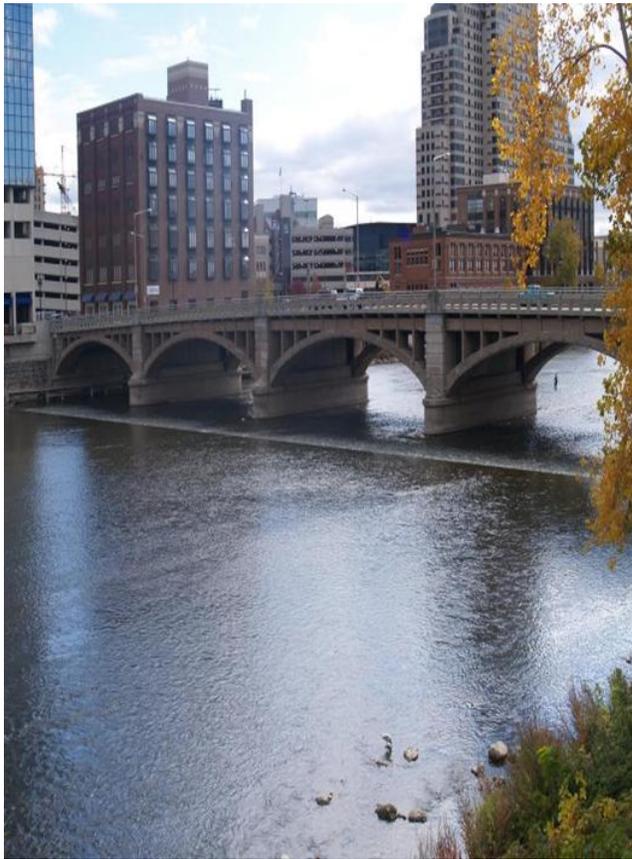


Lower Grand River Watershed Management Plan



August 2011
MDEQ Tracking Code 2007-0137

LOWER GRAND RIVER
ORGANIZATION *of* WATERSHEDS



Michigan's
Nonpoint Source
Program

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

1.1	Watershed Management Plan Purpose	1
1.2	Designated Uses	2
1.3	Lower Grand River Organization of Watersheds and Subcommittees	2
1.4	Public Participation Process	4
1.5	Public Commenting	5

CHAPTER 2 WATERSHED CHARACTERISTICS

2.1	Cultural History	1
2.2	Geographic Scope and Boundaries	2
2.3	Geology and Topography	3
2.4	Soils	4
2.5	Hydrology	6
2.6	Natural Resources	13
2.7	Land Use and Land Cover	21
2.8	Political Boundaries	23
2.9	Development Trends	23

CHAPTER 3 WATERSHED CONDITIONS

3.1	Designated and Desired Uses	1
3.2	Water Quality Standards	4
3.3	Watershed Inventory and Conditions	4
3.4	Watershed Pollutant Summary	15
3.5	Designated Use Summary	16

CHAPTER 4 IDENTIFICATION AND PRIORITIZATION OF POLLUTANTS, SOURCES, AND CAUSES

4.1	Identifying Sources and Causes	1
4.2	Nonpoint Sources	1
4.3	Pollutant Loading By Subwatershed	10
4.4	Identification of Critical Areas for Restoration	16
4.5	Identification of Priority Areas for Preservation and Protection	21

CHAPTER 5 GOALS AND OBJECTIVES OF THE WATERSHED

5.1	Goals for the Watershed	1
5.2	Objectives for the Watershed Goals	2

CHAPTER 6 IMPLEMENTATION PLAN

6.1	Best Management Practices	1
6.2	Recommended Structural and Vegetative BMPs	1
6.3	Managerial Strategies	9
6.4	Wetland Restoration/Preservation	10
6.5	Land Use Planning	10
6.6	Accomplishment Assessment	15
6.7	Estimated Pollution Reductions from Proposed Actions and BMPs	29
6.8	Action Plan Implementation	37

CHAPTER 7 INFORMATION AND EDUCATION STRATEGY

7.1	Driving Forces, Goals, and Objectives	1
7.2	Identifying Target Audiences	2
7.3	Developing Messages	12
7.4	Selecting Delivery Mechanisms	12
7.5	Implementation of I&E Strategy	13
7.6	Coordination with NPDES MS4 Storm Water Requirements	14

TABLE OF CONTENTS

CHAPTER 8 METHODS OF MEASURING PROGRESS

8.1	Measures of Success.....	1
8.2	Indicators of Overall Water Quality	1
8.3	Ongoing Watershed Monitoring Efforts.....	4
8.4	Environmental Assessments.....	15
8.5	Volunteer Monitoring Toolbox	18
8.6	Evaluation Framework	18

