CMAP

Water Quality Activities Report 2017-18

DECEMBER 2018

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Contents

Watershed Planning 4
- Lower Salt Creek Watershed-based Plan 4
- Mill Creek Watershed-based Plan 9
- Watershed Management 12

Wastewater Planning 14
- Water Quality Management Plan Support 14

Lake Monitoring and Management 15
- Volunteer Lake Monitoring Program 15

Related Water Resource Activities 18
- ON TO 2050 18
  - Plan Recommendations 18
  - Strategy Papers 19
- Stormwater Management and Flooding 20
  - Regional Flood Susceptibility Index 20
  - Stormwater Planning Assistance 21
  - Calumet Stormwater Collaborative 21
- Water Supply 22
  - ON TO 2050 Regional Water Demand Forecast 22
  - Reducing Water Loss 23
  - Sub-regional Coordination 23
- Climate Resilience 24
  - Incorporating Climate Science into Local Plans 24
- Local Technical Assistance 25
  - Algonquin-Cary Subarea Plan 25
  - Beecher Comprehensive Plan 25
  - Berwyn Stormwater Management Plan 25
  - Carol Stream Zoning Code Update 26
  - Channahon Comprehensive Plan 26
  - Chicago North River Communities Neighborhood Plan 26
  - Cook County (Maine-Northfield) Unincorporated Area Plan 26
  - Des Plaines Comprehensive Plan 27
  - Fox River Corridor Plan (McHenry and Lake Co.) 27
  - Franklin Park Comprehensive Plan 28
  - Governors State University Transportation Impact Reduction and Green Infrastructure Plan 28
  - Illinois International Port District (IIPD) Planning Priorities Report 28
  - Midlothian 147th Street Corridor Plan 28
  - Midlothian Stormwater Management Capital Plan 28
  - Robbins Stormwater, TOD, and Industrial Area Plan 29
  - Richton Park Stormwater Management Plan 29
  - Sandwich Planning Priorities Report 29
  - South Holland Comprehensive Plan 29
  - Thornton Planning Priorities Report 29

As the delegated Areawide Water Quality Planning agency for the region, CMAP works with local governments and stakeholders to conserve and restore the region's water resources to help achieve the goals of the Areawide Water Quality Management Plan. In 2017 and 2018, CMAP worked to improve water quality through various program areas: watershed planning, wastewater quality planning and management, the Illinois Volunteer Lake Monitoring Program (VLMP), and the Local Technical Assistance program. Other program areas that supported and complemented water quality improvements include stormwater management and flooding, water supply, and climate resilience. CMAP also ensured that improved water quality and water resources was a strong focus of the region's next regional plan, ON TO 2050.

Watershed Planning

CMAP was involved in the development of two watershed plans in 2017 and 2018 to protect and remediate water quality: the Lower Salt Creek watershed plan and the Mill Creek watershed plan. CMAP also advised partners with the development of Section 319 grants and assisted with watershed management coordination throughout northeastern Illinois.

Lower Salt Creek Watershed-based Plan

The Lower Salt Creek Watershed Planning project began in 2016. Supported by a Clean Water Act Section 604(b) planning grant from the Illinois EPA, CMAP worked with project partners DuPage County Stormwater Management and DuPage River Salt Creek Workgroup to develop a watershed-based plan for the Lower Salt Creek Watershed – the area that drains to Salt Creek from below the outlet of Busse Lake southward to Salt Creek's confluence with the Des Plaines River in Lyons (Figure 1). Located primarily in eastern DuPage and western Cook Counties, the planning area includes the Spring Brook, Westwood, Sugar, Ginger, and Addison Creek subwatersheds. The 100.7 square mile planning area spans 34 municipalities and 11 townships.

The purpose of this plan is to work with local stakeholders to develop recommendations that upon implementation will help restore and protect the water quality of Salt Creek, its tributaries, and the numerous lakes and ponds within this highly urbanized area. The plan follows watershed-based planning guidelines established by the U.S. Environmental Protection Agency in order for implementation projects to be eligible for Clean Water Act Section 319(h) grant funding.

Figure 1. Lower Salt Creek watershed planning area.

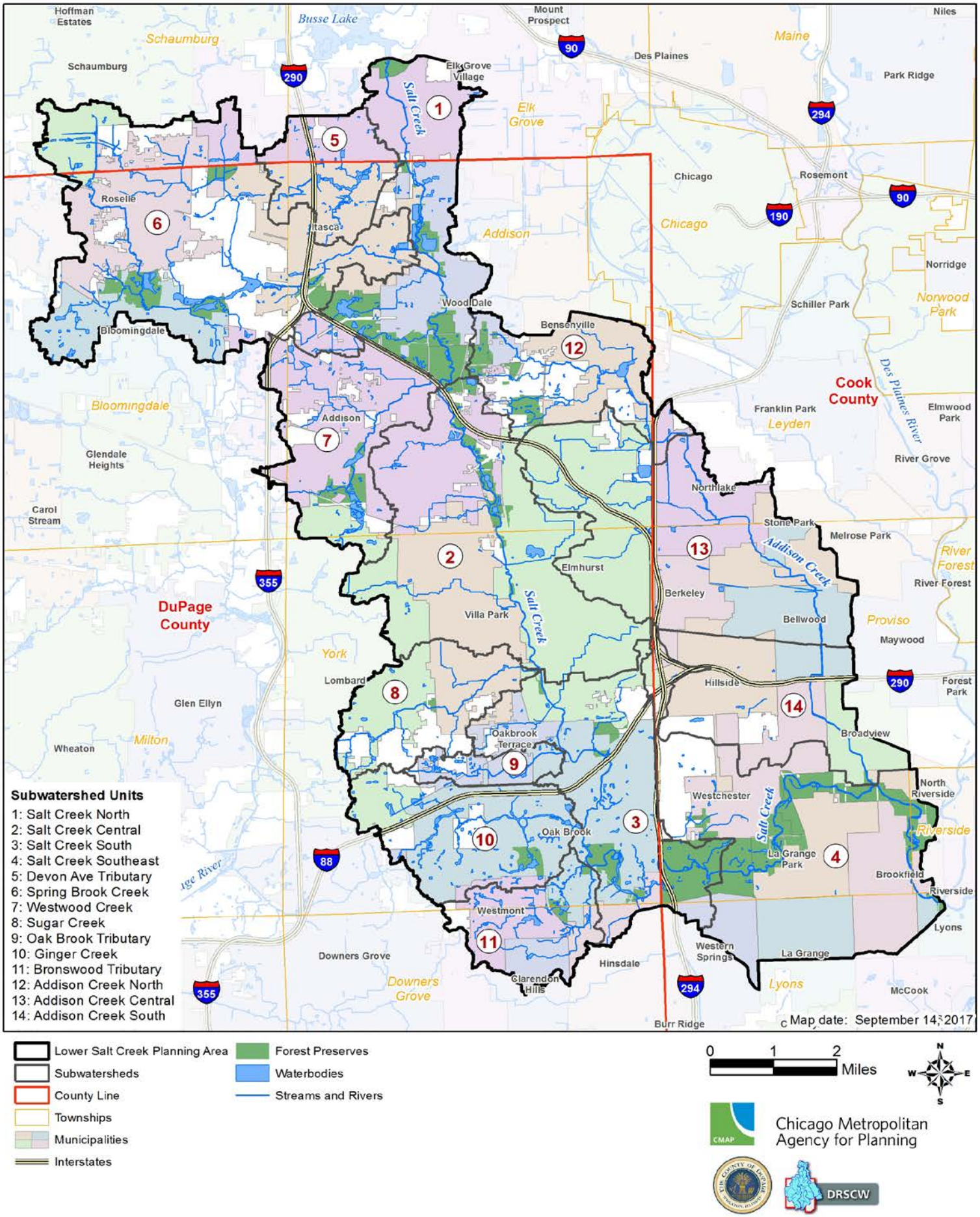
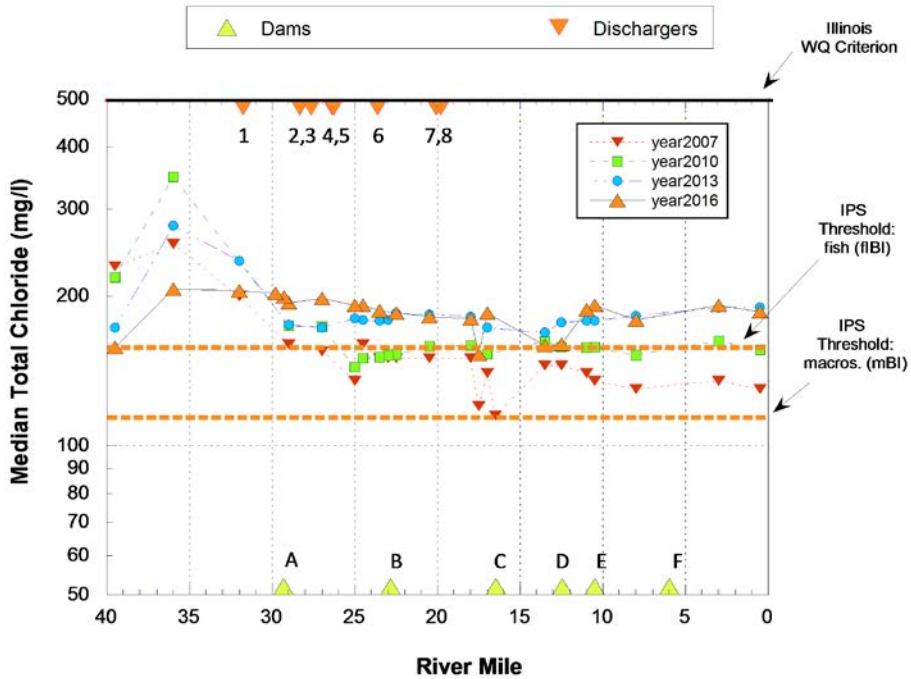


Figure 2. Longitudinal median summer chloride concentrations in Salt Creek, 2007-2016.



