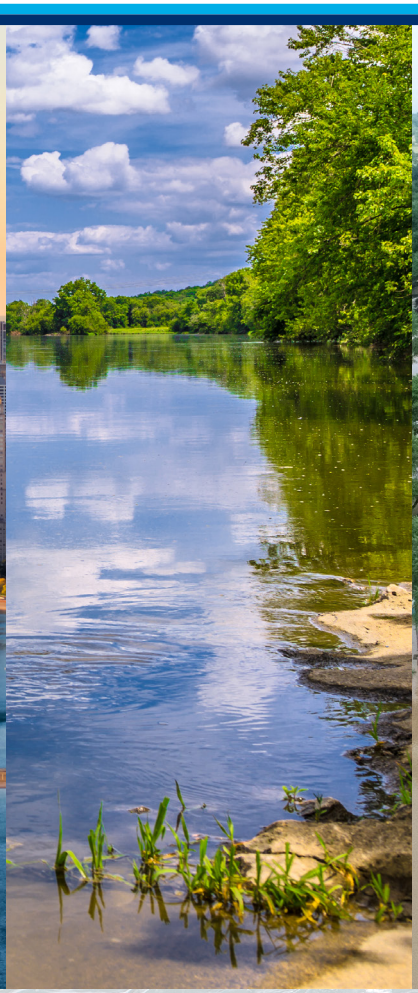
State of Illinois

2022 ILLINOIS STATE WATER PLAN

ILLINOIS STATE WATER PLAN TASK FORCE



ILLINOIS DEPARTMENT OF NATURAL RESOURCES

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

ILLINOIS Illinois State Water Survey PRAIRIE RESEARCH INSTITUTE

IWRC ILLINOIS WATER RESOURCES CENTER

IPCB Illinois Pollution Control Board

Illinois Department of Transportation

IDPH Illinois Department of Public Health

IEMA

Illinois Department of Agriculture

DNR-OWR-230047, 12/22

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2022 Illinois State Water Plan

Illinois State Water Plan Task Force

December 2022

Plan Website:
https://www2.illinois.gov/dnr/WaterResources/Pages/StateWaterPlanTaskForce.aspx

Cover Photo Credits:
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Left to Right – Sampling in Jo Daviess County, Near Galena (Kelly, 2019)
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July 2022 Flooding in Metro East (IDNR, 2022)

Printed by Authority of the State of Illinois, December 2022

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LETTER FROM TASK FORCE CHAIR

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ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

JB Pritzker, Governor
Colleen Callahan, Director

Dear Governor JB Pritzker and our fellow Illinoisans:

Illinois is physically and economically defined by Lake Michigan and large rivers bounding and crisscrossing the state, by its abundant fields, rich forests, large cities, unique parks, active industries, railways, waterways, and highways but most importantly, its diverse people. People that rely on the abundant, but not uniformly available, water resources of Illinois to live, work, and play regardless of race, gender, age, income, housing status, or geography. We are all connected by water, and with the abundance of water resources in Illinois comes an abundance of water challenges.

On behalf of my fellow State Water Plan Task Force members and the state agencies they represent, as well as a wide range of diverse individuals representing a broad spectrum of water interests in Illinois, I am proud to provide an updated Illinois State Water Plan – a plan and interactive website www2.illinois.gov/dnr/WaterResources/Pages/StateWaterPlanTaskForce.aspx spotlighting 13 key water issues and focused on improving the resiliency, sustainability, public safety, stewardship, economic development, and understanding of the water resources of Illinois to improve the lives of the people of Illinois. The State Water Plan is an opportunity. Opportunity to adjust state programs and policies in water resources, including social and environmental justice opportunities inextricably linked to water and woven into the Plan, and an opportunity to recommend necessary changes and new ideas to elected officials and key leaders in the state of Illinois. The State Water Plan update provides a 7-year focus strategic plan or "blueprint" composed of 147 actionable and measurable recommendations for future inclusive and equitable state water resources development in Illinois.

Different from previous Illinois State Water Plans, this Plan intentionally strives to integrate social and environmental justice perspectives into recommendations in every section of the Plan to better serve economically and socially marginalized individuals and communities in Illinois. Like throwing a rock into a lake, implemented actions of the Plan and the resulting plan accomplishments over the next 7 to 10 years, will have ripple effects in Illinois for the next 50 years – effects necessary to address a changing climate, economy, landscape, and social structure. The Plan is dynamic and subject to change by the State Water Plan Task Force based on stakeholder collaboration to address these changes in Illinois for the good of its inhabitants. The Plan focuses on near-term opportunities in state water related programs where change is necessary and is not intended to change very functional and well-established successful state agency programs.

Thank you to all the individuals recognized in the Plan, and those who are not recognized, who are dedicated to improving water resources in Illinois and diligently worked at a grass roots level, even through COVID 19 impacts, to develop this plan update. Opportunity is defined as a favorable combination of circumstances that makes it possible to accomplish something special. Please embrace the opportunities presented in this Plan to accomplish something special for the future of water resources in Illinois.

Sincerely,

Loren A. Wobig, P.E., CFM
Chair, Illinois State Water Plan Task Force

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AGENCY SUPPORT

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Dear Governor JB Pritzker:

As a water rich state, Illinois has an abundance of water related challenges. Such challenges identify needs, needs generate ideas, ideas grow plans, and plans in the hands of passionate individuals drive actions that change the world. The 2022 Illinois State Water Plan was created by state agency staff with input from engaged not-for-profit stakeholders, and citizens of Illinois passionate about improving the water resource programs and addressing water issues in the state.

The Plan, and associated interactive website, spotlights 13 critical water issues and recommends actions for improving the resiliency, sustainability, public safety, stewardship, economic development, and understanding of the water resources of Illinois. To address the ever-changing climate, economy, landscape, and social structure in Illinois, the State Water Plan provides a 7-year focus strategic plan or "blueprint" composed of 147 actionable and measurable recommendations for future inclusive and equitable state water resources development in Illinois. While intentionally integrating social and environmental justice perspectives into the recommendations, the Plan focuses on near-term opportunities in state water related programs where change is necessary and is not intended to change very functional and well-established successful state agency programs.

As leaders of the state agencies included in the State Water Plan Task Force, we support the work of the State Water Plan Task Force and the implementation of recommended actions in the State Water Plan to improve the lives of the people of Illinois.

Colleen Callahan
IDNR

Jerry Costello
IDOA

Omer Osman
IDOT

Sameer Vohra
IDPH

Alicia Tate- Nadeau
IEMA

John Kim
IEPA

Barbara Flynn Currie
IPCB

Kevin O'Brien
ISWS

Yu-Feng Lin
IWRC

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Homer Lake, Champaign (C. Eliana Brown, Illinois-Indiana Sea Grant, University of IL Extension, 2018)

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INTRODUCTION

Mission Statement and Goals

All Illinois' citizens, businesses, industries, agricultural producers, and other populations want and deserve safe and abundant waters. The state will support equitable and prioritized administration of existing and new programs that protect surface water, groundwater, and public water supply resources to safeguard human and environmental health.

Mission:

For state agencies to develop a concise plan for addressing the water issues facing the state in an efficient and unified front.

State Water Plan Goals:

Purpose

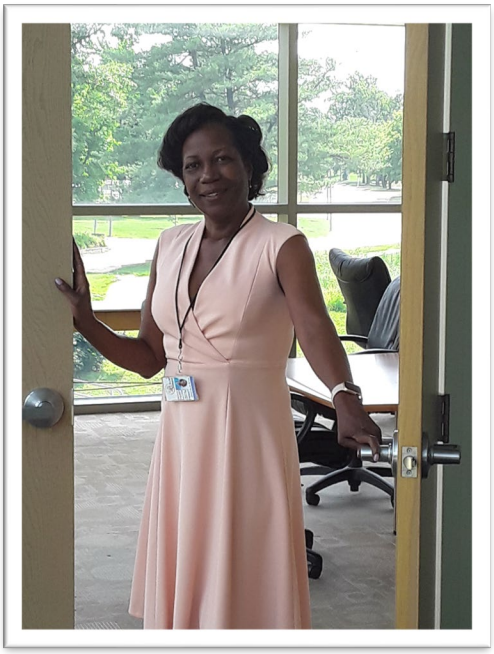

Figure 3.1 - Opening Doors to Opportunity (IDNR, 2022)

Opportunity - a favorable combination of circumstances that makes it possible to accomplish something special.

This Illinois State Water Plan update creates opportunity:

- Opportunities in state programs and policies in water resources to ensure that the water resources of the state are available to and wisely managed for all people in Illinois regardless of race, income, housing status, or geography.
- Opportunity for unified voices to spotlight key water issues in the state, including social and environmental justice issues inextricably linked to water and woven into the Plan.
- Opportunity to recommend necessary changes and new ideas to elected officials and key leaders in the state of Illinois. This opportunity recommends dynamic program actions and changes in state government that are ever changing to parallel the changes we see in community populations, land use, climate, Lake Michigan water levels, and staffing capacity challenges at both state and local government levels.

The State Water Plan update provides a 7-year focus strategic plan or "blueprint" composed of key recommendations for future inclusive and equitable water resources development in Illinois. The updated Plan is the culmination of unified water related state agencies in Illinois, members of the State Water Plan Task Force, collaborating on 13 prioritized Illinois water resources topics including:

- Water Quality
- Climate Change
- Integrated Water Management
- Long Term Funding
- Water Sustainability
- Lake Michigan
- Flood Damage Mitigation
- Aquatic and Riparian Habitat
- Water Use Laws and Regulations
- Navigation
- Erosion and Sedimentation
- Data Management
- Recreation

Figure 3.2 – Lake Michigan/IEPA monitoring boat *(IEPA, 2021)*

Illinois is physically and economically defined by Lake Michigan and large rivers bounding and crisscrossing the state, by its abundant fields, rich forests, large cities, unique parks, active industries, railways, waterways, and highways but most importantly, by its diverse people. People rely on the water resources of Illinois to live, work, and play. As explained later in the Plan, the update was crafted including and utilizing this wide range of diverse

individuals representing a broad spectrum of water interests in Illinois. Different from previous Illinois State Water Plans, this update intentionally strives to integrate social and environmental justice perspectives into recommendations in every section of the Plan to better serve economically and socially marginalized individuals and communities in Illinois. To improve the resiliency, sustainability, public safety, stewardship, economic development, and education related to the water resources of Illinois, the Plan focuses on improving institutional processes and connections in state agencies that challenge program management, program implementation, fiscal management, and the professional health of those public service individuals dedicated to improving the lives of others in Illinois.

Results of a public survey utilized during development of the Plan update indicated that 43% of those surveyed intended to use the State Plan to direct and/or influence water related planning efforts at the local and regional levels of government and collaborating partners. In addition, 20% of those surveyed intend to use the Plan to help educate/empower community residents.

