to
Stream Modification/Natural
Area Impairments
in the TMDLs

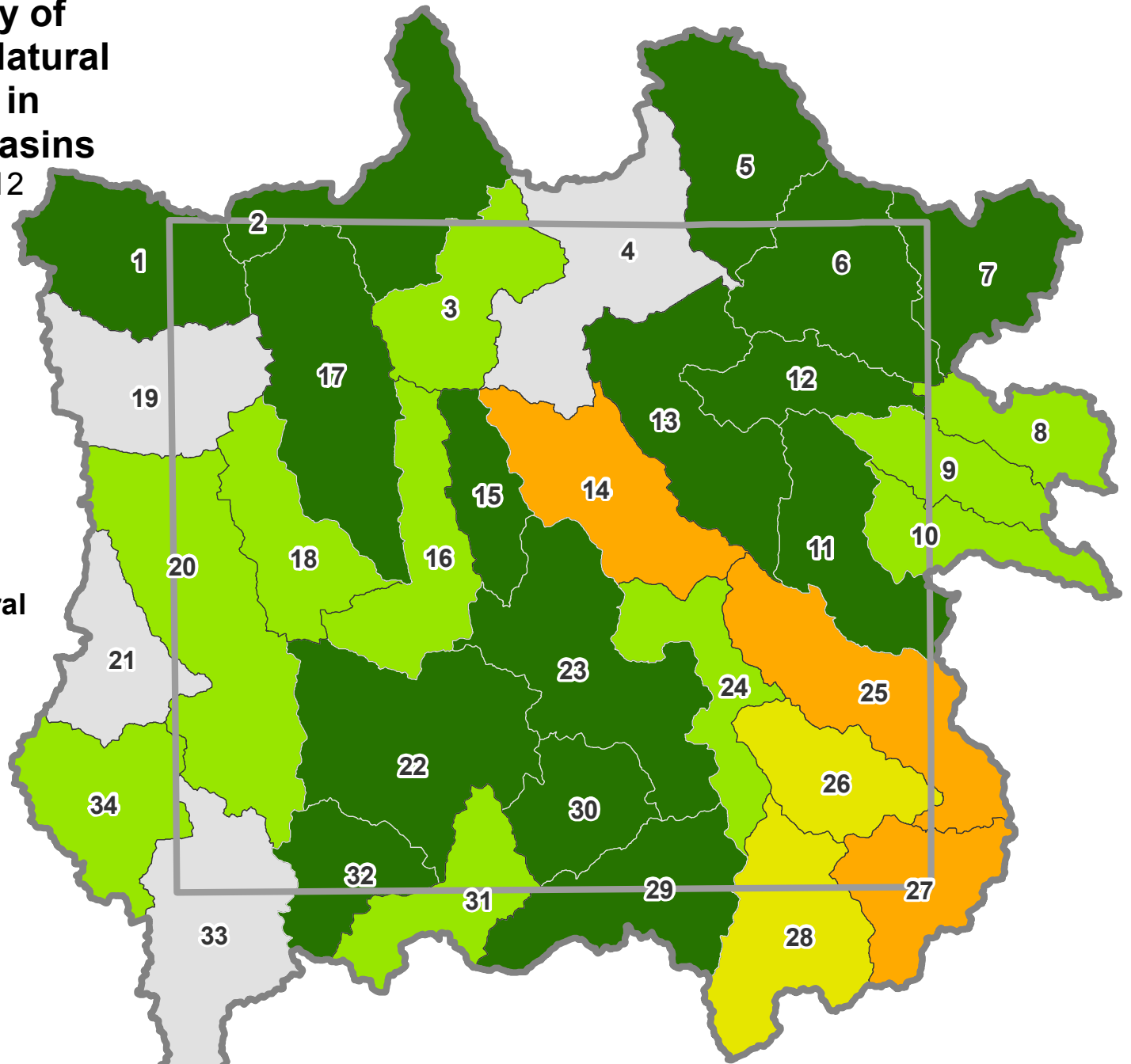
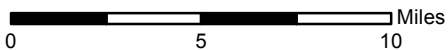
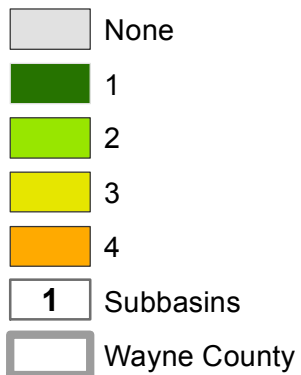