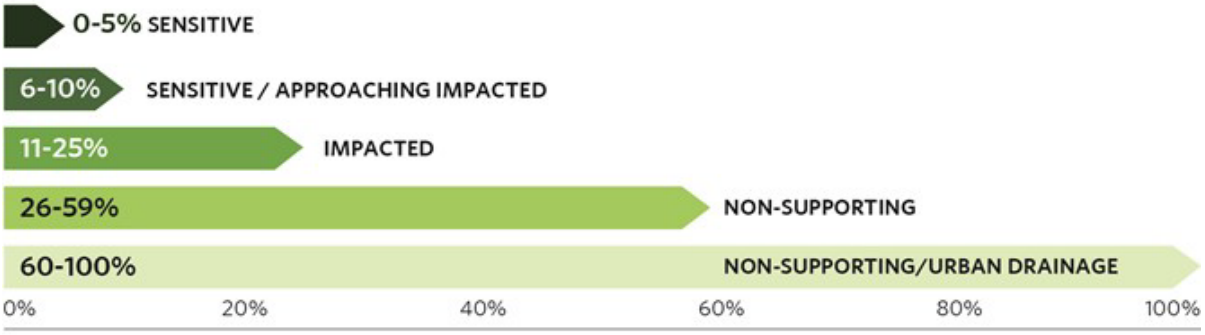
Source: DuPage River Salt Creek Workgroup. Notes: Yellow triangles along the bottom X axis depict mainstem dams. Red triangles along the upper X axis depict WWTP discharges. The thick black line along the upper X-axis denotes the Illinois water quality standard for chloride (500 mg/L). The orange dashed lines denote the Integrated Priority System (IPS) threshold criteria for fish (112 mg/L) and macroinvertebrates (141 mg/L).

For over a year and a half, more than 50 local residents, community leaders, businesses, local government agencies, and other organizations participated in meetings, identified local water resource goals, and contributed invaluable information on local water issues and potential best management practices throughout the Lower Salt Creek planning area. During this public engagement process, CMAP inventoried and analyzed the planning area's physical and natural features, land use and land cover, water resource conditions, pollutant sources, and land management practices. This work served as a basis for communicating the existing water quality and stream health conditions as well as identifying goals and recommendations for protecting and improving water quality and habitat conditions in the planning area.

A few analyses to highlight from the Lower Salt Creek Watershed-based Plan include DuPage River Salt Creek Workgroup's (DRSCW) comprehensive instream data collection through their bioassessment program including chloride monitoring, as well as CMAP's evaluation of stream health as a function of impervious surface extent.

Approximately 51 sites in the Salt Creek watershed—which encompasses the Lower Salt Creek planning area—were sampled in 2006, 2010, 2013, and 2016 through DRSCW's extensive bioassessment program. Based on 2016 data samples, biological assemblages sampled are rated poor to fair. Because of the low biological performance, none of the 51 sites sampled within the watershed fully supported Illinois EPA aquatic life use goals. The 2016 data included physical habitat quality that was evaluated using the Qualitative Habitat Evaluation Index (QHEI) at 21 sites along the Salt Creek main stem (study units #1-4), 6 sites in the Springbrook Creek subwatershed (study unit #6), one site on Westwood Creek (study unit #7), 6 sites in the Addison Creek South subwatershed (study unit #14), one site on Sugar Creek (study unit #8), two sites on the Oak Brook Tributary (study unit #9), and two sites on Ginger Creek (study unit #10). Data obtained from the QHEI utilized in the physical stream condition survey includes channelization, bank erosion, and riparian width.

Figure 3. Stream health categories relative to extent of imprvious surface.



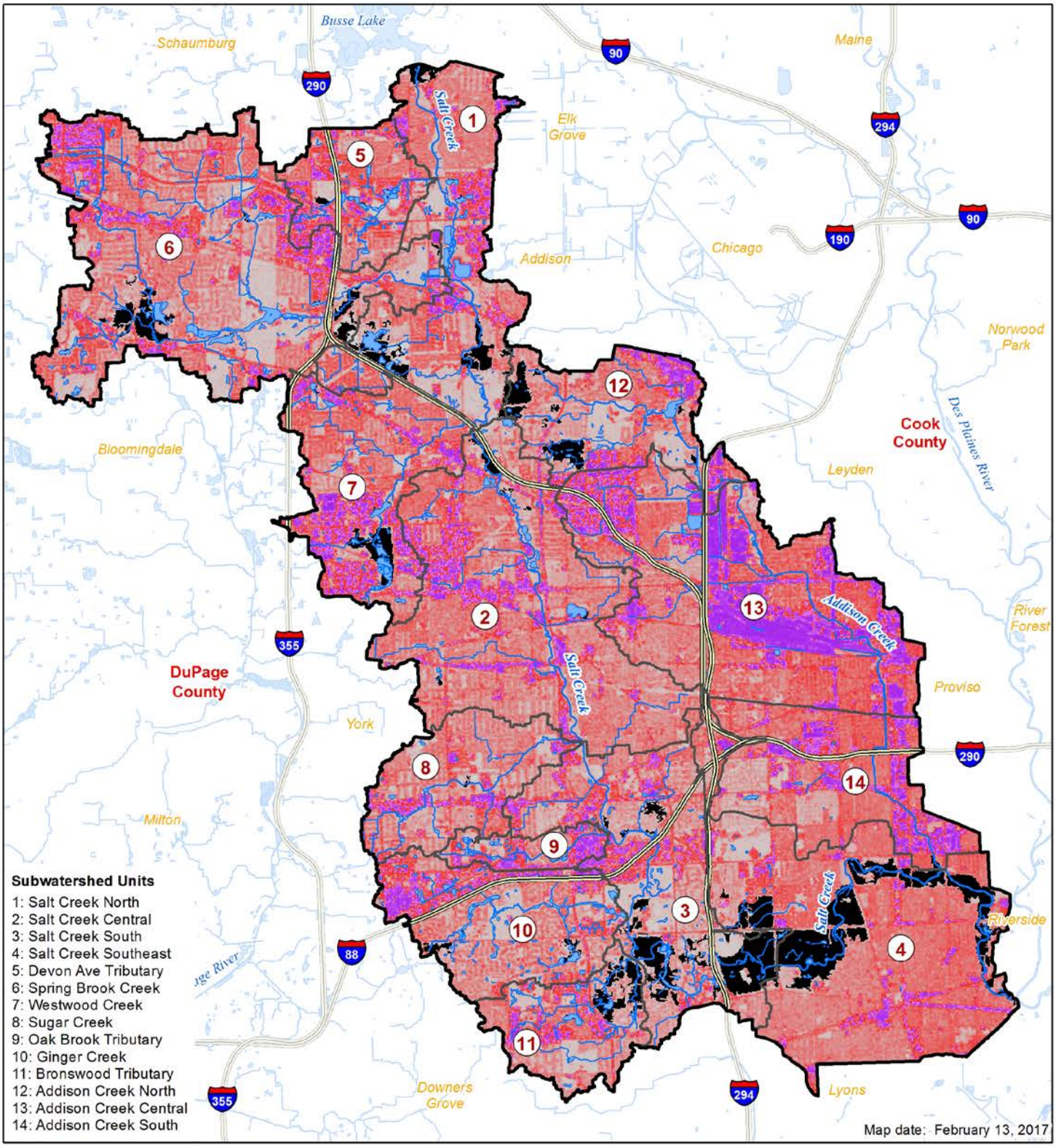
Salt Creek drains a highly urbanized landscape with a high population density. Pollutants associated with urbanized landscapes, especially heavy metals, hydrocarbons, and road de-icing compounds, enter the stream system via stormwater flows. Unlike heavy metals and hydrocarbons that typically attach to sediment particles, de-icing compounds are soluble and primarily persist in the water column. The water quality "footprint" resulting from de-icing compounds is most obvious in the small tributaries and especially in the headwater network upstream from Salt Creek's confluence with Spring Brook Creek (at approximately River Mile 24.8) (Figure 2). Summer concentrations of chlorides measured in the headwaters of Salt Creek were elevated to the point that if one were to attempt drinking the water, the taste would be "salty." Chloride concentrations that elevated are anomalous for freshwater systems and are beyond the tolerance of most macroinvertebrates. Plan recommendations outline a number of strategies for reducing road salt, including how municipalities store salt, calibrate de-icing equipment, alternative de-icing agents, and best practices for de-icing applications.

For purposes of the Lower Salt Creek Watershed-based Plan, impervious surface is best understood in the context of its impact on stream quality. The percent of impervious cover is a widely used metric for estimating stream health at the watershed scale.[1] Figure 3 illustrates the relationship between stream health and the degree of impervious surface.

In the Lower Salt Creek planning area, stream health was assessed at the subwatershed level since the relationship between impervious surface and stream quality is best examined at smaller units of geography, such as the subwatershed scale. Of the fourteen subwatersheds, thirteen fall within the non-supporting category, and one (Addison Creek Central) falls in the highest category of non-supporting / urban drainage with 61 percent of the subwatershed being completely impervious (Figure 4).