Figure 3.3 – Glenn D. Palmer Margaret White Bypass Dam (*IDNR, 2022)*

Using the Plan update as its blueprint, state agencies will continue to use the Plan to influence equitable programming, improve program policies, and support necessary water related program and/or project funding requests. The Plan provides a basis and opportunity for federal, state, county, and community elected officials to collaborate with state agency professionals on the key issues and recommendations proposed in the Plan. Providing the Plan both as a written document and as an interactive website will further promote discussions about these key topics in water resources.

The Plan focuses on near-term opportunities in state water related programs where change is necessary and is not intended to change very functional and well-established successful state agency programs. The Plan is not intended to supersede any existing state program, policy, project, or practice unless or until formalized by law. The Plan is dynamic and subject to change by the State Water Plan Task Force based on stakeholder collaboration, or changing environmental, economic, and social needs in Illinois for the good of its inhabitants. The Illinois State Water Plan represents a consensus of those agencies who participated in the Task Force. By identifying the main issues and recommendations, this document is the first step in addressing the critical water issues for Illinois. The next step, the implementation of the recommendations and further development of the solutions, will be completed by the Task Force and the committees over the coming years. The Plan is the launch pad for water related opportunities in Illinois.

Water Challenges

The State of Illinois is primarily bound by water including the Mississippi River, Ohio River, Wabash River and Lake Michigan (**Figure 3.4**). With the abundance of natural water sources in Illinois comes an abundance of water challenges.

Illinois has experienced increased rainfall events in many portions of the state. This coupled with expanding land development and agricultural field tiling has led to more flow in the river systems. The higher flow further exacerbates not only flooding, but erosion rates which leads to increased sedimentation. The additional sedimentation impacts available surface reservoir supply, water quality, navigation, aquatic habitat, and recreation.

There are many facets of the critical water concerns for Illinois. Of those, many of these facets have an impact to various other areas. The water issues that affect Illinois are expansive and complex. As a result, this Plan will cover

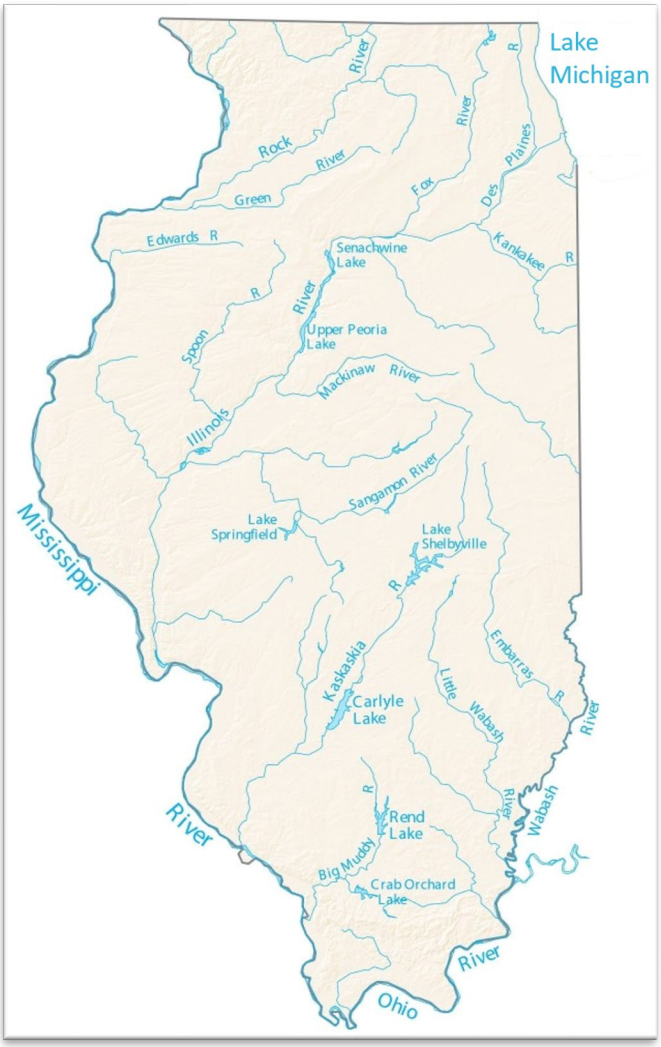

Figure 3.4 – Major Rivers and Lakes in Illinois
(GISGeography, 2022)

a variety of issues, many of which are cross-cutting. Below are the 13 identified issues and a brief description of each.

1. **Water Quality** – chemical, biological, and physical characteristic of water.
2. **Climate Change** – a trending change in weather parameters over the past century.
3. **Integrated Water Management** – holistic approach in addressing water issues.
4. **Long Term Funding** – sustainable funding for state water programs and projects.
5. **Water Sustainability** – ensuring water quantity availability in all sources that are not diminishing over time.
6. **Lake Michigan** – Any issues that are specific to Lake Michigan.
7. **Flood Damage Mitigation** – Reduction in flood damages.
8. **Aquatic & Riparian Habitat** – Ensuring sustainable ecological habitat in and along water ways.
9. **Illinois Water Use Laws & Regulations** – Addressing any issues pertaining to water use legislation and administrative rules.
10. **Navigation** – The ability of ships and barges to transverse specific waterways for the purpose of transporting goods.
11. **Erosion & Sedimentation** – the loss of channel bed and bank material or accumulation of soils from channels or uplands.
12. **Data Management** – The collection and management of data pertaining to streams in Illinois.
13. **Recreation** – Considerations to an individual's activities on lakes, rivers and streams such as fishing, rafting, motorized boating, non-motorized boating and swimming.

Figure 3.5 – Flood Surveillance in Illinois *(IDNR, 2014)*

As this report is focusing on addressing issues within these categories, particular attention was given to focusing on mitigating the cause of the problem and not the effect of it. Some issues that have been identified occur naturally and cannot be fully mitigated, such as channel erosion that occurs from the natural process with geomorphology. While this issue may never be fully resolved, recommendations in this Plan strive to minimize their impacts. Additionally, critical discernment is necessary to determine the proper avenue to address these issues. Considerations are given in addressing the issues by legislative mandates, voluntary programs, or outreach.

Plan History

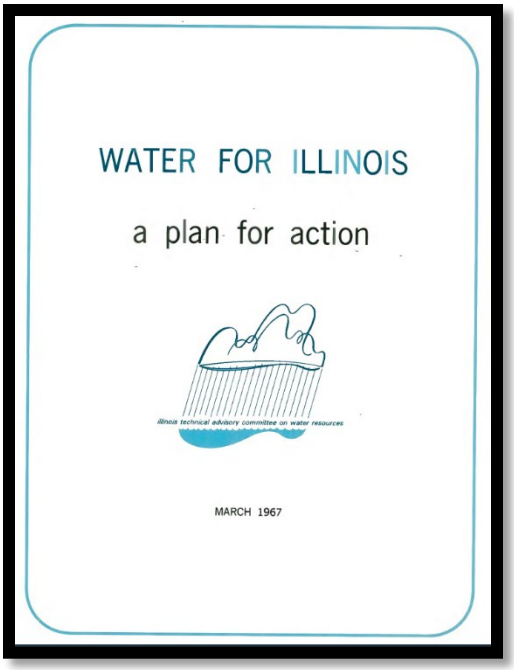

Figure 3.6 – 1967 State Water Plan *(IDNR)*

The first interest in state water planning for Illinois can be traced back to the 1944 report titled, *Illinois Resources,* which included, but wasn't limited to, water resources planning. Developing a water resources specific plan gained interest when the Federal Water Resources Planning Act of 1965 was developed which established a National Water Resources Council. This created Federal and State River Basin Commissions and provided funding to states for water resources planning. Other legislation passed during that time period including the Federal Water Resources Research Act of 1964 and Water Quality Act of 1965. National Water Resources planning was taking great strides and Illinois quickly followed suit in developing its first State Water Plan published in 1967. The intent of the 1967 report was to address issues projected through the future. The Plan focused on actions through 1980 and utilized 2020 as the most distant time to evaluate potential needs. The Plan focused on topics such as precipitation, weather modification, streamflow, groundwater, water quality, water supply, pollution, land and water management, flooding, navigation, recreation, Laws and Government.

Since the 1967 Plan focused on recommendations until 1980, Governor Thompson appointed the State Water Plan Task Force in 1980 to develop the next State Water Plan. The Plan received $437,500 in grant funding from the U.S. Water Resources Council over two years which required matching funds from the State. The Task Force members were identified by the Governor who designated the Director of the Division of Water Resources in IDOT, now IDNR-OWR, as the Chairman. The Task Force is comprised of the following members:

- Illinois Department of Natural Resources (IDNR) - Office of Water Resources (OWR), Office of Resource Conservation (ORC), Office of Mines and Minerals (OMM), Office of Land Management (OLM)
- Illinois Environmental Protection Agency (IEPA)
- Illinois Pollution Control Board (IPCB)
- Illinois Department of Transportation (IDOT)
- Illinois Emergency Management Agency (IEMA)
- Illinois Department of Agriculture (IDOA)
- Illinois Department of Public Health (IDPH)
- Illinois State Water Survey (ISWS)
- Illinois Water Resources Center (IWRC)

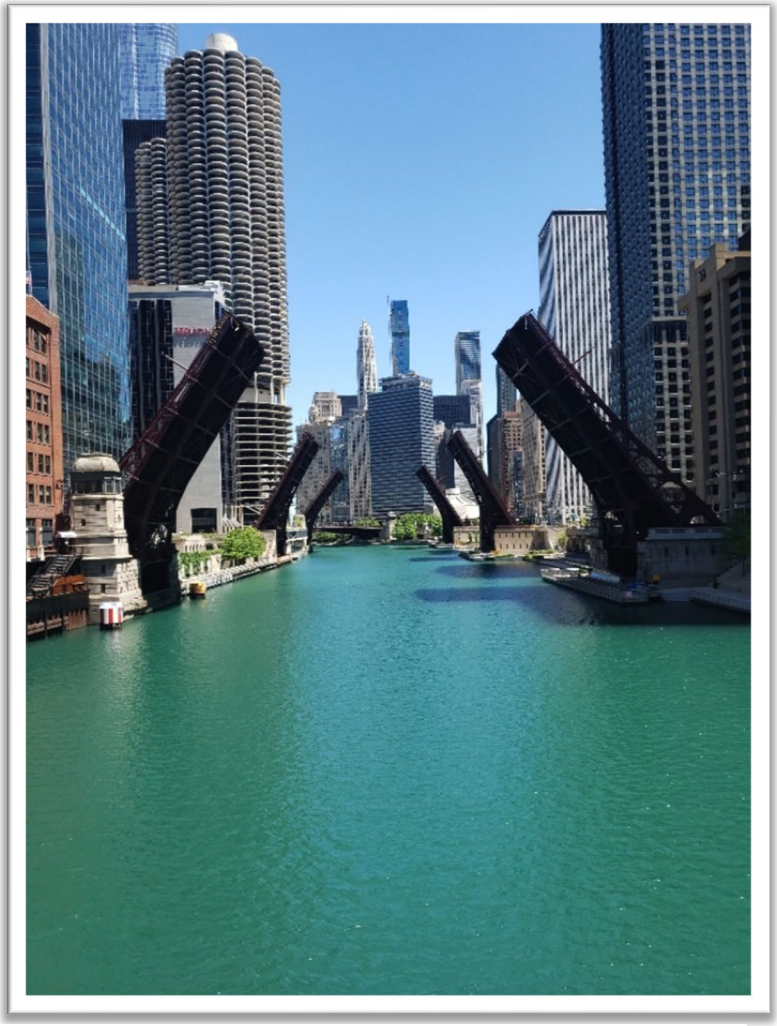

Figure 3.7 – The Chicago River Waterway
(Miliszewski, 2021)