Figure 2.30

Recreation Use Attainment Score Portage County Subbasins

Clean Water Plan, 2012





Index Score

-  Not Calculated
-  0 - 24
-  25 - 49
-  50 - 74
-  75 - 99
-  >100

Score Criterion

- > 10x E.Coli Standard
- 5x - 10x E.Coli Standard
- 2x - 5x E.Coli Standard
- < 2x E.Coli Standard
- Meets E.Coli Standard

-  Subbasins
-  Portage County

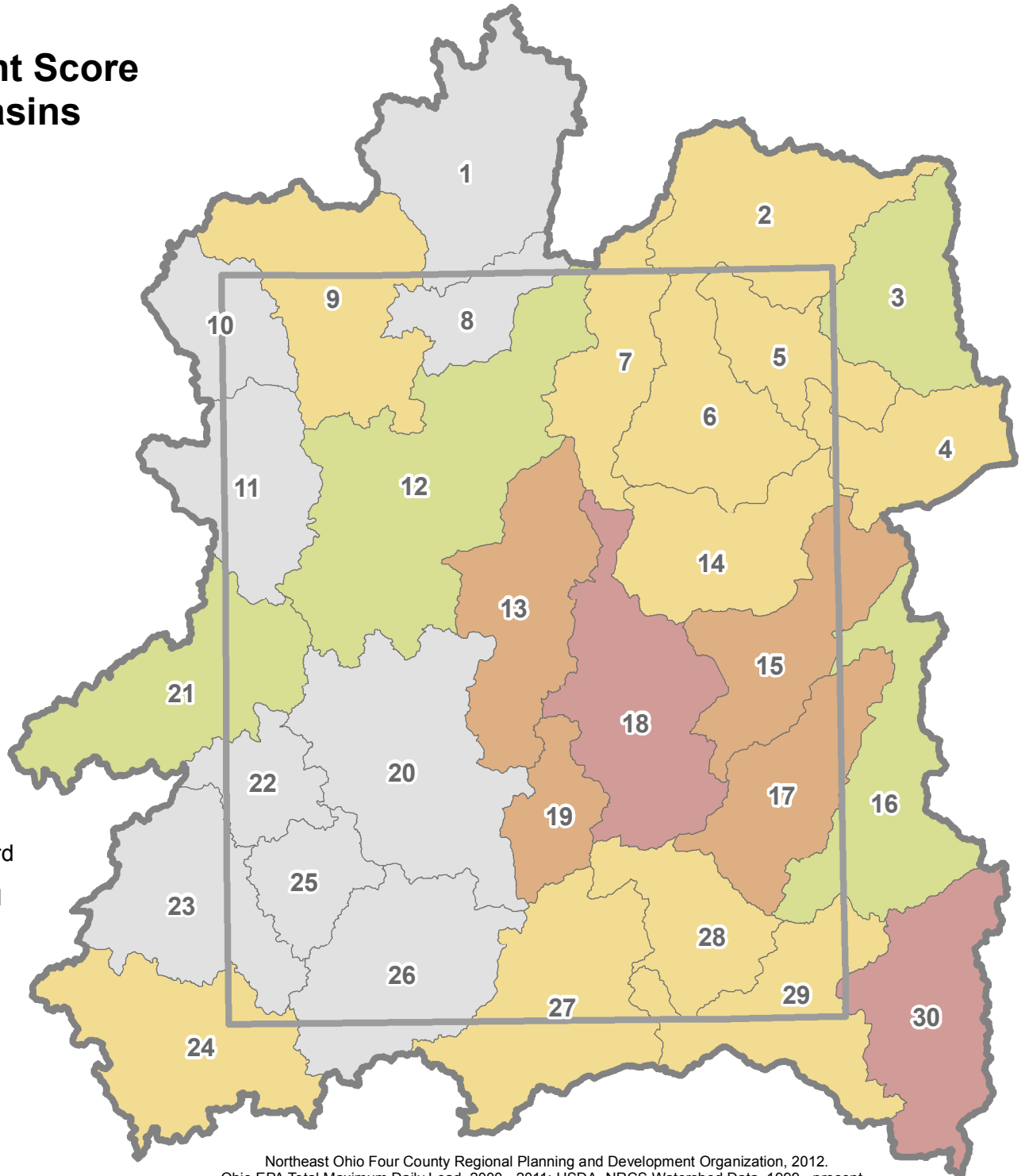
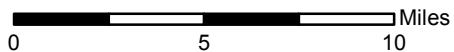
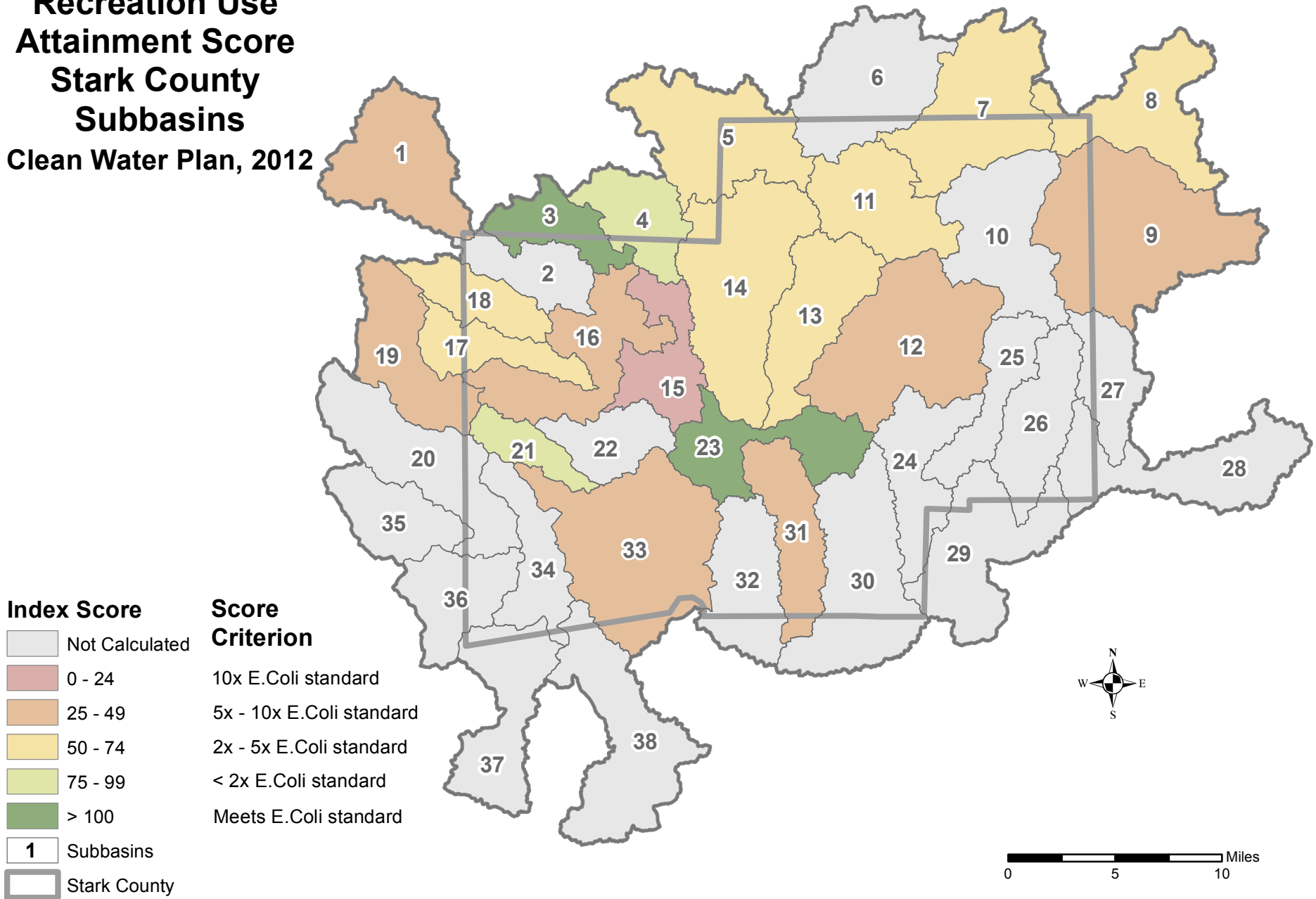


Figure 2.31
Recreation Use
Attainment Score
Stark County
Subbasins
Clean Water Plan, 2012