Plan recommendations emphasize infill development and redevelopment, the use of sustainable development and natural resource management best practices, as well as site-level green infrastructure practices to protect and maintain sensitive water quality and aquatic habitat conditions within the watershed. In addition to local planning and policy recommendations, numerous on-the-ground best management practices (BMPs) were identified. These included various urban stormwater infrastructure retrofits such as bioretention and detention basin retrofits, stream channel and riparian buffer establishment and restoration, and chloride reduction strategies. Total pollutant load reductions and costs for BMPs also were estimated. Public education and outreach activities were also outlined to help support plan goals and recommendations. Planning partners and local stakeholders contributed extensively to the identification of site-specific BMPs and development of watershed-wide BMP scenarios. Collectively, these efforts culminated in an action plan that seeks to protect and restore water quality and watershed health. The full plan was scheduled for completion in December 2017, finalized in December 2018, and scheduled to be posted to CMAP's website in early 2019.

Figure 4. Subwatershed imperviousness and associated stream health



Percent Imperviousness

- 0
- 1-9
- 10-19
- 20-29
- 30-39
- 40-49
- 50-59
- 60-69
- 70-79
- 80-89
- 90-99
- 100
- Lower Salt Creek Planning Area
- Subwatersheds
- County Line
- Townships
- Municipalities
- Interstates
- Waterbodies
- Streams and Rivers

0 1 2 Miles

Chicago Metropolitan Agency for Planning

Mill Creek Watershed-based Plan

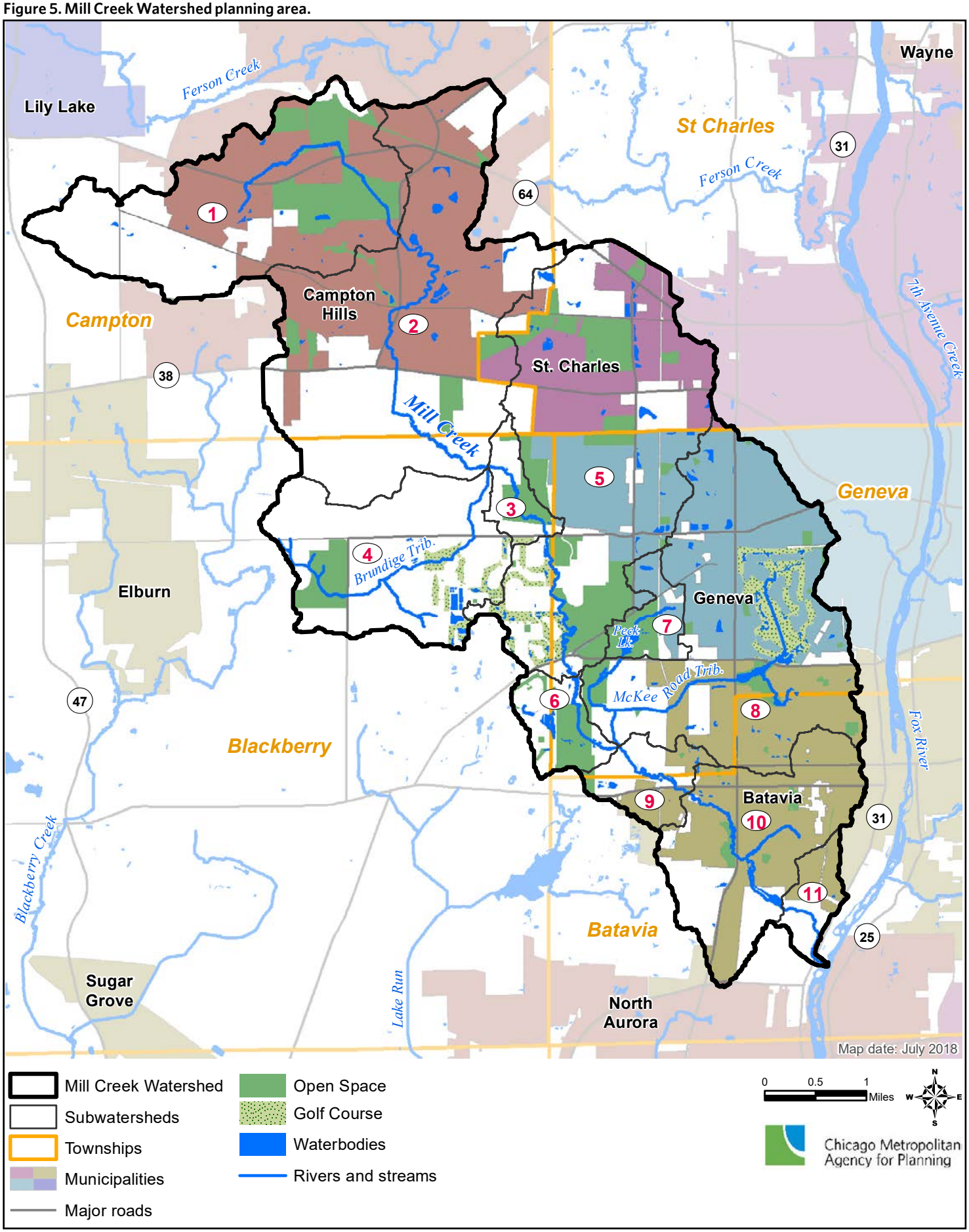
The Mill Creek Watershed planning project is supported by a Clean Water Act Section 604(b) planning grant from the Illinois Environmental Protection Agency (IEPA). Starting in 2017, CMAP began working with Kane County's Division of Environmental and Water Resources and Development and Community Services Department along with the Fox River Ecosystem Partnership and Fox River Study Group to develop a watershed-based plan for the Mill Creek Watershed. The watershed is a 31 square mile area that drains to Mill Creek—a tributary of the Fox River—and includes the majority of four municipalities (Batavia, Campton Hills, Geneva, and St. Charles) and five townships within east-central Kane County.

Originating in a Campton Hills subdivision approximately a half mile west of the Campton Forest Preserve, Mill Creek meanders in a south-southeast direction for nearly 15 miles and junctures at the Fox River in an unincorporated area of Batavia (Figure 5).

The purpose of this plan is to work with local stakeholders to develop planning, policy, and on-the-ground project recommendations that, upon implementation, will help improve and protect the water quality in Mill Creek, its tributaries, and the numerous wetlands, lakes, and ponds within this agricultural and urbanized area. The plan will follow watershed-based planning guidelines established by the U.S. EPA and Illinois EPA in order for implementation projects to be eligible for Clean Water Act Section 319(h) grant funding.

Poster created for the Mill Creek Watershed Open House in September 2018.

Figure 5. Mill Creek Watershed planning area.



The draft of the watershed resource inventory was submitted to the Illinois EPA in July 2018. The inventory includes an overview of the planning area's population and demographics, physical and natural features, land use, water resource conditions, pollutant sources, and land management practices. In addition to the inventory, CMAP spent the summer of 2018 conducting an assessment of Mill Creek's physical conditions (Figure 6). This entailed collecting data on streambank erosion, bottom composition, as well as observations of native and invasive terrestrial and aquatic species. Staff also hosted an open house in September 2018 to provide the public with an opportunity to participate in the watershed plan development process. Additional opportunities to provide public input will held during 2019. The full plan is scheduled for completion in September 2019.

Figure 6. Mill Creek Stream assessment, summer 2018

Watershed Management Coordination

Throughout the year, staff provided technical assistance, guidance, and regional coordination to water quality related planning and management activities led by others in the region. As funding allows, and consistent with the water quality management planning work approved by Illinois EPA, staff directs efforts at those entities either undertaking watershed planning initiatives, implementing Illinois EPA approved plans, or conducting activities related to evolving issues and the Clean Water Act (CWA). Such entities include those funded through the Clean Water Act or those focused on addressing CWA Section 303(d) listed (i.e., impaired) waters. Partner organizations and activities are summarized in Table 1 and Table 2.

A state initiative with which CMAP is involved is the Illinois Nutrient Loss Reduction Strategy. The strategy lays out a comprehensive suite of best management practices for reducing nutrient loads from wastewater treatment plants and urban and agricultural runoff. Staff serves on the Urban Stormwater Working Group and its Education Subgroup. In 2017-18, staff participated in several conference calls, contributed to a "stormwater education resources" database, hosted the September 2018 Workgroup meeting, and attended the NLRS Partnership Workshop in November 2018 in Urbana in support of this initiative.

Table 1. Watershed management coordination activities

ACTIVITIES
Hosted and participated in a variety of meetings in person and via conference calls with watershed and water resource-related groups.
Provided technical assistance to groups associated with the following watersheds: Upper and Lower Des Plaines River, Thorn Creek, DuPage River, Salt Creek, Addison Creek, Fox River, Boone Creek, Dutch Creek, Flint Creek, Spring Creek, Poplar Creek, Tyler Creek, Cal-Sag Channel, Little Calumet River.
Participated in discussions with various partners regarding approaches for developing watershed-based plans for the Lake Michigan coastal watersheds.
Presented on the history, status, and strategies regarding water quality, water supply, and stormwater and flooding in northeastern Illinois to watershed groups as well as CMAP's new Deputy Executive Director for Planning.
Provided technical assistance in the preparation of Section 319(h) grant applications.
Followed the ongoing development of watershed-based plans in northeastern Illinois.
Stayed abreast of water quality- and watershed-based partner activities via email correspondence and meeting notes.