The initial year was devoted to developing the 1981 Plan of Study report which provided guidance to develop the Plan. The final Plan was published in January 1984 and included the following ten critical and three cross-cutting and eight operating issues:

Critical Issues:

- Erosion and Sediment Control
- Protection of Underground Water

- Flood Damage Mitigation
- Water Conservation
- Competition for Water
- Aquatic and Riparian Habitat
- Water-Based Recreation
- Atmospheric Changes and Management
- Drought and Emergency Interruption of Supplies
- Illinois Water Use Law

Cross-Cutting Issues:

- Integrated Water Management
- Conflict Resolution
- Public Participation

Operating Issues:

- Stream and Lake Use Management
- Stream Data Measurements
- Stream Indexing
- Natural Resources Information System
- Water Resource Permit Coordination
- Water Research and Education
- Reservoir and Lake Operations

Figure 3.8 – Groundwater well installation and monitoring *(IEPA, 2021)*

In addition to the State Water Plan, numerous separate reports were published by the State Water Plan Task Force to support the State Water Plan. These included supplemental reports known as critical topics special reports, cost estimate reports, and regular updates on the implementation of the recommendations. These implementation reports along with regular State Water Plan Task Force meetings continued through 1994. The Task Force continued to meet quarterly with continued focuses on agency updates and special topic presentations until 2018.

Figure 3.9 – IDNR/IEPA collaborative fish shocking/monitoring (IEPA, 2021)

In late 2018, the State Water Plan Task Force Chair decided to change direction of the typical meeting agenda of discussing agency activities to formally update the State Water Plan. An invitation to all original SWPTF agencies, or their current equivalent, was made seeking their willingness to update the State Water Plan report. A kickoff meeting was held in January 2019 to determine interest and readiness to participate in the update. The positive response to the new direction was unanimous among all agencies in attendance.

Summary of Plan Development

Once the initiative to update the SWP was confirmed, all agencies were asked to submit topics to be considered for the SWP update. Outside partners were contacted seeking suggestions for potential topics to consider. Forty topics were recommended so similar topics were combined to have a total of 29 topics for all the agencies to evaluate. Each agency ranked the topics from greatest to least importance based on their experience and agency goals. The results of this vote were presented and discussed in the March 2019 SWPTF meeting and the final topics were combined to come up with the 13 topics presented in this report. Once these were identified, the lead and supporting agencies for each topic were determined.

Figure 3.10 – Calumet River Bridges *(IDNR, 2017)*

Next, lead individuals were selected for each topic and committees were formed after soliciting interest from each agency and other interested participants. Each committee met separately to work on tasks related to their topic. Critical issues were developed for each topic and the report goal and missions were being decided along with discussion of the report format. The first public outreach was initially planned for March 2020. The outreach was delayed as COVID-19 locked down the state in March 2020. The decision was made to hold a virtual outreach event in December 2020 instead of any in-person public outreach for Phase 1. The virtual public outreach meeting shared the 13 topics and the critical issues that would be addressed by the Plan. A survey was conducted in conjunction with the outreach effort and included eight questions with over 700 responses. The survey was used to determine interest in the 13 topics and compare the submitted concerns to the 13 topics listed. **Figure 3.11** summarizes how those surveyed intend to utilize the updated SWP.

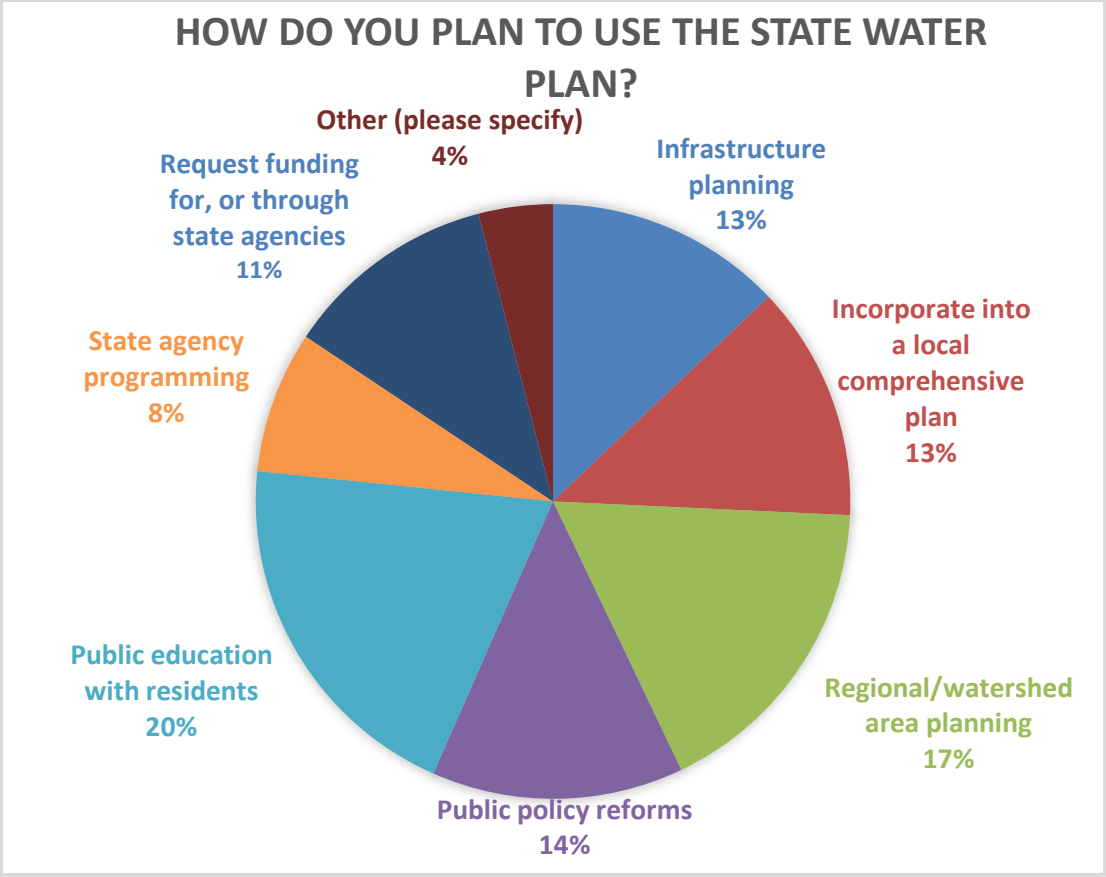

Figure 3.11 – Public Survey Results (December 2021)

A summary of all survey results and further information about the public outreach events can be found in **Appendix B**. Comments were received which confirmed the 13 topics.

In May 2021, the second virtual public outreach meeting was held detailing the recommendations for each of the 13 topics. The outreach effort included the opportunity to be part of breakout session for each critical topic and to submit review comments to the Task Force. In addition to receiving 11 feedback questionnaire responses, five separate stakeholder groups provided letters outlining their review comments. Following the outreach, the Task Force conducted detailed internal discussions of each of the 13 topic recommendations to review the feedback and ensure all agencies agreed with the proposed actions.

A draft report was developed and shared first with stakeholders in July and at the third and final public outreach events held in August 2022. In-Person public outreach meetings were held in Yorkville, Springfield and Carterville. The draft report was published for review in conjunction with the meetings. Each in-person and virtual meeting provided a brief overview of the Plan and highlighted key findings. The public was requested to provide written comments which were incorporated into the final report. Responses to the final review comments will be posted to the website when the report is published.

Recordings of all the public meetings and breakout sessions have been posted to the SWP website. Further information about those that participated and details about the public meetings can be found in **Appendix A** and **Appendix B**, respectively.

Report Overview

The report includes discussions about the critical water issues for the State of Illinois that need to be addressed. First, a general introduction is included to provide background information about the State Water Plan's purpose, history and development of this report. Due to the nature and complexity of water related challenges, many of the critical topics contain aspects that cross connect with each other. For example, climate change leads to increased flooding which can cause soil erosion which leads to sedimentation and water quality issues thus tying all four topics together. Discussion and figures describing how the recommendations overlap and influence each other is included to help clarify the cross-cutting issues (**Section 18 and Appendix C**).

Figure 3.12 – Pine Creek, N. of White Pine Forest State Park *(Iordache, 2020)*

Justice, a new topic not discussed in previous report iterations includes how water issues impact all facets of life in Illinois. Some disadvantaged communities are affected more by water related environmental issues and many times have longer lasting impacts. Therefore, a brief overview of social and environmental justice is provided for background. Each committee was directed to view all the issues and recommendations for each critical topic using a social and

environmental lens to make sure all citizens of Illinois are receiving the help and assistance they need.

Another topic not directly addressed in the previous report iterations was climate change. A standalone section has been developed to discuss the background and research needs related to the general topic of climate change. However, it must be noted that like Justice, climate change impacts and intertwines with every other water issue. As such, specific recommendations related to climate change are outlined in individual critical topic sections.

In summary, the report includes the following main Sections:

- Section 1 – Letter from Task Force Chair
- Section 2 – Agency Support
- Section 3 – Introduction
- Section 4 – Social and Environmental Justice
- Sections 5 to 17 – Thirteen Critical Topics
- Section 18 – Recommendations and Cross-Cutting Impacts
- Section 19 – Conclusions

Each of the main topics will be summarized separately in its own Section. Since other Task Force water related reports and updates have been written with detailed explanations and descriptions of water resources in Illinois, this report will be more concise to allow readers to better see exactly what the current issues and recommendations are for each topic. All the previous reports can be found on the State Water Plan website at the following link:

https://www2.illinois.gov/dnr/WaterResources/Pages/StateWaterPlanTaskForce.aspx

The following lead agencies were assigned to the topics to serve as committee chairs. Other agencies were assigned to each topic to provide collaboration and key support.