CHAPTER 9 SUSTAINABILITY

9.1	Introduction	1
9.2	A Strategic Beginning.....	1
9.3	A New Watershed Organization.....	1
9.4	Organizational Sustainability.....	2
9.5	Measuring Watershed Accomplishments.....	4
9.6	Environmental and Community Sustainability	5
9.7	The Future of Watershed Management in the Lower Grand	6

TABLE OF CONTENTS

LIST OF TABLES

2.1a	Subwatershed Management Units in Major Subwatersheds	2
2.1b	Acreeages of Subwatershed Management Units	3
2.2	Hydrologic Soil Groups	4
2.3	Acreeages of Hydrology Soils Groups	5
2.4	Streams in the Lower Grand River Watershed Direct Drainage (Not Found In Any Other Major Subwatershed)	8
2.5	Streams in Thornapple River Subwatershed	9
2.6	Streams in Flat River Subwatershed	10
2.7	Streams in Rogue River Subwatershed	10
2.8	Flow Rates by Storm Event Predictions for the LGR	11
2.9	Wellhead Protection Areas	13
2.10	Designated Trout Streams	16
2.11	Invasive Species	17
2.12a	Endangered Animal Species in LGRW	19
2.12b	Endangered Plant Species in LGRW	20
2.13	Land Use by Subwatershed	22
2.14	Population (2000 census)	25
3.1	Desired Uses	3
3.2	Summary of 2010 Integrated Report for Waterbodies in the LGRW	5
3.3	NPS Inventory Summary	11
3.4	NPDES MS4 Storm Water Permittees	14
3.5	Status of Designated Uses	17
4.1	Pollutant Sources and Causes of Impairments	6
4.1a	Sediment and Nutrient Loadings by Source - NPS Sites	11
4.1b	EMC and Imperviousness Percentage Values used in P-LOAD Model	11
4.2	Sediment and Nutrient Loading - NPS Sites & P-LOAD	12
4.2a	Pollutant Loadings Reported in TMDL Report in Stream Reaches With Approved TMDLs	14
4.3	Critical Areas for Restoration	17
4.4	Priority Areas for Preservation and Protection	22
5.1	Goals and Objectives	3
6.1a	Action Plan for Restoration	3
6.1b	Action Plan for Preservation	12
6.2	Measurable Milestones	17
6.3	Pollutant Loadings and Expected Reductions from NPS Sites	31
6.4	Reduction Goals for Phosphorus in Approved TMDL Subwatershed	33
6.5	TMDL Reduction Goals for Biota	34
6.6	TMDL Reduction Goals for Phosphorus	36
7.1a	Information & Education Strategy to Raise Public Awareness	17
7.1b	Information & Education Strategy to Address Pathogens and Bacteria	22
7.1c	Information & Education Strategy to Address Sediment	24
7.1d	Information & Education Strategy to Address Nutrients	28
7.1e	Information & Education Strategy to Address Unstable Hydrology	32
7.1f	Information & Education Strategy to Address High Temperature	34
7.1g	Information & Education Strategy to Address Habitat Fragmentation	35
7.1h	Information & Education Strategy to Address Chemicals	36
8.1	Water Quality Monitoring and Evaluation for the Watershed	5
8.2	Assessment Strategy for the LGRW	17

TABLE OF CONTENTS

LIST OF FIGURES

- 2.1 Lower Grand River Watershed
- 2.2 LGRW Major Subwatersheds and Subwatershed Management Units
- 2.3 Topography
- 2.4 Hydrologic Soils Groups
- 2.5 Hydric Soils
- 2.6 Hydrology
- 2.7 Wellhead Protection Areas
- 2.8 Dam Locations
- 2.9 Wetlands Circa 1800
- 2.10 Potential Wetland Restoration Areas
- 2.11 Designated Trout Streams
- 2.12 Prime Farmland Soils
- 2.13 Natural Connections
- 2.14 2006 Land Use and Cover
- 2.15 2000 Census Total Population

- 3.1A Dissolved Oxygen Impairment, Identified in the MDEQ 2010 Integrated Report
- 3.1B *E. coli* Impairment, Identified in the MDEQ 2010 Integrated Report
- 3.1C Phosphorus Impairment, Identified in the MDEQ 2010 Integrated Report
- 3.1D Sedimentation/Siltation Bacterial Slimes, and Cause Unknown Impairments, Identified in the MDEQ 2010 Integrated Report
- 3.2 Subwatershed Management Units with Nonpoint Source Pollution Inventories
- 3.3 Septic System Counts