Table 2. Watershed management coordination partners

PARTNERS
Association for the Wolf Lake Initiative
Buffalo Creek Clean Water Partnership
Chicago Wilderness
City of St. Charles (State Street Creek and 7th Avenue Creek Watershed-based Plan)
City of McHenry (Section 319 grant application assistance - Boone-Dutch Creek Watershed-based Plan)
Des Plaines River Watershed Workgroup (DRWW)
Des Plaines River Watershed planning group (DPR)
DuPage County Municipal Engineer's Discussion Group
DuPage River Salt Creek Workgroup (DRSCW)
Elmhurst Park District (Section 319 grant application assistance – Lower Salt Creek Watershed-based Plan)
Environmental Defenders of McHenry County: Boone-Dutch Creek Watershed Alliance
Flint Creek/Spring Creek Watersheds Partnership
Fox River Ecosystem Partnership (FREP)
Fox River Study Group (FRSG)
Hickory Creek Watershed Planning Group
Illinois Department of Natural Resources (DNR)
Illinois DNR Coastal Management Program
Illinois Nutrient Loss Reduction Strategy (NLRS) Urban Stormwater Working Group and Education Subgroup
Jelkes Creek - Fox River Watershed Coalition
Lake County Health Department – Lakes Management Unit
Lake County Stormwater Management Commission (Des Plaines River Watershed Plan)
Metropolitan Planning Council (Section 319 watershed planning for MWRD watershed plans)
Metropolitan Water Reclamation District (MWRD) of Greater Chicago
MWRD's Poplar Creek Watershed Planning Council
MWRD's Upper Salt Creek Watershed Planning Council
Northwest Water Planning Alliance (NWPA)
Oakbrook Park District (Section 319 grant application assistance – Lower Salt Creek Watershed-based Plan)
Our Great Rivers Implementation Committee
Salt Creek Watershed Network (SCWN)
Silver & Sleepy Hollow Creeks Watershed Coalition
Tower Lakes Drain Partnership
Tyler Creek Watershed Coalition
Village of Carpentersville (Section 319 grant application assistance - Jelkes Creek / Fox River Watershed Action Plan)
Wolf Lake Advisory Committee
9 Lakes Watershed Partnership

Wastewater Planning

Water Quality Management Plan Support

CMAP continued to manage a process for reviewing and providing feedback on wastewater facilities, service areas, and infrastructure loan applications as part of its responsibilities as the designated agency for such activities. This includes discussing and/or reviewing Facility Planning Area (FPA) amendment requests from the region's stakeholders until such time as a replacement program is in place. A number of conversations regarding the future of CMAP's wastewater planning responsibilities occurred over the past two years, and are expected to continue into 2019 and beyond until a replacement program is active. In 2017 and 2018, CMAP reviewed one FPA amendment request for a wastewater treatment facilitation expansion in the Village of Manhattan. The request was reviewed using CMAP's Facility Planning Area Procedures Manual as well as the guiding principles and goals of the region's newest comprehensive regional plan, ON TO 2050. CMAP also responded to multiple requests for comment and guidance on FPA boundary-related questions.

Under contract with Illinois EPA to implement the Areawide and Illinois Water Quality Management Plan, CMAP administered National Pollutant Discharge Elimination System (NPDES) permit notices and State Revolving Loan Fund (SRF) application notices during 2017 and 2018 (Table 3). For each notice received, CMAP reviewed its content and notified partners and other interested parties of the proposed action. In total, 194 NPDES permit applications and three SRF applications were reviewed.[2] CMAP has also reviewed five preliminary environmental impact determinations and 25 Notices for Categorical Exclusions from Detailed Environmental Review.

Table 3. Notices reviewed and processed by year

APPLICATION TYPE	2017	2018
NPDES Permit	82	112
State Revolving Loan Fund (SRF)	3	0
Notice of Categorical Exclusion from Environmental Review	13	13
Preliminary Environmental Impact Determination	4	1
Total	**102**	**126**

Lake Monitoring and Management

Volunteer Lake Monitoring Program

The Illinois Volunteer Lake Monitoring Program (VLMP) marked its 37th and 38th seasons in 2017 and 2018, respectively. Initiated by Illinois EPA in 1981, this popular program brings together citizens, state agency staff, and regional and local governmental staff to monitor and investigate the quality of Illinois lakes. In northeastern Illinois, CMAP served as program coordinator for the counties of Cook, DuPage, Kane, Kendall, McHenry, and Will, while the Lake County Health Department coordinated the program in Lake County. Staff provide volunteer training, technical assistance, educational materials, training material updates, data and equipment management, volunteer recognition recommendations, and assistance in annual report preparation. All monitoring equipment, data forms, instructional materials (including a comprehensive Training Manual), and other supplies are provided to the volunteers. Volunteers need only have a boat and anchor to participate.

Primary goals of the VLMP are to familiarize volunteers with lake processes and to help them learn about lake ecology and the cause-and-effect relationships that exist between their lake, its watershed, weather, and human activity. Through the VLMP's hands-on educational structure, the data and information gathered can more effectively assist in local lake and watershed management decision-making. Lake scientists, planners, and consultants also use the data for a wide variety of purposes. Furthermore, the Illinois EPA uses VLMP data in its biennial assessment of the state's waters as required by the federal Clean Water Act. Volunteers provide monitoring data and labor that would otherwise require IEPA or contracted staff to collect, and thus improves efficiency for the agency.

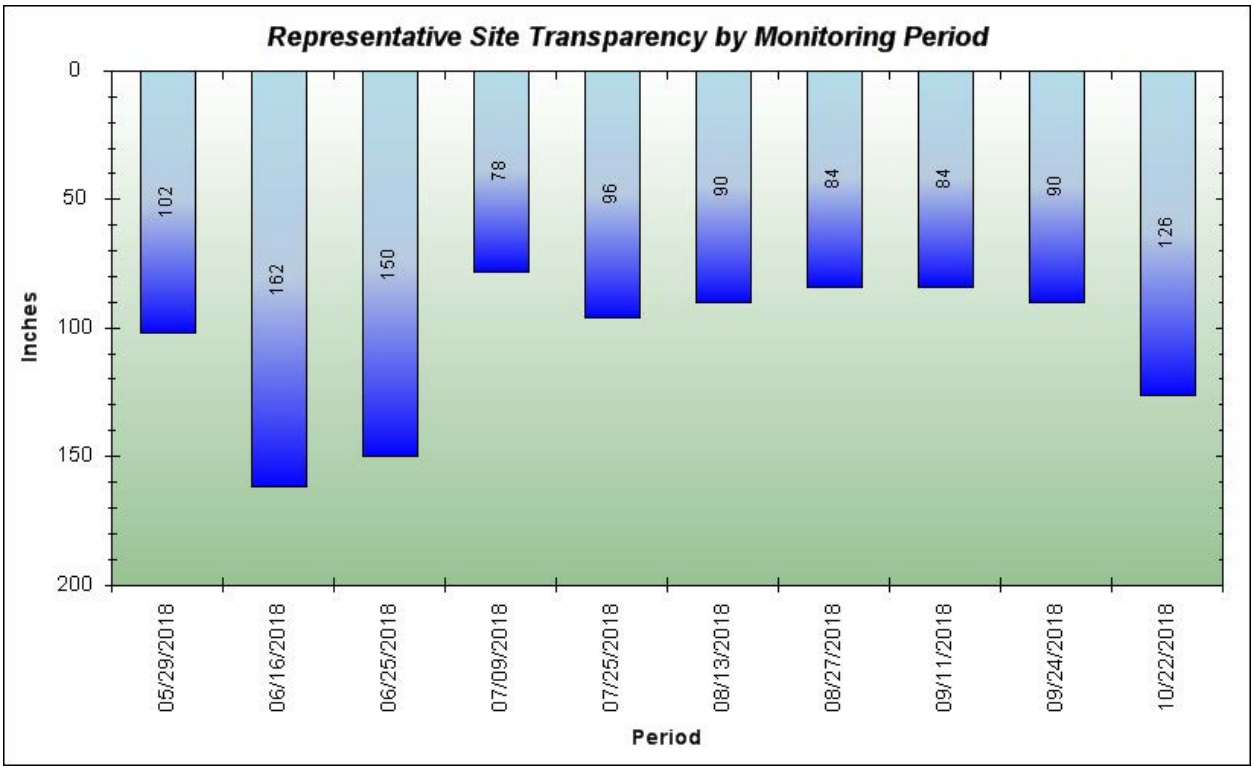
Volunteer monitors measure water transparency (clarity) in a lake of their choosing using a simple device called a Secchi disk (an 8-inch diameter plate painted black and white in opposite quadrants, attached to a calibrated rope or tape measure).[3] Volunteers also record water color, aquatic plant growth, and several other factors relating to lake, weather, and watershed conditions each time they monitor. Secchi monitoring typically is done twice a month during the May through October monitoring season.[4]

Volunteer Dave Phillips assesses water color using a color chart held above his Secchi disk at Bruce Lake in DuPage Co.

The Secchi measurements are used to document changes in water transparency during the monitoring season as well as from year to year. The Secchi measurement also indicates the sunlit, or "euphotic," zone of the lake—an area that generally has enough sunlight for aquatic plants and algae to live and grow.[5] The Secchi monitoring data can be viewed in various formats and downloaded from Illinois EPA's VLMP Lakes Database (http://dataservices.epa.illinois.gov/waBowSurfaceWater/Default.aspx). Figure 7 is an example of a lake-specific graph produced by the database.