Table 3.1 – Lead and Supporting Agencies for each Critical Topic

No.	Critical Topic	Lead Agency	Supporting Agencies
1	Water Quality	IEPA	ISWS, ORC, IDPH, OMM
2	Climate Change	ISWS	OWR, ORC, IWRC
3	Integrated Water Management	OWR	IEPA, ISWS
4	Long Term Funding	IEPA	OWR, IDPH
5	Water Sustainability	OWR	ISWS, ORC
6	Lake Michigan	OWR	IEPA
7	Flood Damage Mitigation	OWR	IEMA, ISWS
8	Aquatic & Riparian Habitat	ORC	ISWS, OWR, IWRC
9	Illinois Water Use Laws & Regulations	OWR	IWRC
10	Navigation	IDOT	OWR
11	Erosion & Sedimentation	IDOA	ISWS
12	Data Management	ISWS	IDOT, IWRC
13	Recreation	ORC	IDOT, OWR

Each committee generally included multi-agency Task Force members as well as various stakeholders and members of the public. Each lead agency and the associated committees first developed a list of the main issues for each topic. Next recommendations for each issue were developed to either address the main issues or provide the first step in addressing each issue. The recommendations are framed so that they can be achievable within the next 5-10 years. Most topics had more issues than could reasonably be addressed in this timeframe so they were noted by the committee to be addressed in the next State Water Plan Update. Each recommendation is to have a measurable outcome to allow the Task Force to determine if the recommendation has been completed. As expected, some issues and recommendations were very broad and complicated so they were refined until they could meet the achievability goals. Similarly, some of the recommendations include pilot programs to work out the details required and to determine success before a full program modification or recommendation can be provided. The hope is to broaden some of

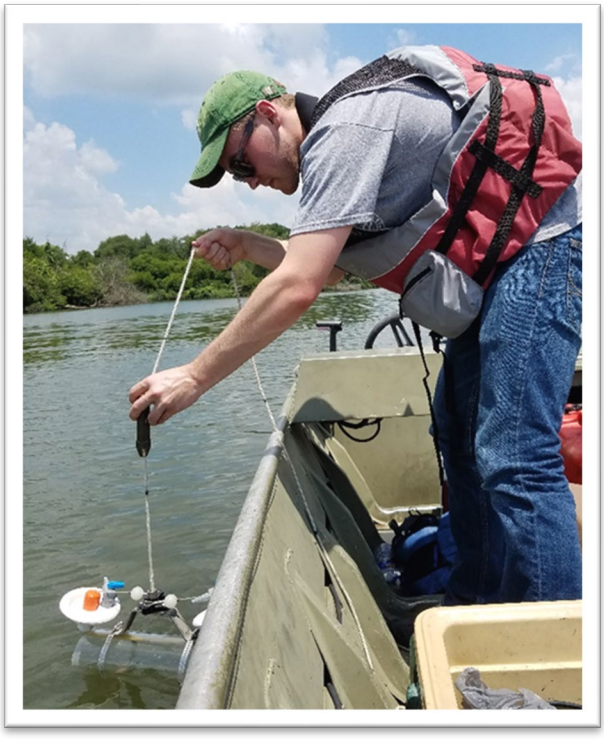

Figure 3.13 – IEPA biologist lake monitoring
(IEPA, 2021)

those pilots in the next State Water Plan update while also addressing newly defined or remaining issues for each topic.

Each main topic Section includes a brief overview of the topic. Sometimes, the original issues from 1984 are brought forward to illustrate progress or lack of progress in meeting the original goals. The overview also serves to provide background details as to why the water topic is important in Illinois and why it needs to be improved.

From there, the main issues are outlined for each water topic. Depending on the topic, the issues might be grouped to explain general needs or discussed separately to outline specific requirements. The issues discussion also serves to categorize how the recommendations will be presented.

The recommendations have been summarized using a table format to allow each section to include the same information for ease of comparison. The table includes a brief description of the issue and the associated recommendation. For these recommendations to be successful, a lead agency was identified to take ownership for making sure the task is completed. It was also noted that many times work by Federal agencies can be leveraged to optimize funding and share resources.

The next column lists whether the recommendation will require funding and if so, the specific type. **Section 8** outlines various long-term funding alternatives such as dedicated funding (new or existing programs), strategic funding (new funding for strategic initiatives), capital funding (construction projects) or a new revolving loan program. Please note that existing federal water related programs will be leveraged whenever possible. One of the intents of the Plan is to access recently approved federal funding to help address some of the current water issues in Illinois when possible. To make comparisons easier, only the following options were listed:

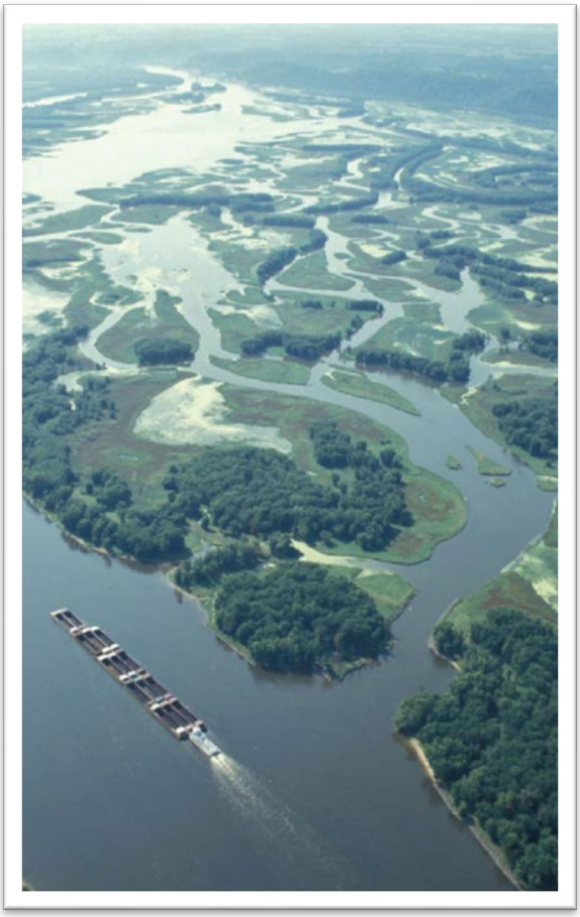

Figure 3.14 – The Mighty Mississippi River
(IEPA, 2021)

Funding Options:

- One Time Funding
- New Annual Funding
- Increased Annual Funding
- Maintain Annual Funding
- New Water Resources State Revolving Funding
- None
- Unknown
- Federal (IL Match)

The final column outlines several Action tasks that are required for the recommendation to be accomplished. The Action was selected from the following alternatives:

Figure 3.15 – Green River near Binghampton *(Iordache, 2019)*

Action Options:

- Study (Includes Research)
- Program (Includes Staffing)
- Policy (Includes Rules)
- Legislation
- Project (Capital Construction)

The Policy and Legislation options do not require funding, but the other three choices generally require continued, increased or new funding. In many cases, studies and/or data collection and analysis is required before action can be completed and this need is spelled out. This report is not intended to provide all the detailed methods to solve the identified issues. At this point, the key issues and potential recommendations have been identified along with suggested actions to make progress. Additional work will be completed by the Task Force and the committees to further flesh out specific courses of action when funding and support has been provided by the General Assembly.

Acknowledgements

> An Optimist sees the opportunity in every difficulty.
> Winston S. Churchill

Figure 3.16 – Canoeing in Waukegan *(IDNR, 2019)*

The State Water Plan is loaded with opportunities ready to happen and was created by a team of optimists who worked hard to define those opportunities from the identified water related difficulties and challenges in Illinois. Without executive office direction or legislative mandate, the State Water Plan Task Force agency representative members, with support from their state agencies, chose to dedicate time and effort utilizing existing programmatic appropriated resources to update the State Water Plan. State Water Plan Task Force agency representative members and their associated agencies are listed in **Table 3.2**. The updated State Water Plan reflects a multi-team effort of dedicated professionals and concerned citizens who also

volunteered their time and resources to participate in individual Water Plan Topic Committees and the development of the Plan. Thank you to all the individuals who served on the various topic issue committees on behalf of their community, organization, or agency. A listing of topic issue committee members is provided in **Appendix A**.

Table 3.2 – State Water Plan Task Force Agency Representatives / Topic Leaders

Issue	Lead Agency	Topic Lead
Water Quality	IEPA	Michael Brown
Climate Change	ISWS	Dave Kristovich
Integrated Water Management	IDNR - OWR	Loren Wobig
Long Term Funding	IEPA	Chris Davis, Gary Bingenheimer
Water Sustainability	IDNR - OWR	Wes Cattoor
Lake Michigan	IDNR - OWR	Ania Bayers
Flood Damage Mitigation	IDNR - OWR	Terra McParland
Aquatic & Riparian Habitat	IDNR - ORC	Brian Metzke
Illinois Water Use Laws & Regulations	IDNR - OWR	Steve Altman
Navigation	IDOT	BJ Murray
Erosion & Sedimentation	IDOA	Michael Woods
Data Management	ISWS	Laura Keefer
Recreation	IDNR -ORC	Seth Love, Brennan Caputo

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Acronyms and Abbreviations

Acronym	Definition
ANS	Aquatic Nuisance Species
BAAD	Boat Access Area Development
BMPs	Best Management Practices
BRIC	Building Resilient Infrastructure in Communities
BSMN	Benchmark Sediment Monitoring Network
CDB	Capital Development Board
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CRIA	Community Resilience Indicator Analysis
CSP	Conservation Stewardship Program
CSOs	Combined Sewer Overflow
CTAP	Critical Trends Assessment Program
DFIRM	Digital Flood Insurance Rate Map
EDCs	Endocrine Disrupting Chemicals
EJ	Environmental Justice
EQIP	Environmental Quality Incentives Program
FEMA	Federal Emergency Management Association
fIBI	Fish Index of Biotic Integrity
FIRMs	Flood Insurance Rate Map
FRA	Federal Railroad Administration
FY	Fiscal Year
GIGO	Green Infrastructure Grant Program
GIS	Geographic Information System
GOMB	Governor's Office of Management and Budget
HAB	Harmful Algal Bloom
IDCEO	Illinois Department of Commerce & Economic Opportunity
IDNR	Illinois Department of Natural Resources
IDOA	Illinois Department of Agriculture
IDOT	Illinois Department of Transportation
IDPH	Illinois Department of Public Health
IEMA	Illinois Emergency Management Agency
IEPA	Illinois Environmental Protection Agency
IMAG	Illinois Mitigation Advisory Group
IMTS	Illinois Marine Transportation System
INAI	Illinois Natural Areas Inventory
INHS	Illinois Natural History Survey
IPCB	Illinois Pollution Control Board
IRAP	Illinois Recreational Access Program
ISIS	Illinois Stream Information System