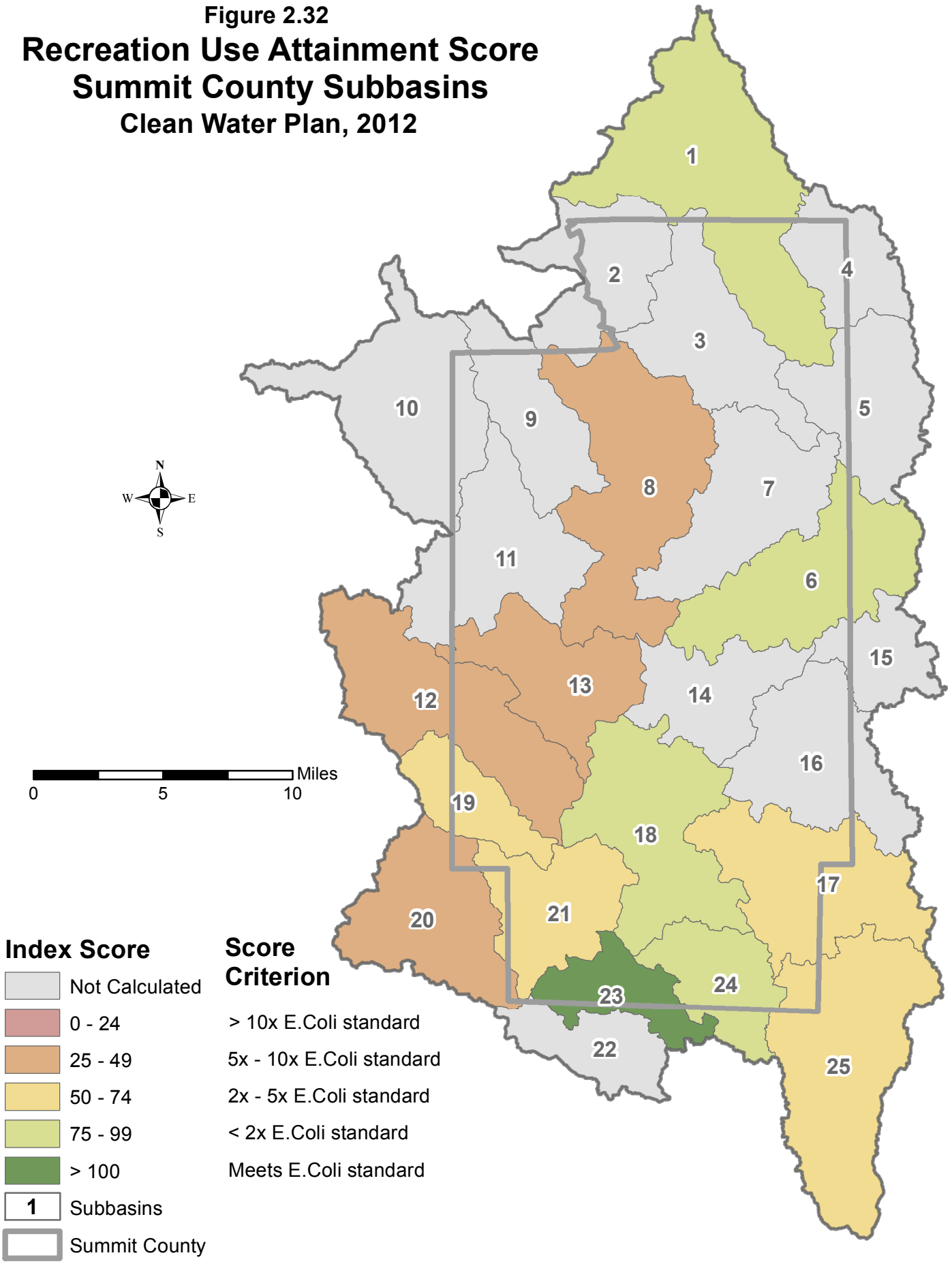
2-50



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 1998 - 2011; USDA, NRCS Watershed Data, 1999 - present.