In addition to Secchi disk monitoring, a subset of the volunteers (on a rotating basis) also have the opportunity to collect water chemistry samples on a monthly basis that are analyzed at an Illinois EPA laboratory. The water chemistry data provides important information on suspended material in the lake (e.g., sediment and algae) as well as levels of nutrients (e.g., phosphorus and nitrogen) that can promote nuisance aquatic plant and algae growth. Some volunteers also collect samples for chlorophyll analysis and record dissolved oxygen and temperature data. The chlorophyll data is particularly useful in determining the amount of microscopic, "planktonic" algae in the lake. Dissolved oxygen and temperature data are useful for determining if the lake stratifies during the summer (i.e., separates into layers of warm, upper water and cool, bottom water) and if there is adequate oxygen in the water to support aquatic life.

Figure 7. Secchi transparency - Lake Killarney/McHenry Co., Site 1, 2018.



In the six counties coordinated by CMAP, 23 lakes were monitored at least once during the 2017 – 2018 seasons, involving more than 60 volunteers. Technical assistance activities conducted by CMAP staff included updates to the VLMP Training Manual, co-presenting a "Limnology 101" session at the 2017 Illinois Lake Management Association (ILMA) conference, co-instructing two Lake Management Planning workshops with Lake County Health Department-Lakes Management Unit staff at the 2017 ILMA conference and in February 2018, responding to harmful algae bloom reports at various VLMP lakes, attending the annual meeting of several homeowner associations to present and explain their VLMP data, and providing information and guidance to volunteers regarding various lake and watershed management topics including aquatic plant management, harmful algal blooms, aquatic invasive species, dredging, and water chemistry data interpretation, among others. Staff also participated in meetings of the Great Lakes Invasive Crayfish Collaborative and the North American Lake Management Society's Secchi Dip-In and Lakes Appreciation Month Committee.

For more information about or if you would like to join the VLMP, contact Northeastern Illinois VLMP Coordinator Holly Hudson at CMAP (hhudson@cmap.illinois.gov).

Volunteer Dave Casillas measures dissolved oxygen and temperature at Deboer Woods in Lake/Will Co.

Volunteer John Kanzia folds a filter covered with algae for chlorophyll analysis at Swank Lake in Lak/Cook Co.

Related Water Resource Activities

ON TO 2050

ON TO 2050 (https://www.cmap.illinois.gov/onto2050) is the most recent comprehensive plan for northeastern Illinois. Building on the agency's first comprehensive regional plan, GO TO 2040 (https://www.cmap.illinois.gov/about/2040), which was released in 2010 and updated in 2014, ON TO 2050 guides land use and transportation investments and frames regional priorities for development, the environment, the economy, and other issues affecting quality of life. The plan was adopted on October 10, 2018, after a three-year plan development process that entailed extensive research, analysis, and public engagement. Three overarching principles frame ON TO 2050: inclusive growth, resilience, and prioritized investment. These principles resonate throughout each chapter and the plan's strategic recommendations. Within the Environment Chapter, which encompasses CMAP's water resources goals, CMAP calls for the region to:

1. Promote inclusive growth by increasing the ability of vulnerable populations to respond to environmental challenges and improving environmental conditions and access to nature.
2. Improve resilience by planning for anticipated future impacts, protecting residents from risk, and promoting gray and green infrastructure that provides essential services and can adapt to changes in climate and technology.
3. Prioritize investment of limited financial resources in a strategic and efficient way, maintaining existing infrastructure, and securing new revenues for needed enhancements.

Plan Recommendations

Recommendations that support CMAP's water resources goals are detailed in the Environment Chapter, which establishes three primary goals:

- Prepare the region for climate change through climate resilience planning and intensifying climate mitigation efforts.
- Apply and integrate approach to water resources by protecting and enhancing the integrity of aquatic systems while reducing flood risk to protect people and assets, and coordinating and conserving shared water supply resources.
- Promote development practice that protect natural resources by improving natural resources through the redevelopment process and integrating land preservation into strategic growth efforts.

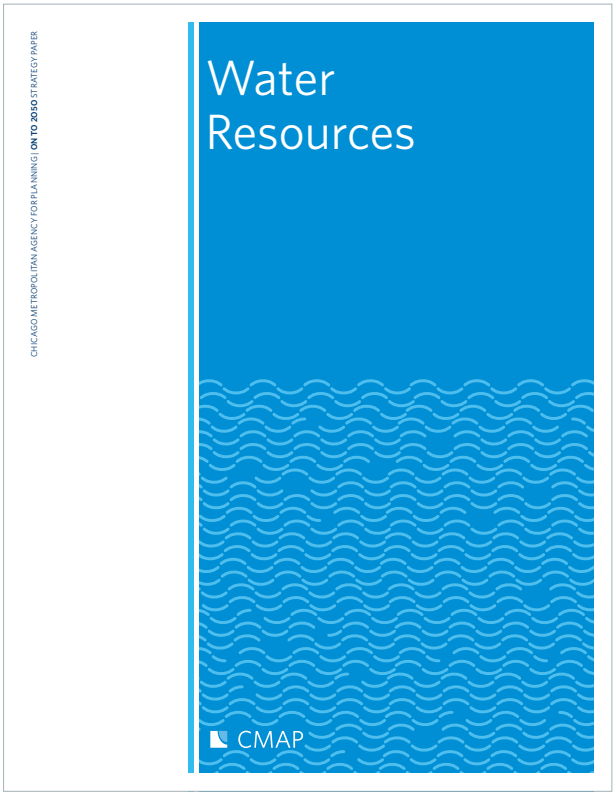
Within the recommendation to protect and enhance the integrity of aquatic systems, where many of the water quality related strategies can be found, the plan identifies five strategies, each of which identifies a number of specific actions to be taken by different parties. The five strategies are:

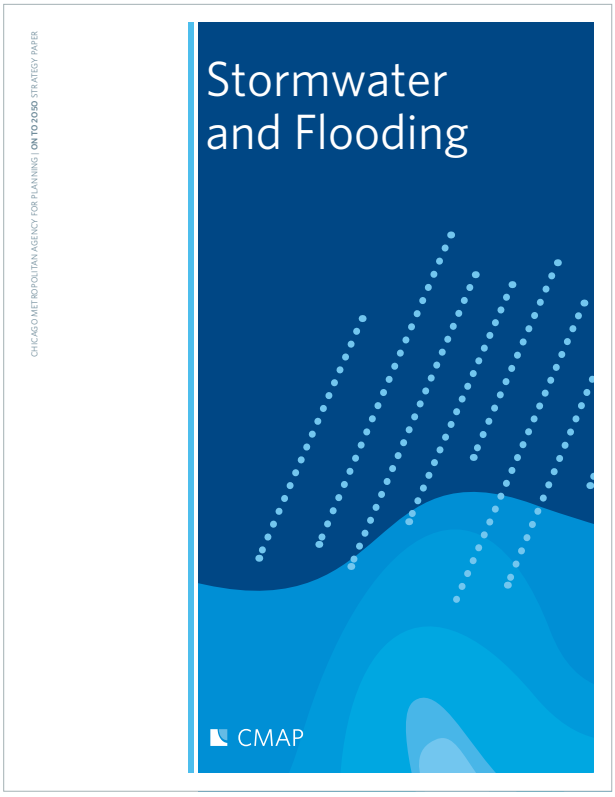
1. Improve water resource management and coordination
2. Incorporate water resource management into local planning
3. Create and implement multi-objective watershed plans
4. Optimize water infrastructure investment
5. Address the unique challenges of Lake Michigan and its tributaries

It is worth noting that water resources have been given a much more significant treatment in ON TO 2050 than in the previous plan, as has the environment, climate resilience and adaptation, and other natural resource issues. The support of state agencies such as the IEPA and IDNR has helped elevate the importance of these to the region.

Strategy Papers

The development ON TO 2050 was guided by a series of strategy papers aimed to advance the agency's direction on new topics or explore refinements to existing GO TO 2040 recommendations. The Water Resources Strategy Paper explored issues and challenges in a fairly comprehensive way, and was then distilled and summarized for inclusion in the regional plan. The strategy paper specifically targets three major topics – water quality planning, wastewater planning, and water supply planning – and one minor topic, Lake Michigan and the Chicago Area Waterways System. (See http://www.cmap.illinois.gov/onto2050/strategy-papers for a link to the Water Resources Strategy Paper.) CMAP staff developed additional strategy papers on other planning topics related to water resources such as Lands in Transition, and Stormwater and Flooding.





Strategy papers written during the ON TO 2050 development process.