Acronym	Definition
ISWS	Illinois State Water Survey
IUM	Illinois Urban Manual
IWIC	Integrated Water Information Center
IWIP	Illinois Water Inventory Program
IWRC	Illinois Water Resources Center
JCAR	Joint Committee on Administrative Rules
LiDAR	Light Detection and Ranging
mIBI	Macroinvertebrate Index of Biotic Integrity
N	Nitrogen
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration
NLRS	Nutrient Loss Reduction Strategies
NMTS	National Marine Transportation System
NPS	Non-Point Source
NPDES	National Pollutant Discharge Elimination System
NRDA	Natural Resources Damage Assessment
NREC	Nutrient Research and Education Council
NWI	National Wetlands Inventory
NWIS	National Weather Information System
NWS	National Weather Service
OAR	Outdoor Access for Recreation
OMM	Office of Mines and Minerals (IDNR)
OLM	Office of Land Management (IDNR)
ORC	Office of Resource Conservation (IDNR)
OWR	Office of Water Resources (IDNR)
P	Phosphorus
PAHs	Polynuclear Aromatic Hydrocarbons
PFAS	Per- and Polyfluorinated Substances
RAPT	Resilience Analysis and Planning Tool
RDF	Resource Development Fund
SAFR	Structures at Flood Risk
SESC	Soil Erosion & Sediment Control
SEWQAC	Soil Erosion and Water Quality Advisory Committee
SRF	State Revolving Fund
STAR	Saving Tomorrow's Agriculture Resources
SWCDs	Soils and Water Conservation Districts
SWP	State Water Plan
SWPTF	State Water Plan Task Force
SVI	Social Vulnerability Index
TARP	Tunnel & Reservoir Plan
UHI	Urban Heat Island

Acronym	Definition
UMBRA	Upper Mississippi River Basin Association
UMR	Upper Mississippi River
USACE	United States Army Corps of Engineers
USEPA	United State Environmental Protection Agency
USGS	United States Geological Survey
WRDA	Water Resources Development Act
WRSRF	Water Resources State Revolving Fund

Key Terms

Cross-Cutting – a concept that relates to more than one topic

Environmental Justice – principle that all people should be protected from environmental pollution and have the right to a clean and healthy environment

General Assembly – The legislative body

Integrated Management – a single system to manage or account for multiple aspects or issues

Mitigation – an action to reduce or eliminate the severity of an impact

Non-Point and Point Pollution Sources – Nonpoint source pollution is a combination of pollutants from a large area (e.g., agricultural runoff) rather than from a specific identifiable source (poin source t) such as a discharge pipes (e.g., factory or wastewater treatment plant).

Riparian – the edge between land and a river or stream

Social Justice – human equality including but not limited to economics, education, health and opportunity

Water Quality - chemical and physical characteristics of water

Water Resources – The world's natural supply of rainwater, surface water and groundwater

Water Sustainability – ensuring adequate quantity of water to meet demands

Outreach and Education (IEPA, 2021)

4

SOCIAL AND ENVIRONMENTAL JUSTICE

Overview

Social and Environment Justice cuts across each of the critical topics identified in the updated State Water Plan. As such, the Governor's Office has directed that the updated State Water Plan should consider Social and Environment Justice matters and strive to engage Social and Environment Justice in implementable plan actions and recommendations in order to protect the health and interests of the citizens of Illinois and their environment.

Social Justice

Social justice is served when all citizens have equal access to health, well-being, opportunities and privileges throughout Illinois. It focuses on fair treatment for and by all individuals. However, there are subsets of populations that are vulnerable such as children, older adults, persons with disabilities, persons with chronic illness, marginalized groups, persons with limited English proficiency, and persons experiencing homelessness. Race, ethnicity, gender, social class, and religion are also contributing factors to vulnerability. These groups have fewer economic resources, fewer social networks and less power and influence. All these factors coalesce and contribute to social injustice.

Social vulnerability refers to groups or populations that are susceptible and lack the capacity to withstand adverse impacts to which they are exposed (Natural Hazards Center, 2021). They often experience worse physical and mental outcomes while maintaining lower economic status which impacts their ability to anticipate, resist or recover.

Environmental Justice

In 2011, the General Assembly passed the Illinois Environmental Justice Act (EJ Act) which created the Commission on Environmental Justice (EJ Commission). The EJ Act requires that:

> *No segment of population, regardless of race, national origin, age, or income, should bear disproportionately high or adverse effects of environmental pollution.*

The EJ Commission advises legislators and the Governor on environmental justice issues and is comprised of public and various state agency members (24 voting members). Some of the represented agencies overlap with the SWP Task Force including IEPA, IDNR, IDPH, and IDOT. Historically, the group meets quarterly and provides a yearly report to the Governor and Legislative Leaders.

Figure 4.1 – Boating at Rock Cut State Park *(Gray, 2021)*

In addition, the IEPA has developed an Environmental Justice Policy (EJ Policy) that highlights what that agency is doing to promote environmental equity in the administration of its programs. The Agency maintains a website with additional information and explains how this topic is implemented (https://www2.illinois.gov/epa/topics/environmental-justice/Pages/default.aspx).

The SWP recommendations with respect to environmental justice build on the Commission's overall definitions and IEPA's EJ Policy goals. The goals are listed next but have been adapted for the SWP:

- to ensure that communities are not disproportionately impacted by degradation of the environment or receive a less than equitable share of environmental protection and benefits
- to strengthen the public's involvement in environmental decision-making, including in permitting and regulation, and where practicable, enforcement matters
- to ensure that personnel develop common practices when implementing EJ concepts into Agency programs
- to ensure that the SWP continues to evaluate and adapt its EJ strategy to safeguard the environment and the health of the residents of Illinois, promote environmental equity in the administration of its programs, and be responsive to the communities it serves

Equality vs. Equity

Another way to look at this issue is to determine whether all citizens of IL are being treated equitably. Equity is different than equality. Everyone wants to be to be treated equally but equality ensures that everyone is being provided the exact same resource. However, not everyone needs the exact same resource, which will vary depending on their own individual needs. For example, with respect to water resources, you could have fishing poles available for public use at a park. If all the poles are the same type and size, you are providing equal resources to everyone. However, children might not be able to use that larger pole. Instead, providing varying sizes of poles with different types of reels to allow a larger population of people to use them is an equitable solution.

Figure 4.2 – Teaching the next generation about Water Resources *(IEPA, 2021)*

When social and environmental justice is brought to the forefront of the decision-making process and when solutions are adopted and implemented, equity is being achieved. Similarly, when water resource related recommendations are implemented as outlined in this Plan, it will be important to verify that equitable social and environmental outcomes have been accomplished.

Justice Areas of Concern

As part of IEPA's Environmental Justice Public Participation Policy (April 20, 2018), areas of EJ concern were defined as:

> *a census block group or areas within one mile of a census block group with income below poverty and/or minority population greater than twice the statewide average.*

They also developed a Geographic Information System (GIS) based publicly available mapping tool called EJ START (http://epagisportal.illinois.gov/portal/apps/webappviewer/index.html?id=414d804241e94c5809f08f3644c37d9) to identify census block groups and areas within one mile of those census block groups to help focus IEPA's outreach activities.

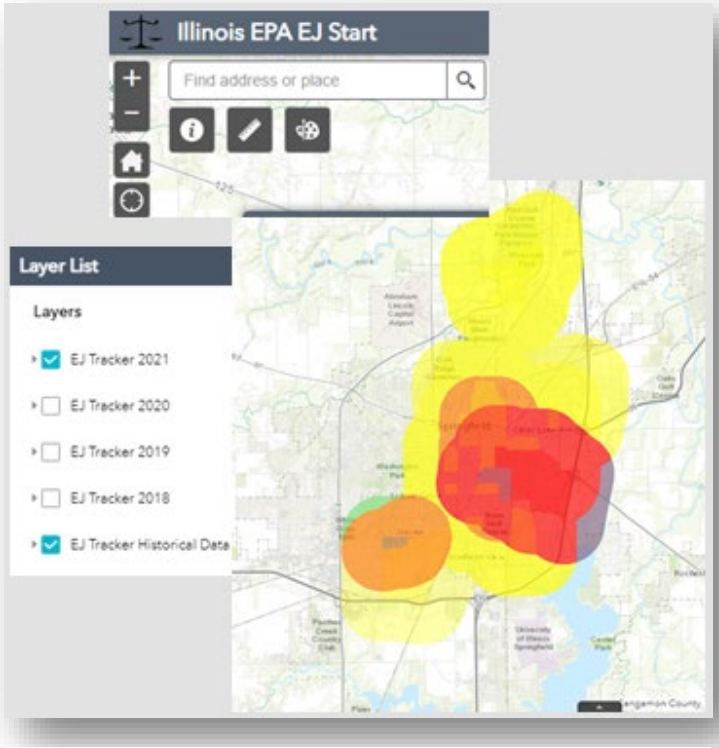

Figure 4.3 – Example Justice Mapping *(IEPA, 2022)*

The IEPA EJ GIS tool provides locations related to income and race. While it is a good base, several other justice indices have been developed that include additional comparative factors to address a greater breadth of social justice aspects. The CDC tracks 15 socioeconomic factors, both separately and as a combined index (Social Vulnerability Index – SVI). FEMA uses the Community Resilience Indicator Analysis (CRIA) for their Resilience Analysis and Planning Tool (RAPT) mapping tool which tracks 20 resilience factors, again either separately or as one combined index. In general, SVI tracks to census track level and the CRIA tracks only to county levels. Both indices will be updated every ten years along with census updates. The USEPA also employs an environmental justice mapping and screening tool called EJScreen which includes 12

environmental factors, 7 demographic indicators and 12 EJ indexes which combines each demographic indicators with a single environmental factor (https://www.epa.gov/ejscreen).

All these indices can used by members of the Task Force to assist in identifying areas that might need additional social and environmental focus in their water resource recommendations. Depending on the topic, these indices can be overlaid where known water resource problems occur to see where they overlap. This will help determine where additional support, resources and funding is needed. Part of the SWP focus will be to determine whether one methodology can be used for prioritizing work to underserved communities or populations versus if varying methods should be used, depending on the topic. Once determined, the selected indices can be used for statewide planning and implementation. This is one of the recommendations that can be found in the discussion on Integrated Water Management (**Section 7**).

Incorporation into the State Water Plan

Social and Environmental justice are interconnected and manifest in similar ways. When a specific group is marginalized, it can lead to higher environmental vulnerability. For example, in the 1970's some of the largest polluters were sited in lower income communities due to lower land costs. These depressed areas ended up having more and longer-term health issues related to adverse impacts from pollution. Then, the income opportunities for sick populations decreased and further impacted the community's socioeconomic status. This illustrates how social decisions can negatively impact a population environmentally.

In turn, social and environmental justice weaves into each of the identified State Water Plan topics and related issues. Each topic's committee was charged with looking at each issue and related recommendation through the lens of Social and Environmental Justice. Specifically, the goal is to protect the health and interests of the citizens of Illinois and their environment. In other words, the Plan needs to provide both social and environmental justice to everyone in the state.