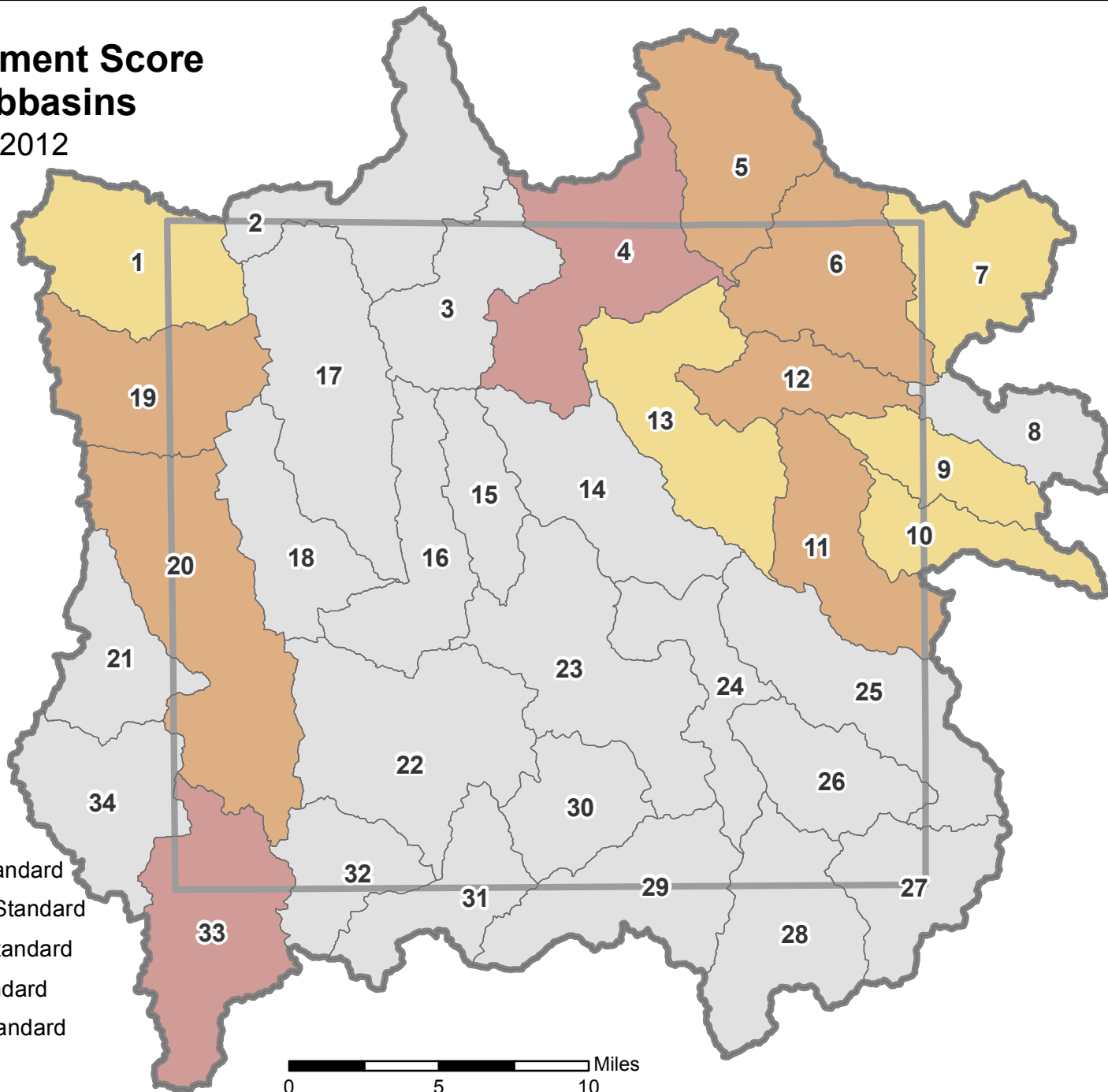
Figure 2.32

Recreation Use Attainment Score Summit County Subbasins Clean Water Plan, 2012



Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2000 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Figure 2.33
Recreation Use Attainment Score
Wayne County Subbasins
 Clean Water Plan, 2012



2-52

0 5 10 Miles

Northeast Ohio Four County Regional Planning and Development Organization, 2012.
 Ohio EPA Total Maximum Daily Load, 2002 - 2009; USDA, NRCS Watershed Data, 1999 - present.

Water Quality Trends in Northeast Ohio

The Ohio EPA has identified that major changes have occurred, which have contributed to the improvements in current statewide water quality conditions. The Ohio EPA notes that most of these water quality improvements can be attributed to improvements in point source control and that future threats to water quality will come from nonpoint sources of pollution. Their assessment is applicable to Northeast Ohio as well. The Ohio EPA states:

“the impacts from nonpoint sources of pollution, such as combined sewer overflows, urban storm water, siltation of substrates, and habitat degradation, agricultural and storm water run-off, etc., are becoming increasingly evident as historically more pronounced impacts from point sources e.g. municipal WWTPs, some industrial effluents, are reduced. Since 1988, there has been a 48% decline in point sources as a major source of impairment in reassessed streams in Ohio...Nonpoint sources have emerged as a major source of impairment in streams and rivers during this period...River and stream attainments will not be achieved by the restoration of point source related impairments alone. Even if point source associated impairment is virtually eliminated (and assuming no new nonpoint source impacts are revealed) the result would be over 70% of streams and rivers fully attaining aquatic life criteria. Given these facts, “new” successes in controlling, abating, and preventing nonpoint and other sources of impairment will be needed.”