Stormwater Management and Flooding

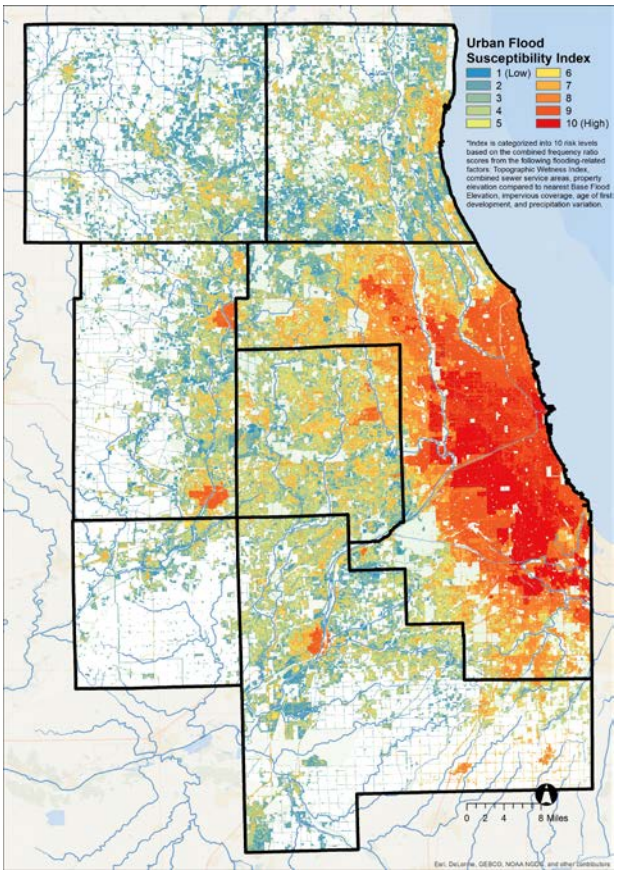
Stormwater management and flood prevention in northeastern Illinois can be particularly challenging due to the region's flat topography and broad floodplains. While flooding is a natural occurrence, continued urbanization and climate change are leading to more flooding, as well as the associated water quality impacts such as pollution and the degradation of the integrity of our aquatic systems. Development of impervious cover prevents the infiltration of rainwater and generates stormwater runoff, while climate change results in more frequent and intense storm events. As a result, the existing gray and green infrastructure designed to handle runoff is inadequate and requires significant investment in order to reduce negative impacts of pollutants in waterbodies and flooding on private property, local infrastructure, regional transportation, and natural resources. In an effort to improve stormwater management and flood mitigation throughout the region, CMAP is currently engaged in numerous stormwater activities, which are summarized below.

Regional Flood Susceptibility Index

During 2017 and 2018, CMAP developed urban and riverine flood susceptibility indexes (FSI) to identify priority areas across the region for flood mitigation activities (Figure 8). Locations highlighted in the FSI may be more susceptible to riverine or urban flooding than other parts of the region. Streets and buildings within these areas could be more susceptible to overbank flooding, surface ponding, overland flow, water seepage, and basement backups due to the presence of flood-related physical conditions that are correlated with reported flood damages.

Two versions of the FSI were created to reflect the different causes and factors that contribute to urban and riverine flooding. The riverine FSI pertains to developed areas of the region within the Federal Emergency Management Agency (FEMA) 100-year floodplain or Metropolitan Water Reclamation District (MWRD) 100-year inundation layer within Cook County, and the urban FSI includes all developed areas of the region outside of those 100-year zones.

Figure 8. Regional Urban Flood Susceptibility Index



CMAP is currently using the index to integrate stormwater management strategies into CMAP Local Technical Assistance (LTA) and watershed planning projects. The FSI methodology, FSI index raster and flood-related factor data, as well as additional information on how to use the FSIs in planning activities (see Guide to Flood Susceptibility and Stormwater Planning), area available on CMAP's website and DataHub (https://datahub.cmap.illinois.gov/dataset/on-to-2050-layer-flood-susceptibility-index). The FSI was developed with critical support from John D. and Catherine T. MacArthur Foundation.

Stormwater Planning Assistance

As communities continue to experience flooding issues, municipal planning projects are changing to better incorporate stormwater management solutions alongside other community objectives. Historically, flooding concerns have been addressed separately via engineering studies, often missing opportunities to complement other goals or projects within a community. With support from the MacArthur Foundation, CMAP developed an approach to help identify problem areas and causes and begin to articulate discrete, on-the-ground opportunities for improvements that can reduce flooding. The purpose of the approach is to present a cost-efficient planning tool to assess flooding issues, inform stakeholders and decision makers about potential flood mitigation options, particularly green infrastructure (GI) and land use solutions, and to incorporate those solutions into land use and transportation decisions. CMAP's goal in providing this assistance is to guide communities to stormwater and flood management strategies that achieve multiple benefits, such as green infrastructure solutions that reduce flooding, provide vegetation to help green up a community, and improve water quality of stormwater runoff.

With funding support through Cook County's CDBG Disaster Recovery Program, CMAP was able to apply the approach to the following LTA projects and provide an additional focus on stormwater planning; more specific project details can be found for several of these projects in the LTA section below:

- South Holland Comprehensive Plan
- Midlothian 147th Street Corridor Plan
- Cook County (Maine-Northfield) Unincorporated Area Plan
- Des Plaines Comprehensive Plan
- Berwyn Stormwater Management Plan
- Brookfield Comprehensive Plan
- Richton Park Stormwater Management Plan (adoption pending)
- Calumet Park Comprehensive Plan (underway)
- Sauk Village Comprehensive Plan (underway)
- Midlothian Stormwater Management Capital Plan (underway)

In the summer of 2018, CMAP created a step-by-step guide of the flooding and stormwater planning approach to assist partners in their planning efforts. A Guide to Flood Susceptibility and Stormwater Planning details the four main tasks of the approach, including data collection and development of a GIS database, data analysis to identify flooding problems and opportunities in a community, prioritization of implementation, and preparation of a draft plan. The approach utilizes the Regional Flood Susceptibility Index. A Guide to Flood Susceptibility and Stormwater Planning can be viewed at https://www.cmap.illinois.gov/web/guest/programs/water/stormwater/stormwater-and-flooding.

Calumet Stormwater Collaborative

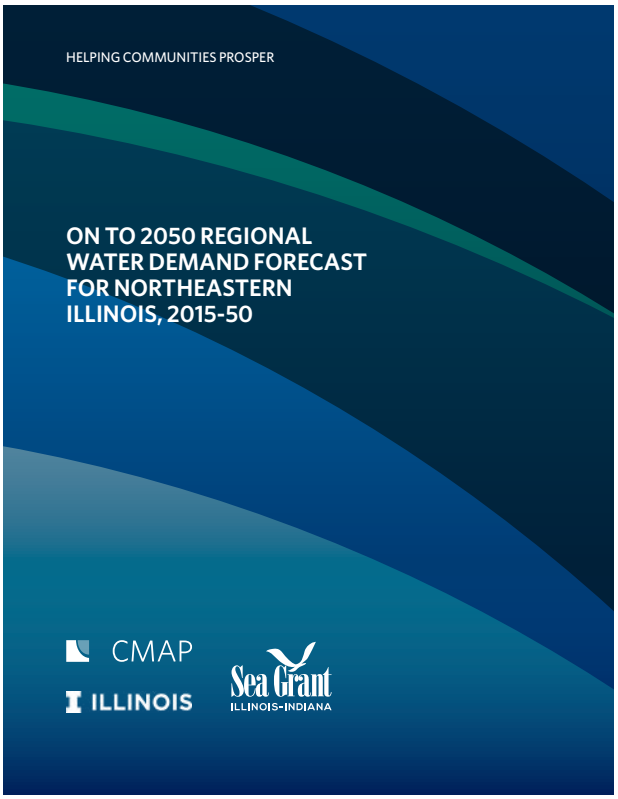
As part of CMAP's involvement with the Calumet Stormwater Collaborative (CSC), staff led the CSC Planning and Policy Workgroup through 2017 and into 2018. The workgroup focused on creating and promoting effective planning practices and policies that advance the integration of stormwater best management practices in the Calumet region. In February of 2018, CMAP completed the development of an online repository of stormwater resources and participated in strategic discussions about collaborative priorities. Later in the year, staff gave a presentation to the CSC on CMAP's Urban Flood Susceptibility Index and the stormwater elements of ON TO 2050, CMAP's latest regional comprehensive plan.

Water Supply

To maintain our quality of life and economic competitiveness, CMAP recommends the region pursue strategies that maintain and improve drinking water infrastructure and protect water sources. CMAP supports an integrated approach to water supply planning through three strategies outlined in ON TO 2050: incorporate water supply and demand considerations into local and regional planning, maintain drinking water infrastructure and manage demand, and strengthen regional water supply management. CMAP is able to work on water supply issues with critical support from the Illinois Department of Natural Resources, and there are clear connections between regional water supply work and water quality protection as it relates to the region's water sources, particularly surface water and shallow groundwater.

ON TO 2050 Regional Water Demand Forecast

Assessing forecasted demand scenarios in the context of available water supply and infrastructure capacity can inform regional and local planners about the sufficiency of water supply and encourage actions that conserve water, protect supply, and/or pursue alternative drinking water sources. In 2018, CMAP partnered with Illinois-Indiana Sea Grant (http://www.iiseagrant.org/) and the University of Illinois Extension (https://web.extension.illinois.edu/state/index.php) to update the regional water demand forecast for the CMAP region. The ON TO 2050 Regional Water Demand Forecast builds on the previous regional water demand forecast, *Regional Water Demand Scenarios for Northeastern Illinois: 2005-2050*, which was completed in 2008. The current effort updates the previous forecast methodology in two key ways – it provides municipal scale forecasts as well as accessible datasets so that stakeholders can better plan for water supply at the municipal and subregional scale.



ON TO 2050 Regional Water Demand Forecast for Northeastern Illinios, 2018-50.

Reducing Water Loss

Water lost through aging and leaky infrastructure is a waste of taxpayer dollars and the valuable water resource itself. CMAP has been working with the IDNR Lake Michigan Water Allocation Program to improve water loss control practices and challenges faced by community water suppliers whose source of water is Lake Michigan. In 2018, staff updated and expanded upon CMAP's Lake Michigan Water Loss Reporting tool. The accounting tool now encompasses water loss data for the years 2007 through 2016. It also incorporates other supply sources, such as shallow and deep aquifers, to account for communities that rely on groundwater or those that have switched to Lake Michigan water. CMAP integrates water loss information into LTA plans wherever practical, including recent projects in South Holland, Des Plaines, and Thornton.