When reviewing issues, each group determined if the resolution had direct positive impacts to all types of populations throughout the state. Some recommendations strive to first identify and prioritize where underserved communities are affected in their particular water resource topic. As discussed previously, indices will be selected to assist with this task for each topic. Other ways that social and environmental justice was brought into the Plan related to determining how to provide equitable technical assistance and funding for all communities in the state. Instead of providing one single solution, several alternatives might be needed to present more equitable outcomes.

While the first step is to provide additional assistance and resources where needed, it is also key to review the processes over time to determine if they are actually impacting the communities equitably. Therefore, as part of the State Water Plan status updates, a check will be completed to make sure all the statewide partners are receiving the intended benefits. If

not, adjustments will be made to the recommendations to better serve all residents. Similarly, where success is achieved, some of those processes will be adopted in the implementation of other recommendations moving forward. Since this Plan is to be continually refined, feedback from the Task Force and the general public will be solicited to find out how successful the measures are with respect to both Social and Environmental Justice. Any lessons learned and new ideas will be weaved back into the Plan recommendations as we move forward.

Figure 4.4 – IEPA biologist stream monitoring *(IEPA, 2021)*

Water Quality Testing (Iordache, 2019)

5

WATER QUALITY

Overview

Illinois has abundant surface water resources. Three large rivers form much (about 911 miles) of the state's borders, including the Mississippi, Wabash, and Ohio Rivers. About 63 miles of Lake Michigan shoreline borders northeastern Illinois. Within Illinois borders are 118,333 miles of streams and more than 91,400 lakes and ponds. Regarding the state's groundwater resources, there are approximately 5,200 groundwater-dependent public water supplies, of which 1,150 are community water supplies (including direct users and purchase systems), and the rest of which are non-community type wells. In addition, the Illinois Department of Public Health estimates approximately 750,000 residences of the state are served by private wells. Approximately 30 percent of Illinois' population, including 90 percent of community water supplies, utilize groundwater as their primary source of drinking water.

Numerous state and federal statutes and regulations are in place to guide and fund the implementation of programs designed to maintain and improve Illinois water quality. To name a few, there is the federal Clean Water Act; federal Safe Drinking Water Act; Illinois Groundwater Protection Act; Illinois Environmental Protection Act; Illinois' Rivers, Lakes, and Streams Act; and Illinois Lake Management Program Act. In addition, there are a seemingly endless list of programs intended to maintain or improve surface and groundwater quality, including wastewater and drinking water permitting and financial assistance programs, stormwater management programs, operator certification programs, watershed and nonpoint source management programs, water quality standards development programs, groundwater protection programs, water resource monitoring and assessment programs, water research

programs, education and awareness programs, and environmental and regulated community water protection and advocacy programs and others.

"Water Quality" by itself was not identified as a critical, cross-cutting, or operating issue for surface waters in the 1984 Illinois State Water Plan, nor was it identified as a remaining or new issue in the 1994 State Water Plan update. However, providing all Illinois citizens and communities with access to clean and plentiful waters is critical. This 2022 State Water Plan update provides a significant discussion of Illinois' water quality issues, and identification of meaningful recommendations for future water quality program and policy consideration.

Issues

Surface Water Quality

From a surface water quality perspective, great strides have been taken over the past four to five decades to reduce both point and nonpoint sources of pollution from impairing our surface waters. For example, ecological improvements to the Illinois River's water quality, native species diversity, and sport-fish populations have occurred directly from the implementation of large-scale policies and regulations, namely via National Pollutant Discharge Elimination System permitting authorized by the federal Clean Water Act (Gibson-Reinemer et al., 2017). Implementation of numerous voluntary or incentive-based programs have all served to keeping millions of tons of nitrogen, phosphorus, sediments, and other nonpoint source pollutants on the landscape and out of Illinois rivers and the Gulf of Mexico. Despite these successes, significant surface water quality issues remain. Aquatic life and primary contact (swimming) uses do not meet federal Clean Water Act interim goals in 42% and 89%, respectively, of assessed streams (IEPA, 2021); in lakes, aesthetic quality use goals are not met in 90% of the acreage assessed; and in streams, lakes, and Lake Michigan open waters, fish consumption advisories exist on most waters assessed.

Figure 5.1 – Hennepin Canal *(Iordache, 2022)*

Groundwater Quality

Regarding groundwater, the state recognizes the essential and pervasive role of groundwater in the social and economic well-being of the state and its vital importance to the general health, safety, and welfare of the people of Illinois. State policy holds that groundwater resources should be utilized for beneficial and legitimate purposes, that waste and degradation of the resources should be prevented, and that underground water resources should be managed to allow for maximum benefit of the people of Illinois. There is a continued need to recognize trends in groundwater quality in the major aquifers in Illinois and evaluate the long-term effectiveness of Clean Water Act and Safe Drinking Water Act program activities in the protection of groundwater resources. The state promotes and is supportive of the need for region-specific advocacy in groundwater protection matters. The state also recognizes the need in facilitating informational and educational activities relating to groundwater protection within the State.

Figure 5.2 – Groundwater well installation and monitoring *(IEPA, 2021)*

Regarding water supply issues, the Illinois Environmental Protection Agency (IEPA) regulates approximately 1,760 community water supplies (e.g., municipalities, privately owned utilities) and the Illinois Department of Public Health (IDPH) regulates 3,800 non-community water

supplies (e.g., schools, factories, campgrounds, rest areas). The mission of these two agencies is to assure that all persons served by public water supplies receive water that is assuredly safe. The majority of public water supplies are small groundwater systems serving fewer than 1,000 people and often associated with Environmental Justice Communities. These small public water systems are often less resilient to natural disasters such as drought and fire, have more difficulty adjusting to regulatory changes, and may struggle to fund infrastructure maintenance and replacement due to poor economies of scale and lack of staff.

Water Supply and Drinking Water

Some of these water quality issues that threaten sources of public water supplies and the ability to boat and swim and catch edible fish for recreational or subsistence needs have been with us for decades and will continue. Excessive nutrient, pesticide and sediment runoff will always be at issue in some places because of Illinois' loess soils, expansive agricultural landscapes, and large urban-community settings. Likewise, many shallow aquifers and surface water bodies in northeastern Illinois and other urban areas will continue to be vulnerable to runoff from deicing salts applied to roads, parking lots, and sidewalks.

New and Emerging Challenges

Figure 5.3 – Harmful Algal Bloom Sampling *(IEPA, 2021)*

On both a national and state level there is an increasing focus on known issues like lead, nitrates, harmful algal blooms, and the increasing occurrence of Legionnaires Disease. But there are also new and emerging issues associated with drinking water such as new pesticides, per- and polyfluorinated substances (PFAS) and endocrine disrupting chemicals (EDCs). IEPA recently completed a statewide investigation into the prevalence of PFAS in finished water at all community water supplies across Illinois to support the development of standards (https://www2.illinois.gov/epa/topics/water-quality/pfas/Pages/pfas-statewide-investigation-network.aspx). However, the biggest hurdle with many of these new emerging issues is that there is little or no data to develop and support management measures. Likewise, there will always be new issues that emerge that will require changes to existing priorities and require constant vigilance and adaptive management if they are to be properly managed.

Recommendations

Equitable administration of existing water related regulations, policies, and programs that protect and improve surface, groundwater, and public water supply resources are needed to safeguard human and environmental health. Not just some, but ALL Illinois' citizens, businesses, industries, agricultural producers, and other populations want and deserve clean, safe, and abundant waters. The following recommendations are provided to address these concerns.

Figure 5.4 – Agricultural Drain Tile *(Kelly, 2017)*

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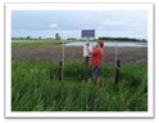
Table 5.1 – Water Quality Recommendations

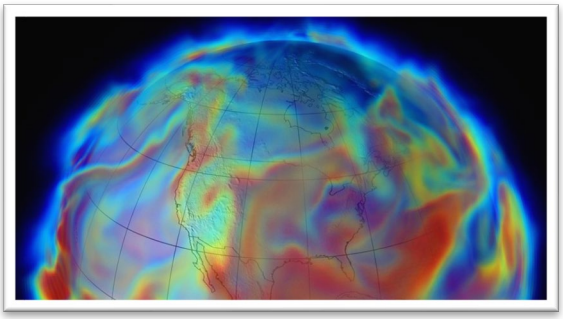
Issue	Recommendation	Lead Agency	Funding	Action
Resources are needed to reduce phosphorus pollution in the Illinois rivers system.	1. The state should establish substantial, long-term funding for IEPA and IDOA to lead implementation of recommendations in Illinois' Nutrient Loss Reduction Strategy so the long-term goal of reducing point and nonpoint sources of total phosphorus and total nitrogen by 45%, with interim reduction goals of 15% nitrate-nitrogen and 25% total phosphorus by 2025, can be realized.	IDOA	New Annual	Program
More funding is needed in existing nonpoint source pollution reduction and flood prevention programs.	2. The state should support and advocate for a doubling of state and federal agency Green Infrastructure and water quality programs (e.g., GIGO and Section 319 NPS). Program projects should be prioritized where the highest water quality benefits can be achieved, especially if located in disadvantaged communities.	IEPA	Increased Annual	Program
More funding is needed in existing voluntary nutrient reduction programs in agricultural areas.	3. The state should support and advocate for a doubling of state and federal agency voluntary nutrient reduction programs promoted by the agricultural and urban nonpoint source sectors (e.g., Partners for Conservation, CREP, CRP, CSP, EQIP). Program projects should be prioritized where the highest water quality benefits can be achieved, especially if located in disadvantaged communities.	IDOA	Increased Annual	Program
Additional monitoring is needed to further understand the effectiveness of current nonpoint source pollution reduction strategies.	4. State funds should be provided for the continued operation of USGS "Super Gages" to provide the data necessary to determine if interim and long-term goals of Illinois' Nutrient Loss Reduction Strategy are being realized.	IEPA	Maintain Annual	Program
Harmful algal blooms can occur in lakes,	5. Illinois should continue to conduct and expand Harmful Algal Bloom (HAB) monitoring and safety notification efforts and	IEPA	Maintain Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
reservoirs, rivers, ponds, bays and coastal waters, and the toxins they produce can be harmful to human health and aquatic life.	integrate this monitoring through participation in USGS's 10-year "Next Generation Water Observing System" in the Illinois River Basin.			
More funding is needed to fully utilize the new equipment used to monitor fish tissues to assist in developing better fish consumption advisories.	6. With the recent purchase of new GC/MS/MS laboratory equipment, IDNR collection and IEPA analysis of PFAS samples in Lake Michigan fish tissues will be used to develop fish consumption advisory thresholds and IDPH issued consumption advisories for the protection of the most sensitive populations, pregnant or nursing women, women of childbearing age, and children less than 15 years of age, and especially subsistence fishing populations located in disadvantaged communities. Multiple agencies will be involved with the State of IL Fish Contaminant Monitoring Program (IEPA, IDNR, IDPH, IDOA).	IDPH	New Annual	Program
Increased groundwater monitoring is needed to better understand the locations of chronic or emerging groundwater contamination in order to protect public health.	7. State funds should be provided to expand the ambient groundwater monitoring network to assess the overall conditions of statewide groundwater resource quality (i.e., ambient conditions) for focus or intensive evaluation of chronic or emerging conditions (e.g., Nitrate Trend Network, Chromium 6 project, Chloride Trend Network, VOC Trend Network, Statewide PFAS Network and pesticides).	IEPA	Increased Annual	Program
Protection and restoration of the Upper Mississippi	8. As a member state of the Upper Mississippi River Basin Association (UMRBA), the State will provide appropriate input and support for large-scale UMRBA program and federal funding	IDNR-OWR	Increased Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
River basin is a critical state need.	recommendations to protect and restore the Upper Mississippi River (e.g., UMR Water Quality Improvement Act, Upper Mississippi River Monitoring Plan).			
Water well owners need to better understand how to protect their water supplies and their responsibilities when they cease using individual wells.	9. Increased outreach efforts should be conducted to educate private and public well owners on the importance of: • protecting water quality • proper well abandonment and the requirement to seal unused wells pursuant to the Illinois Water Well Construction Code.	IDPH	New Annual	Program
Resource-challenged public water systems need assistance to maintain their water systems.	10. The state should provide grant funding for smaller public water systems that are unable to fund essential infrastructure projects through conventional means such as the existing State Revolving Fund.	IDNR-OWR	New Annual	Program
Smaller resource-challenged public water systems could benefit from regionalization to better address infrastructure management.	11. The state should investigate the development of an assistance program for the regionalization of small public water systems.	IEPA	Maintain Annual	Program
Smaller public water systems often do not have sufficient technical expertise to address water resource issues.	12. The state should provide technical assistance or funding for capacity development for small public water systems to develop long term technical, financial, and managerial resiliency.	IEPA	New Annual	Program