“While successes resulting from the abatement of point sources have been documented, there are other indications that impact from nonpoint source runoff, habitat degradation, and watershed disturbances may be worsening. Siltation of substrates i.e. stream bed, stream channel, stream bottom, etc. and habitat degradation are now the second and third leading causes of aquatic life impairment in Ohio streams and rivers, surpassing ammonia and heavy metals. These impairments are principally the result of agricultural land use, intensive urbanization, and suburban development, the latter of which is emerging as one of the most significant threats to watersheds...Increasingly, water pollution problems are associated with nonpoint sources such as, construction sites, farm land, abandoned mines, landfills, pits and lagoons, oil and gas wells, domestic sewage systems, manure and treatment processing residuals.”³

The following discussion presents historical data and interpretation of the Watershed Scores and Large River Scores

The Ohio EPA measures both watershed units and large river units for aquatic life attainment status. 2000 was the last year the Ohio EPA used stream segments when determining attainment status. The Ohio EPA now analyzes watershed units instead of stream segment units, since TMDLs are watershed-based reports.

³Ohio Water Resources Inventory: Executive Summary (Ohio EPA, 1996), pp. 11-13.

Watershed Scores

Each of the 331 11-digit watersheds in Ohio is assessed for aquatic life attainment. The watersheds receive scores between 0 and 100 based on the percentage of full aquatic life attainment; the higher the score, the closer to full aquatic life use attainment. In 2000 the state average was 47. Table 2-1 lists and Figure 2-2b maps the scores received in 2002 and 2004 for 12 of the 14 basins in the NEFCO region.

II. Regional Population and Employment Developments Since 1980

The abundance of clean water in Northeast Ohio once facilitated the rapid growth experienced by the region throughout most of the industrial age. With the decline in or re-shaping of heavy manufacturing in Northeast Ohio over the last several decades, population and development trends become important factors in the use of water resources.

Population Changes

Since 1980, the NEFCO region's population has grown by 5 percent. Individually, NEFCO's counties experienced diverging trends in population change in the past 30 years, ranging from double-digit percentage increases for two of NEFCO's largely rural counties (Portage and Wayne) to a slight increase in urban Summit County and a minor loss of population in Stark County. Many planners in the region attribute the growing populations in the region's rural counties as evidence of urban sprawl.

Despite the population growth in most of the NEFCO region depicted in Table 2-6, a comparison with the U.S. population trend indicates Northeast Ohio's (as well as the State's) slow rate of growth over the last three decades. Effective water quality planning will require analyses of sub-portions of counties and communities in which rapid population growth may threaten water resources. The region's characteristically rural counties, Portage and Wayne, are experiencing the largest percentage increases in population. The Ohio Policy Research and Strategic Planning Office projects continued growth in the years 2020 and 2030 while Stark and Summit Counties decline. In the parts of the region experiencing population growth, planners should have measures in place to prevent environmental degradation. Land use planning in these areas will lead to more sustainable decisions for the placement of infrastructure and development.

**Table 2-6
Population Change 1980-2010**

County	1980 Census	1990 Census	2000 Census	2010 Census	% Change 1980-2010	Annual Average rate of Change*	Projected 2020	Projected 2030
Portage	135,856	142,585	152,061	161,419	18.8%	0.4%	161,660	161,880
Stark	378,823	367,585	378,098	375,586	-0.9%	0.0%	372,490	368,900
Summit	524,472	514,990	542,899	541,781	3.3%	0.0%	564,810	564,210
Wayne	97,408	101,461	111,564	114,520	17.6%	0.3%	128,670	136,690
NEFCO	1,136,559	1,126,621	1,184,622	1,193,306	5.0%	N/A	1,227,630	1,231,680
Ohio	10,797,630	10,847,115	11,353,140	11,536,504	6.8%	0.1%	12,005,730	12,317,610
U.S.	226,545,805	248,709,873	281,421,906	308,745,538	36.3%	11%**	N/A	N/A