The magnitude of the problem, judging by well-documented estimates of the investment needed in water infrastructure repair and replacement, is considerable both at the national level and within the Chicago metropolitan region. Lost potable water is of particular concern in the Chicago region given the rules that govern use of Lake Michigan water and the terms of the Great Lake Compact with its emphasis on conservation and efficiency.

Sub-regional coordination

CMAP promotes coordination across jurisdictions to provide a forum for improved management of our shared drinking water supplies. This is particularly needed in the absence of a comprehensive groundwater management program to resolve conflicts and manage withdrawals for long-term sustainability. CMAP continues to assist the Northwest Water Planning Alliance, a coalition of over 70 communities and their county governments formed to collaboratively plan for shared groundwater resources. CMAP funded two projects in 2018 to spur additional intergovernmental collaboration. CMAP enlisted the Metropolitan Planning Council (MPC) to jumpstart strategic planning conversations among communities and businesses in the Will County area that are facing short-term water supply challenges due to the depletion of the St. Peter aquifer. In addition, MPC provided CMAP a report for the Villages of Oswego and Montgomery, and the United City of Yorkville on governance options for shared drinking water service (https://www.cmap.illinois.gov/programs/LTA/oswego-montgomery-yorkville-water). In addition to providing guidance to these three communities as they explore potential partnerships for alternative water supply sources, the report can be used by others across the state navigating similar questions.

Climate Resilience

A resilient region is one that proactively addresses climate changes. Resilience strategies can range from updating infrastructure designs to account for more extreme weather to promoting land use decisions that consider future climate impacts. ON TO 2050 and external grants received in 2017 and 2018 have been helping CMAP integrate climate resilience into its local planning efforts. Resilience planning includes strategies that can help improve water quality.

Incorporating Climate Science into Local Plans

Under a grant from the National Oceanic and Atmospheric Administration's (NOAA) Climate Program Office, the American Planning Association APA partnered with CMAP and climatologists from the University of Illinois and the Illinois-Indiana Sea Grant Consortium to assist communities in the Great Lakes address potential climate extremes, such as high precipitation in a short period of time or extreme drought. The project aims to help communities understand how to plan for resilience and to incorporate available climate science data into local planning efforts.

Vulnerability assessments

Through CMAP's Local Technical Assistance (LTA) program, staff worked with five pilot communities to incorporate climate data into different types of local plans: comprehensive plans, stormwater plans, subarea plans, and capital improvement plans (CIPs). The main avenue for integrating climate data into these plans was through the addition of a vulnerability assessment to the existing conditions report (ECR) for each plan. Each vulnerability assessment was tailored to the needs of the particular plan and included the following primary elements:

- Discussion of current climate-related hazards facing the community
- Analysis of current exposure of community members and key assets to climate-related hazards
- Discussion of projected impact of climate change on the hazards the community faces
- Analysis of the community's adaptive capacity to climate change based on its governance and existing plans and planning processes

Guidebook and Data Analysis Guide

The methodology and data sources used to develop the vulnerability assessments are being compiled by CMAP and the APA and integrated into a guidebook and data analysis guide for local planners. The guidebook is intended to provide a process for incorporating usable sources of climate change data into their decisions and policies, particularly where land use has some direct relationship to long-term climate resilience. The data analysis guide is intended to provide a step-by-step overview on how to conduct analysis on community vulnerability to climate change. Training modules will also be available for other non-coastal communities to learn how they can use climate data in their planning work. These resources are scheduled to be finalized in 2019.

Local Technical Assistance

CMAP established the Local Technical Assistance (LTA) program to direct resources to communities pursuing planning work that helps to implement GO TO 2040 and ON TO 2050. The program is funded by a variety of sources, which allow CMAP to address specific topics such as water quality and water supply. LTA projects that included a water quality component are summarized below.

Algonquin-Cary Subarea Plan

This project will develop a land use sub-area plan along the Route 31 corridor between the villages of Algonquin and Cary for land parcels that will soon become suitable for development as mining draws to a close. Cary is also considering development options for their 265-acre Hoffman Park. In addition to the villages' desire to develop the area with strong bicycle and pedestrian connections including linkages to the downtown business districts, CMAP will help guide the plan to include water quality protections including riparian buffers and green infrastructure BMPs, aquatic and terrestrial habitat enhancement, and water-based recreational development abreast of watershed-based partner activities via email correspondence and meeting notes. The project began in the late spring of 2018. Major project milestones have included a kick-off meeting with the steering committee, completing a public community workshop, conducting interviews with key stakeholders, and drafting an existing conditions report. The plan is expected to be completed in 2019.

Beecher Comprehensive Plan

CMAP is working with a consultant to develop a comprehensive plan for the Village of Beecher. Since their last comprehensive plan, adopted in 1996, major changes to the community include a population that has doubled in size as well as capital projects such as a new regional airport, intermodal center, major expressway, and new railway that are in various stages of planning and development. CMAP will ensure consideration and inclusion of natural resource and water quality protection elements that affect watershed health. Beecher sits in a headwaters area of Trim Creek in eastern Will County. As there is no watershed-based plan for this area, the inclusion of water quality protection concepts at the municipal planning level is a first and very important step in an overall watershed protection planning process. Toward that end, Beecher is already promoting conservation design for new development. The consultant completed the draft existing conditions report, which includes a section on water quality developed by CMAP staff.

Berwyn Stormwater Management Plan

In 2017, CMAP started working with the City of Berwyn and a stormwater engineering consultant to develop a stormwater management plan. The plan provides community-wide and project specific recommendations to manage stormwater runoff to mitigate urban flooding and improve water quality. Specifically, the plan quantifies the water quality benefits from three engineering concept plans for a schoolyard retrofit, park improvement, and green street. This project was also selected as a pilot for the climate resilience project in partnership with NOAA and the American Planning Association. For this work, CMAP staff developed a vulnerability assessment to examine the effects of climate change on flood risk and stormwater management and worked with the consultant team to integrate the findings into the plan (see Vulnerability Assessments under Climate Resilience). The plan was adopted by the City of Berwyn on July 10, 2018. The plan and a separate appendices document can be viewed and downloaded from CMAP's project webpage: https://www.cmap.illinois.gov/programs/lta/berwyn-stormwater.

Carol Stream Zoning Code Update

Carol Stream is already a leader when it comes to improving the water quality benefits of stormwater detention, having retrofit numerous basins to naturalized conditions, including native prairie buffers and bioengineered wetlands. With much of the community built out, the Village is seeing more redevelopment requests. Consequently, they would like to utilize a Unified Development Ordinance to update parking requirements, design/development regulations, zoning district standards/bulk regulations, industrial district standards, permitted/special uses, definitions, and establish stronger subdivision regulations. Working with a consultant, approved in November 2018, CMAP will ensure that the latest best practices are incorporated into the UDO to protect and improve water quality.

Channahon Comprehensive Plan

CMAP has been working with a consultant to update the Village of Channahon's 2008 comprehensive plan to reflect the changed demographic and economic conditions since the recession, including major population growth. The consultants prepared a draft issues and opportunities memo in October 2018. CMAP staff will continue to work with the consultant toward the completion of this project in 2019.

Chicago North River Communities Neighborhood Plan

This project examined stormwater challenges with a focus on water quality in the North Branch Chicago River and flooding of both riverine and urban areas. The plan focuses on a section of the northwest side of Chicago centered on Albany Park, where there is presence of the Brown Line, multiple branches of the Chicago River, and two universities. The plan was adopted by the North River Commission in November 2018. The plan recommends strategies to engage the community in flood mitigation solutions, advocate for the targeted expansion of green stormwater infrastructure, and enable community monitoring of a stormwater diversion tunnel that CDOT and MWRD recently completed in the neighborhood. The plan also recommends collaborative efforts to improve water quality and wildlife habitat by enhancing the accessibility of the Chicago River, support naturalization of floodplains and riverbanks, encourage local stewardship, and engage with ongoing water quality improvement efforts by the City of Chicago, Chicago Park District, U.S. Army Corps of Engineers, and other partners.

Cook County (Maine-Northfield) Unincorporated Area Plan

This project developed a community plan for the Maine-Northfield study area. Cook County, a steering committee, and a consultant team evaluated the community's challenges and opportunities, and identified viable strategies to help guide future growth and development. The plan addresses stormwater, housing, transportation, public services and utilities, and image and identity. In addition to recommendations to better manage stormwater, the plan recommended that Cook County pursue green infrastructure investments in the public right-of-way, and help implement watershed plans that overlap with the planning area via Section 319 grant opportunities. CMAP staff continues to work with the County on plan adoption.