Issue	Recommendation	Lead Agency	Funding	Action
New and emerging contaminants could pose new risks to public and environmental health in Illinois waters.	13. State funds should be provided to expand monitoring on how new and emerging issues such as microplastics, endocrine disrupters, new pesticides and polynuclear aromatic hydrocarbons (PAHs) affect drinking water supplies as well as surface and groundwaters.	ISWS	Increased Annual	Study
More public outreach and education strategies are needed to help the public better understand their roles in protecting and improving Illinois water quality.	14. The state will improve its public outreach and education efforts related to water quality via the Illinois Water Information Center as described in the Integrated Water Management section.	ISWS	Increased Annual	Program



6

CLIMATE CHANGE

Overview

This chapter outlines the demonstrated and anticipated ways that climate change may affect the sources and demand for water in Illinois. It is important to note that atmospheric processes influence nearly all aspects of use of the state's water supplies to varying degrees, far too many to highlight in a single chapter. Therefore, the chapter is organized to first give an overview of historical and expected future climatic changes, followed by targeted topics providing examples of the differing effects of climate change and highlighting areas of particularly needed work and research.

Long-term station observations have shown that trends in temperature and precipitation are key indicators of climate change. Between 1895 and 2019, Illinois statewide annual average temperature increased 1.2°F, with half of that warming occurring in the most recent 30 years (NOAA NCEI, 2020). Statewide annual average daily minimum temperatures have increased at a rate that is three times that of daily maximum temperatures between 1895 and 2019 (NOAA NCEI, 2020). Temperatures in all four seasons have increased since 1895, with larger magnitudes in climatological winter and spring. In the last 30 years, warming was observed during most seasons, with the exception of cooling during winter. **Table 6.1** outlines the changes in temperature per decade in Illinois by season.

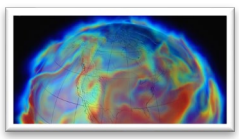
Table 6.1 – Seasonal Rate of Change in Temperature in IL

TEMPERATURE Trend	1895 – 2019	1990 – 2019
Winter (Dec. – Feb.)	0.17°F/decade	-0.31°F/decade
Spring (Mar. – May)	0.17°F/decade	0.44°F/decade
Summer (Jun. – Aug.)	0.03°F/decade	0.33°F/decade
Fall (Sep. – Nov.)	0.08°F/decade	0.60°F/decade

Source: Wuebbles et al., 2021

Meanwhile, statewide annual total precipitation has increased by nearly 6 inches between 1895 and 2019, an approximate 15% increase, greatly exceeding the national average precipitation increase of 4% (NOAA NCEI, 2020). Although total precipitation has increased in every season, the relative changes are largest in climatological spring (16% increase) and summer (17% increase). Increased total precipitation has been accompanied by more frequent intense or heavy precipitation events in Illinois (Frankson et al., 2017).

Globally, climate changes are driven largely by changes in emissions of climate-sensitive gasses and particles, while local changes are often greatly influenced by nearby water bodies and land use. Higher-resolution climate models are needed to provide detailed information on likely future climate changes throughout Illinois. **Figure 6.1** shows the changes in precipitation in a high-emissions scenario by the end of the century based on a high-resolution climate model. Precipitation is projected by the high-resolution model to increase, on average, throughout the state. Spring is projected to have the greatest increases in total precipitation amount. Unlike the other months, though, summer months are anticipated to be drier. However, uncertainty in precipitation projections needs to be considered, especially for summer (Byun and Hamlet, 2018). The climate model tends to indicate greater amounts of warming in northern areas of the state (not shown).



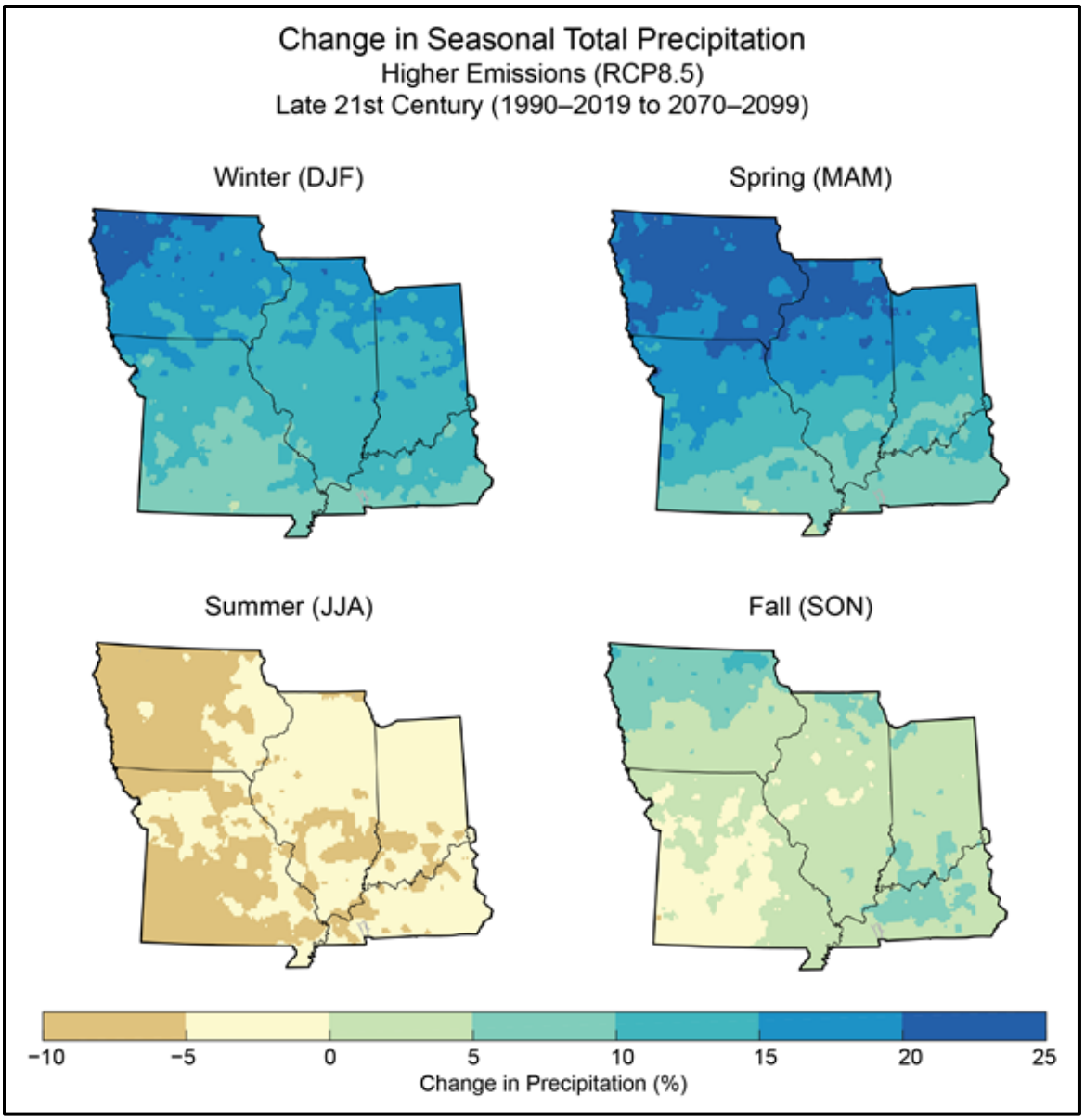


Figure 6.1 – Projected Changes in Precipitation between 1990-2019 and 2070-2099
(Wuebbles et al., 2021)

In addition to the overall changes in total precipitation amount, precipitation intensity is also expected to change (as discussed in *Precipitation Frequency Study for Illinois*, ISWS Bulletin 75, 2020). Overall, the frequency of extreme heavy precipitation is expected to increase, continuing this trend observed over Illinois over the period 1900 to the present. Many flood-control systems, such as reservoirs, stream restoration projects and levees, assume that the precipitation distribution will remain somewhat constant; thus, the increasing extreme precipitation would be expected to make some systems less effective over time.

Finally, climate change is expected to affect more than just temperature and precipitation. These multiple climate changes can have important impacts on runoff and drainage of water from precipitation, demand for water from agricultural and urban areas, seasonal changes in water availability from rivers and lakes, and impacts to water quality. Changes in humidity, wind speed and solar radiation will alter evaporation rates from the surface as well as storm development, thus offering an added challenge to water sustainability plans in Illinois. Projections of changes in all of the climate variables, however, are highly inter-dependent and complex, so these projections should be treated with caution. Efforts are needed to decrease such uncertainties and mitigation plans need to increasingly take uncertainties into account.