- 4.1 Critical Areas for Restoration
- 4.2 Priority Areas for Preservation

- 9.1 Membership Chart – Lower Grand River Organization of Watersheds

LIST OF ABBREVIATIONS/ACRONYMS

AWH	alterations to wetland habitats
AWRI	Annis Water Resources Institute
BEDHD	Barry-Eaton District Health Department
BEHI	Bank Erosion Hazard Index
BMP	Best Management Practices
BS	bacterial slimes
C-CAP	Coastal Change Analysis Program
CES	Center for Environmental Study
cfs	cubic feet per second
CMI	Clean Michigan Initiative
CNMP	Comprehensive Nutrient Management Plan
CRWC	Coldwater River Watershed Council
CSC	Coastal Services Center
CSO	combined sewer overflows
DIP	Data, Information, and Procedures
DO	dissolved oxygen
<i>E. coli</i>	Escherichia Coli
EMC	event mean concentration
FTC&H	Fishbeck, Thompson, Carr & Huber, Inc.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS/ACRONYMS (continued)

GILC	Green Infrastructure Leadership Council
GIS	Geographic Information System
GLC	Great Lakes Commission
GLEAS	Great Lakes and Environmental Assessment Section Procedure 51 (P51)
GLRI	Great Lakes Regional Information
GVMC	Grand Valley Metropolitan Council
GVSU	Grand Valley State University
IDEP	Illicit Discharge Elimination Plan
I&E	Information and Education
KCHD	Kent County Health Department
LGR	Lower Grand River
LGROW	Lower Grand River Organization of Watersheds
LGRW	Lower Grand River Watershed
LID	Low Impact Development
LLWFA	Landscape Level Wetland Functional Assessment
MACC	Macatawa Area Coordinating Council
MARB	Market Avenue Retention Basin
MCGI	Michigan Center for Geographic Information
MDA	Michigan Department of Agriculture
MDEQ	Michigan Department of Environmental Quality
MDNRE	Michigan Department of Natural Resources and Environment
MDOT	Michigan Department of Transportation
mg/L	milligrams per liter
mi ²	square miles
mL	milliliter
MNFI	Michigan Natural Features Inventory
MPO	Metropolitan Planning Organizations
MS4	Municipal Separate Storm Sewer System
MSU	Michigan State University
MSUE	Michigan State University Extension
NA	not assessed
NOAA	National Oceanographic and Atmospheric Administration)
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
NRCS	Natural Resource Conservation Service
NS	not supporting
OASA	other anthropogenic substrate alterations
OFRA	other flow regime alterations
PCAs	Potential Conservation Areas
PCBs	polychlorinated biphenyls
PDR	Purchase of Development Rights
PEP	Public Education Plan
SEMCOG	Southeast Michigan Council of Governments
SESC	Soil Erosion and Sedimentation Control
SS	sedimentation/siltation
SMU	subwatershed management unit
s.u.	standard unit
SWMP	Storm Water Management Program
SWPPI	Storm Water Pollution Prevention Initiative

TABLE OF CONTENTS

LIST OF ABBREVIATIONS/ACRONYMS (continued)

TDS	total dissolved solids
TSS	total suspended solids
TMDL	total maximum daily loads
TOST	Time of Sale or Transfer
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WMEAC	West Michigan Environmental Action Council
WMP	Watershed Management Plan
WPA	Works Progress Administration
WRP	Wetlands Reserve Program
WQBEL	water quality-based effluent limits
WQS	Water Quality Standards
ZCTA	ZIP Code Tabulation Area

LIST OF APPENDICES

1.1	Lower Grand River Organization of Watersheds Committee Members
1.2	Lower Grand River Watershed Public Participation Process
1.3	Subwatershed Management Unit Summary Sheet Reviewers
2.1	Streams / Lakes / Dams
2.2	Michigan Natural Features Inventory
3.1	Water Quality Standards
3.2	Lower Grand Waterbodies on MDNRE 303(d) and 2010 Integrated Report
3.3	NPS Pollution Inventories of Deer Creek, Bass River, and Thornapple River – Summer 2009
3.4	Hydrology Report
3.5	Lower Grand River Watershed Functional Wetlands Final Report
4.1	Subwatershed Management Unit Summary Sheets and Figures
6.1	Best Management Practices Master Lists A – Structural and Vegetative B – Managerial C – Technical and Financial
6.2	Policy Status Spreadsheet
6.3	Wetland Action Plans
6.4	STEPL Model Worksheets
7.1	Public Education Plan
7.2	Social Profile
8.1	Volunteer Monitoring Toolbox and Feedback Forms
8.2	Lower Grand River Organization of Watersheds Vision Outline
8.3	Accomplishment Data
9.1	LGROW Bylaws