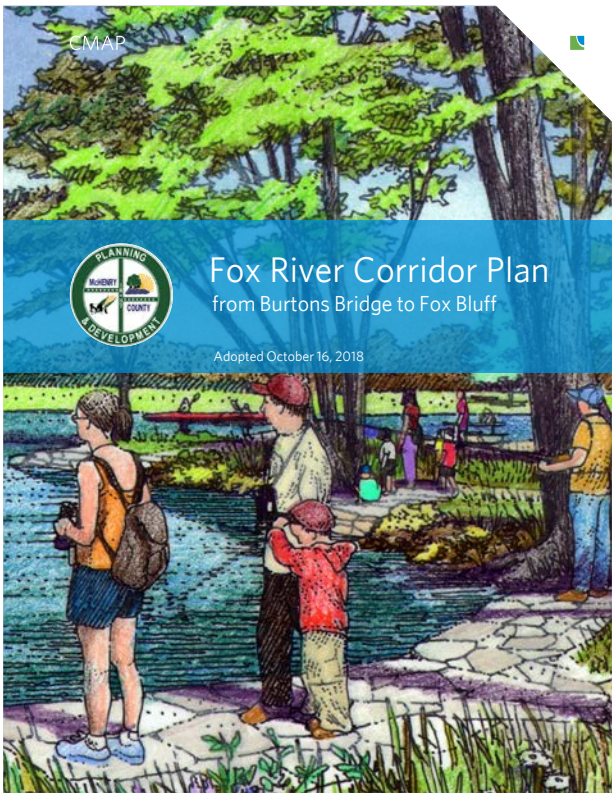
Des Plaines Comprehensive Plan

In 2017 and 2018, CMAP worked with the City of Des Plaines to update their comprehensive plan so that it reflects a shared vision of the community's future. As an added benefit to this planning process, CMAP applied its stormwater planning approach to identify and prioritize flooding issues and opportunities. This analysis was also used inform the development of three consultant-led stormwater best management practices concept plans that were incorporated into the plan's water resources recommendations. In addition to stormwater management and flood mitigation recommendations, the plan recommends to improve habitat and water quality through greater involvement in local watershed planning efforts, the restoration and stabilization of wetlands and river edges, and retrofitting retention/detention ponds. This project also serves as a pilot for a separate project in partnership with NOAA and the American Planning Association to examine how to best incorporate climate resilience and adaptation data into planning processes and deliverables (see Vulnerability Assessments under Climate Resilience). The Planning Zoning Board unanimously recommended the plan to the City Council. The plan was presented to the City Council in December 2018 and is pending adoption upon further review.

Fox River Corridor Plan in McHenry and Lake Counties

This corridor plan for a portion of the Fox River addresses a number of relevant topics including water quality, river edge/riparian habitat, floodplain management, and landscape management for river health. This project also serves as a pilot for a separate project in partnership with NOAA and the American Planning Association to examine how to best incorporate climate resilience and adaptation data into planning processes and deliverables (see Vulnerability Assessments under Climate Resilience).

The draft plan was first presented to the public at an open house on August 29, 2018 at Fox River Grove Village Hall and subsequently revised before it was presented to the McHenry County Planning, Environment & Development Committee on October 2, 2018. The McHenry County Board adopted the Fox River Corridor Plan on October 16, 2018, after a recommendation from the Planning, Environment, and Development Committee. The plan can be viewed and downloaded from CMAP's project webpage: https://www.cmap.illinois.gov/programs/lta/fox-river-mchenry-lake. CMAP continues to work with Lake County and the individual municipalities to adopt or formally accept the plan as well as use the plan's momentum to move forward with implementation.



Fox River Corridor Plan in McHenry and Lake Counties

Franklin Park Comprehensive Plan

In August 2017, the Village of Franklin Park Board of Trustees adopted the comprehensive plan (http://www.cmap.illinois.gov/programs-andresources/lta/franklin-park), which includes recommendations for a floodplain overlay district, a community-wide green infrastructure network, and other policies and strategies that will indirectly benefit water quality.

Governors State University Transportation Impact Reduction and Green Infrastructure Plan

Supporting recommendations made in the Thorn Creek Watershed-based Plan (NIPC 2005) and Addendum (CMAP 2014), this project developed a stormwater management and natural areas restoration and management plan for the Governors State University campus in eastern Will County. The stormwater plan incorporated green infrastructure practices as much as practical to address flooding issues, including impacts on facilities and transportation routes, and improve water quality. The natural areas restoration and management plan addressed native habitat degradation of prairie, lake, and wetland ecosystems associated with hydrologic, water quality, and invasive species issues. The plan was finalized by the consultant in October 2017.

Illinois International Port District (IIPD) Planning Priorities Report

CMAP is working with IIPD to create a planning priorities report that will synthesize information about IIPD's local context drawn from stakeholder interviews and scans of transportation, economic development, demographic, natural resource, water, and bike and pedestrian data maintained by CMAP. The water section of the report will detail the relationship of IIPD lands to local lakes, rivers, and streams, floodplains, and water supply, stormwater, and sewer systems. It will also feature subregional water quality challenges and conservation opportunities. A Request for Proposals (RFP) has been developed for Phase 2 of the project: an IDOT-funded, consultant-led master plan for the IIPD, which is scheduled to begin in 2019.

Midlothian 147th Street Corridor Plan

This project identified potential pedestrian and stormwater management improvements at key points along 147th Street between Cicero Avenue and Kedzie Avenue. CMAP worked with a stormwater engineering consultant to analyze flooding issues along the corridor and develop concept plans for green infrastructure improvements to reduce ponding and improve water quality. The consultant developed planning-level cost estimates and quantified water quality benefits for the Village to use in future grant applications. CMAP also worked with the Active Transportation Alliance to host a Complete Streets on-site demonstration event to showcase potential stormwater, pedestrian, and bicycle improvements.

In late 2017, CMAP completed a project summary memo, which was approved by the Village. The summary included the engineering consultant's design concepts for stormwater BMPs at three locations along the corridor, as well as CMAP's recommendations for pedestrian improvements at key points along the corridor, including new crosswalks and sidewalks. CMAP helped the Village apply to the Metropolitan Water Reclamation District of Greater Chicago Green Infrastructure program in July 2018 and continues to explore possible funding sources for the recommended stormwater improvements as part of the Stormwater Management Capital Plan (see below).

Midlothian Stormwater Management Capital Plan

CMAP is working with a stormwater engineering consultant to develop a stormwater management capital plan (SMCP) for the Village of Midlothian. The SMCP is intended to inform the establishment of a stormwater utility and will assist the Village to prioritize short- and long-term projects and other actions to pursue. Since June 2018, CMAP staff have coordinated with the consultant, Village, and steering committee, gathered and created relevant datasets, and held meetings and a site visit with stakeholders. The plan is scheduled to be completed in 2019.

Robbins Stormwater, TOD, and Industrial Area Plan

The Village of Robbins has partnered with the Metropolitan Water Reclamation District of Greater Chicago (MWRD) to develop a stormwater, TOD, and industrial area plan to address flooding along Midlothian Creek. The proposed stormwater solutions will remove approximately 140 acres from the floodplain, freeing the area for potential transit-oriented development. At the end of 2018, outreach and the plan's existing conditions report was still underway. The plan is expected to be completed in 2019.

Richton Park Stormwater Management Plan

The goal of the project is to develop a green infrastructure concept plan that accommodates desired development by the Village while also protecting the integrity of the Hickory Creek riparian zone, floodway, floodplain, and environmental quality. The second phase of work, completed in 2018, entailed the development of sub-area concept plans and planning and design guidance to demonstrate how future development could protect hydrology, water quality, and stream integrity. In the fall of 2018, CMAP staff and the consultant presented draft sub-area plans to the Richton Park Plan Commission. The consultant subsequently prepared the final project report, which is expected to be adopted or approved by the Village Board in 2019.

Sandwich Planning Priorities Report

CMAP is currently working with the City of Sandwich to develop a planning priorities report to explore potential next steps for the City's planning initiatives. Although work on the report is ongoing, stormwater management emerged as a key priority early in the planning process. In addition to the development of the planning priorities report, CMAP wrote a letter of support for the City's Section 319 grant application for the development of a Little Rock Creek watershed-based plan, which falls within the planning geography of Sandwich. The proposed project supports several goals of CMAP's ON TO 2050 Comprehensive Plan. Specifically, this project would enhance the region's green infrastructure network while also improving water quality in a sensitive headwater stream and encourage BMPs in agricultural and urban settings.

South Holland Comprehensive Plan

South Holland was the first community in which CMAP's new stormwater planning and analysis approach, funded via MacArthur and Cook County CDBG – Disaster Recovery funds, was tested and refined. Findings from this analysis were used to develop recommendations for the stormwater and flooding chapter of the plan, including strategies to enhance water quality and riparian habitat. CMAP staff presented the final plan recommendations to the public at Mayor's Coffee event on the evening of June 12, 2017, which was followed by a presentation and adoption by the Village Board of Trustees on June 18, 2017. The comprehensive plan and stormwater appendix can be downloaded from CMAP's project webpage: https://www.cmap.illinois.gov/programs/lta/south-holland.

Thornton Planning Priorities Report

In the spring of 2018, CMAP began to work with the Village of Thornton to study the full range of current opportunities, assets, and needs in the community to help determine what type of planning the Village should undertake next. The project will culminate in a "planning priorities report" that provides recommendations for planning priorities and/or implementation actions for the Village to pursue. Key milestones completed to date include stakeholder interviews, an assessment of existing conditions, and initial development of priority recommendations.

Endnotes

1 T.R. Scheuler, "Is Impervious Cover Still Important? Review of Recent Research," *Journal of Hydrologic Engineering* 14, no. 4 (2009), 309-315.

2 Numbers reflect permits reviewed in 2017 – December 18, 2018.

3 The disk is lowered into the water and the depth at which it is no longer visible is recorded.

4 Secchi transparency is affected by the color of the water and the amount of suspended sediment and algae in the lake.

5 The euphotic zone is about twice as deep as you can see the Secchi disk in the water.

6 Dziegielewski, B. and F.J. Chowdhury, 2008, "Regional Water Demand Scenarios for Northeastern Illinois: 2005-2050," Southern Illinois University Carbondale: Department of Geography and Environmental Resources.

The Chicago Metropolitan Agency for Planning (CMAP) is our region's comprehensive planning organization. The agency and its partners developed and are now implementing ON TO 2050, a new long-range plan to help the seven counties and 284 communities of northeastern Illinois implement strategies that address transportation, housing, economic development, open space, the environment, and other quality-of-life issues. See www.cmap.illinois.gov for more information.

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