Source: *Ohio County Profile*, March 2011
2009 Population Estimates by County, City, Village and Township; July 2010, Revised
 Ohio Department of Development, Policy Research and Strategic Planning Office

*Between April 1, 2000 and July 1, 2009

**Between 1980-2010

Except for Wayne County, which is primarily a rural county with a large Amish and farming population, the region's average family size (ranging from 3.0-3.07) is well below the 3.23 reported for the U.S. (Table 2-7). A possible explanation for this pattern could be attributed to a population that is, for the most part, older than that of the nation. A comparison between the percent of various age cohorts in the NEFCO region and the U.S. supports this conclusion. With one exception, younger populations (ages 18-24 and 25-44 years) in the NEFCO region make up a smaller percentage of the population than in the U.S. The presence of Kent State University in rural Portage County explains the significantly higher number of college age (18-24 years) residents. The region has a higher share of older adults (45-64 years) and elderly (65 and over) than found nationally. Despite the healthy distribution of colleges and universities in the region, the numbers seem to indicate that many members of this younger cohort do not remain here. The median age in each county is higher than the national median age of 37.2 years. Environmental planning will need to address the concerns and limitations of an aging population if the current demographic trends continue.

**Table 2-7
Population Estimates, 2010**

County	Average Family Size	College Age (18-24) Pct. Dist.	Young Adult (25-44) Pct. Dist.	Older Adult (45-64) Pct. Dist.	Old Population (65+) Pct. Dist.	Median Age (Yrs.)
Portage	3.00	15.6%	23.1%	27.5%	12.9%	37.4
Stark	3.00	8.7%	23.3%	28.8%	16.2%	41.1
Summit	3.07	9.1%	24.7%	28.8%	14.6%	40.0
Wayne	3.24	9.7%	23.0%	27.3%	14.6%	38.3
Ohio	3.06	9.5%	25.0%	27.7%	14.1%	38.8
U.S.	3.23	9.9%	26.6%	26.4%	13.0%	37.2

Sources: 2010 American Community Survey, 1-Year Estimates
StatsAmerica, May 2012

Economic Trends

Employment in the NEFCO region reflects the nation’s recent economic recovery. Local reports that the manufacturing industry has seen some gains may be a result of the growing oil and shale gas industry in which Portage and Stark Counties play a major role. The 2011 annual average unemployment rate in three of the region’s four counties was below the state and U.S. rates (see Table 2-8). However, Stark County and cities in the region continue to report unemployment rates well above the U.S. rate. This trend represents a possible challenge in educating individuals in parts of the region with the highest populations (and therefore with the greatest impact on the environment) but whose own economic struggles will likely take priority over environmental concerns.

**Table 2-8
Income and Unemployment**

County	Median Household Income	Median Household Income as % of U.S.	Per Capita Income	Per Capita Income as % of U.S.	2011 Annual Average Unemployment Rate
Portage	49,244	98.4%	23,515	90.2	8.3%
Stark	42,664	85.2%	22,590	86.7	9.2%
Summit	45,593	91.1%	25,391	97.4	8.5%
Wayne	46,288	92.5%	21,438	82.3	7.7%
Ohio	45,090	90.1%	23,975	92.0	8.6%
U.S.	50,046		26,059		8.9%

Source: 2010 American Community Survey, 1-Year Estimates

American Community Survey 2010 One-Year Estimates for median household income and per capita income (PCI) show that the area lags behind the U.S. Within the region, NEFCO’s rural counties (Portage and Wayne) display the highest median household

incomes. Summit and Stark Counties, home to the region’s largest cities, report a lower median household income. However, Summit County’s per capita income and its percentage of the U.S. PCI are significantly higher than that of the other counties. A higher earning potential due to a concentration of headquarters and commerce in the Akron area could explain this result. This interesting pattern has implications for how to proceed with planning efforts in the region.

Planners need to consider Portage County’s important position in the region. While the data do not always place Portage County in the best or worst positions in the region, they depict the economic stability of this county. Coupled with a low unemployment rate, proximity to major urban centers in Northeast Ohio (Akron, Canton, Youngstown and Cleveland), and having the NEFCO region’s highest population growth, Portage County can have a significant influence on economic and water quality planning in the NEFCO region. Portage County’s median household income is 98.4 percent of the U.S. household income – the highest of NEFCO’s four counties despite its large college-age population. A note must be added to consider the effects of the oil and shale gas drilling industry in the region. The discovery of potentially significant energy reserves in the region can have serious implications for water quality. Because drilling operations will likely occur on private properties scattered throughout the region, this development could pose challenges to monitoring water quality and maintaining a clean water supply.

Portage County also stands out as the county with the lowest percentage of residents that reported working in the county in the 2000 Census. As Table 2-9 shows, nearly half of the residents (49.6%) work elsewhere, and 65.5 percent of people working in Portage County live there, making it the last of NEFCO’s four counties with residents employed locally. This pattern is likely the result of Portage County being suitably located near major employment centers: Cleveland, Akron, Canton and Youngstown. However, the large number of residents working out-of-county could pose problems for those wishing to reach a population whose employment focus is in another community.

Table 2-9		
Patterns of In-County/Out-of-County Employment		
Workers Living in County in 2000 (Pct. in county)		
County	Working In County	Working Elsewhere
Portage	50.4%	49.6%
Stark	79.3%	20.7%
Summit	75.0%	25.0%
Wayne	73.0%	27.0%

Source: StatsAmerica; 2000 Census

Social Trends

A great advantage of the NEFCO region has been its percent of the population with a high

school degree or further schooling. All four counties report percentages higher than in the nation, and Wayne, Portage and Stark Counties' percentages are higher than that for the State of Ohio (see Table 2-10). Summit County has the lowest percent of high school graduates, possibly due to it having the largest city in the region (with a higher concentration of the urban poor and immigrants). This trend reverses with the percent of the population with a college degree or graduate studies. Summit County is the only one with a percent higher than the State, while Wayne County (with the highest percent of high school graduates) is among the lowest of the counties. This occurrence could be attributed to Wayne County's diversified economy, which includes farming, and a large Amish population. The location of headquarters, manufacturing and major businesses which make Summit County a center of commerce could explain the concentration of highly-educated residents. Portage County is second in percent of college graduates. The presence of The University of Akron and Kent State University in these two counties also attracts populations with several years of education.

Table 2-10		
Educational Attainment		
County	Percent H.S. Graduate or Higher	Percent College Graduate or Higher
Portage	39.8%	15.6%
Stark	39.5%	13.4%
Summit	31.9%	19.8%
Wayne	43.0%	13.6%
Ohio	35.2%	15.7%
U.S	28.5%	17.7%

Sources: 2010 American Community Survey, 1-Year Estimates
StatsAmerica, May 2012

Some interesting patterns emerge when viewing poverty rates for each county (Table 2-11). Although the four counties report 2010 poverty rates below the national rate of 15.3, analyses of the five-year percentage change in this rate provides a disparate picture of the counties. Portage County saw an 84 percent increase in the general poverty rate between 2005 and 2010. The poverty rate of children under 18 also changed markedly between 2005 and 2010, though not as drastically as the poverty rate for Portage County's general population. Although these trends are likely a mirror of the national trend for poverty, the disparately large increases in the poverty rates seen in Portage and Wayne Counties may provide guidance on how best to reach residents with information on environmental programs.

Table 2-11 Poverty Estimates						
County	Poverty Rate		5-Year % Change	Poverty Rate for Children Under 18		5-Year % Change
	2010	2000		2010	2000	
Portage	15.1	8.2	84.1%	18.1	10.7	69.2%
Stark	14.6	9.1	60.4%	23.1	13.8	67.4%
Summit	15.4	9.6	60.4%	22.4	13.7	63.5%
Wayne	12.6	8.0	57.5%	20.4	11.9	71.4%
Ohio	15.8	9.8	61.2%	23.1	14.1	63.8%
U.S	15.3	12.4	Not Avail.		16.6	Not Avail.

Source: StatsAmerica, 2012; Census 2000.

Conclusion

The most recent concern to water quality today is occurring in the rapidly developing areas of the region on the periphery of the existing urban areas. This threat comes from a variety of potential sources, including nonpoint source discharges from residential and commercial developments, but most significantly from the combined effects of land disturbances to construct these new developments. This transformation is threatening regionally important water resources once thought relatively secure from water pollution threats (upland drinking water reservoirs, headwaters areas, and high quality streams once far removed from urbanization). Thus, while the perceived water pollution problems of the 1970s have largely been addressed, there remains a whole new set of water pollution challenges at the turn of the century to be confronted. Land uses will change from a predominantly rural character to urbanizing uses, and this will affect whether water runs off the land surface or seeps into the ground. This trend will have an impact on water quality.