Issues

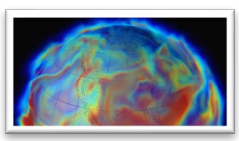
Anticipated changes in the climate are expected to impact the water resources of the state of Illinois in multiple ways. Large-scale wind pattern changes, such as those affecting all North America, are expected to result in widespread precipitation and water demand alterations across the state. Smaller-scale atmospheric changes, such as those due to changing tillage practices or growing urban areas, will cause additional impacts varying from location to location within the state. While the scientific field has advanced in the ability to predict large-scale and local water resource variations, many complex interacting processes are not adequately understood, necessitating additional targeted research and continuous monitoring water sources and sinks. Additionally, climate information – especially climate model projections – can be challenging to obtain and interpret by decision-makers and stakeholders. Therefore, additional work is needed to develop stakeholder-focused toolkits to improve the accessibility and usability of past, current, and future climate information.

Agriculture, Droughts and Floods

Recent studies indicate that droughts during the growing season in Illinois may be shorter, but more intense than in previous decades. To help mitigate the influences of such flash droughts on agriculture, maintaining and increasing monitoring of climate, soil and hydrologic factors would allow for development of best techniques to provide advance warnings.

Investigations of rapidly developing drought conditions should be undertaken to understand the complex soil-atmospheric exchanges that cause them. Improving modeling techniques would allow for not only simulating water supply and demand in previously observed situations, but also provide information on expected future conditions outside of what has previously been observed. Artificial intelligence techniques should be explored to determine critical relationships between climate, soil, vegetation, and hydrologic factors to provide predictions when not all processes are fully understood and to augment rapid advancements of numerical climate models.

Agricultural and ecological practices strongly influence the movement of heat and moisture into the atmosphere that, in turn, affect the locations and intensity of new storm development.



Focused studies on relationships between such practices and the overlying atmospheric conditions, including influences on heavy precipitation or drought events, are necessary.

During the growing season, increased frequency of hot days and warm nights can more regularly induce crop and livestock heat stress (Angel et al., 2018; Bowling et al., 2020; Kistner et al., 2018), thus increasing the water demand in rural and suburban areas. Research is needed on how the changing climate conditions could influence the ideal timing of irrigation or fertilizer applications, integrated pest management and water management that would most effectively utilize changing water-use demands while increasing productivity. Higher growing season temperatures can increase crop stress from disease and insect pests (Bebber et al., 2015; Landau et al. 2021), leading to negative yield impacts and reduced marketable crops.

Climate models indicate a high likelihood of continued precipitation increases throughout Illinois through the end of the 21st century, especially during fall, winter and spring seasons. Such increases enhance the probability of excess rainfall, causing flooding of both rural and urban lands. Mitigation efforts would benefit from increased availability of expected climate conditions and risk of both riverine and urban flooding which vary with communities in the state. Increased communication and cooperative efforts are needed to address the multiple scientific, economic and social justice needs, at the community decision-making level.

Urban Issues

Mounting urban impacts in the historical record provide a growing body of evidence that storm statistics are changing and that these changes represent an important sustainability challenge. In addition, appropriate tools for quantitatively assessing the current and future performance of stormwater infrastructure are frequently unavailable to urban stormwater planners, designers, and managers (Winkler et al., 2012). Regular (e.g., every 10 years) characterization of both current and future storms at different return intervals is one important element of this problem.

In addition, regulation of combined sewer overflows (CSOs) has become an increasingly important concern for a large number of cities with combined sewers (which carry sewage and stormwater runoff in the same piping system). Under current water quality legislation, municipalities are charged by the U.S. Environmental Protection Agency (USEPA) with reducing the number of CSO events to acceptable levels either by more effectively maintaining and managing existing stormwater infrastructure, or by designing and installing new infrastructure (e.g., increased stormwater storage facilities, green infrastructure, or separated sewer and stormwater piping systems) to cope with these problems. Chicago, for example, has invested more than $3 billion to date in the Tunnel & Reservoir Plan (TARP) Project (https://www.mwrd.org/irj/portal/anonymous/tarp) to reduce stormwater damage in the city and CSOs to Lake Michigan. Smaller municipalities across Illinois with combined sewers are also profoundly affected by the need to effectively manage existing sewer systems to meet water quality standards. Thus, the impacts of climate changes on water quality from combined sewer

overflow events has become a critical problem for the 108 cities with combined sewer systems within Illinois (https://www.aurora-il.org/Faq.aspx?QID=324).

Finally, urban areas tend to exacerbate changes in the balance between water supply and demand in Illinois. Urban areas develop strong urban heat islands (UHI) and dry islands. Increasing urban temperature and the development of local hot spots disproportionately affect water demand in vulnerable low-income urban communities (Sharma et al., 2018). Full scientific evaluations of green infrastructure are needed to address uneven impacts of urban climate changes and water demand in Illinois (Sharma et al., 2016) (https://theconversation.com/low-income-neighborhoods-would-gain-the-most-from-green-roofs-in-cities-like-chicago-102234) .

Winter Impacts

Winter is typically considered a time period with reduced impacts of dry conditions on water supplies, due to the greatly diminished demand for water by vegetation and decreased exchanges of moisture between the frozen surface soils and the atmosphere. However, changes in the occurrence of rapid warming events during winter can lead to ice jams on rivers, causing locally rising water levels, and changes in the ability of heavy precipitation to be absorbed into the soil layers instead of running off to river systems.

While overall warming of the winter temperatures and increased precipitation will benefit many sectors, changes in the frequency and intensity of rapid melting events can have considerable negative impacts on many locations. Relative to other components of the climate system, wintertime variability in climate conditions is much less understood and additional research is needed to provide improved seasonal outlooks of such variability and prepare mitigation efforts.

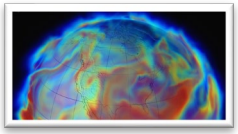
Winter warming also has significant agricultural impacts, particularly to Illinois specialty crops. Economically important fruit trees such as peach and apple are expected to break dormancy earlier because of milder winters, which therefore increases the risk of significant crop damage due to false springs. Warmer winters may also allow agricultural insect pests and disease vectors such as ticks and mosquitoes to overwinter more effectively, possibly increasing risk of crop damage or vector-borne disease incidence in the subsequent warm season.

Recommendations

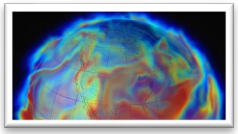
The following recommendations are provided to address short duration, long-term and seasonal concerns.

Table 6.2 – Climate Change Recommendations

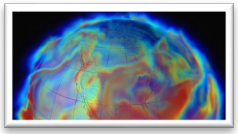
Issue	Recommendation	Lead Agency	Funding	Action
Current research-quality observations are taken at too few climate stations to determine trends and detect impending precipitation extremes.	1. Increase quality and number of climate monitoring sites in sensitive areas to detect precipitation extremes. Special emphasis is needed on regions of diverse agricultural practices as well as growing suburban and urban areas.	ISWS	Increased Annual	Program
Climate data are often difficult to obtain and interpret by decision makers and the public.	2. As climate change poses serious challenges to the social and ecological systems, it is critical to provide climate information to stakeholders and communities of the state to meet the climate-adaptive management needs. The development of web-based climate toolkits is needed to increase the accessibility and usability of climate information.	ISWS	Increased Annual	Program
Numerical climate models have inadequate detail to simulate local impacts.	3. Physical and financial support is needed to increase the availability of data on future climate, particularly of future climate outlooks, at size and time scales small enough to inform local mitigation efforts.	ISWS	Federal (IL Match)	Study
Interacting multiple, concurrent impacts of climate changes complicate communication of climate change hazards to the public, farm owners, business leaders, community planners,	4. Increased online analyses and tools should be developed to provide guidance on societal needs that are affected by multiple concurrent climate characteristics (such as heat and intense rainfall, high heat and humidity, drought and high winds, etc.).	ISWS	Increased Annual	Program



Issue	Recommendation	Lead Agency	Funding	Action
water managers, and urban officials.				
Urban areas and their surrounding communities are especially vulnerable to changing storm frequencies and intensities, potentially decreasing flood mitigation effectiveness.	5. Urban areas both alter storm climatology and are vulnerable to impacts of this changing climate. Provide high-resolution information in public-oriented publications, presentations, and online information sources on anticipated changes in storm intensity and frequency, particularly in urban areas where both the storm frequency and flooding impacts are expected to be augmented. This is particularly critical in communities with combined storm sewer drainage systems. Additional research is needed in coming years on climate change impacts on storms, especially over urban areas and their fringes as well as variations in climate within urban areas.	IDNR-OWR	Federal (IL Match)	Study
Agricultural practices affect regional climate in uncertain ways.	6. Additional research, publications and online tools are needed to improve models of how various agricultural practices (such as cultivation strategies, timing of application of chemicals, etc.) affect crop evolution and regional changes in climate.	ISWS	Federal (IL Match)	Study
Precipitation climate, particularly extremes during hour-to-weekly time frames, continues to change rapidly, challenging mitigation efforts.	7. Bulletin 75, which provides information on the frequency of climatically extreme precipitation events for structural planning, needs to be updated as often as possible, at least at 10-year time intervals.	IDNR-OWR	One-Time	Study
Future changes in frequencies and intensities of hour-to-weekly precipitation extremes, are likely to accelerate.	8. Support is needed in the development of analyses of projected precipitation extreme events, similar to Bulletin 75, for future time periods (such as 25 and 50 years into the future). As climate science rapidly increases, it would be necessary to update such a publication at least every 10 years.	IDNR-OWR	One-Time	Study



Issue	Recommendation	Lead Agency	Funding	Action
Observed increases in spring and summer precipitation in source regions for large rivers in/near Illinois in recent years has led to increased risk of long-duration river flooding.	9. Research is needed to understand the effects of changing seasonal precipitation climate (also called non-stationarity) on projected seasonal precipitation and impacts on the state's river systems, especially during spring and summer.	IDNR-OWR	One-Time	Study
Climate trends and models suggest the increased probability of flash droughts, particularly in summer months. Illinois may be particularly impacted by climatic increases in flash droughts.	10. On-line information on the potential for, and impacts of, flash droughts is needed. Flash droughts should be included in county hazard mitigation plans. In the longer-term, more frequent observations and numerical model investigations are needed on the initiation and evolution of flash drought and future hazard risk of flash drought in Illinois, especially focused on areas of greatest sector impacts.	ISWS	One-Time and New Annual	Program
Changes in frequency and intensity of rapid melt events can cause unanticipated local and wider-area flooding events.	11. Research is needed to understand how periods of greater temperatures during the winter and spring seasons will change with a changing climate in Illinois. A better understanding is needed on how melting ice on Illinois rivers and melting moist soil layers will impact local flooding impacts. Support is needed for this research, resulting in public-oriented information and online tools targeted to those at risk of local flood events.	IDNR-OWR	One-Time	Study



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7

INTEGRATED WATER MANAGEMENT

Overview

Integrated Water Management is state and interstate programs coordinating information, authorities, and program resources with each other and with local and/or federal programs for unified, equitable, and improved problem resolution.

Management of the state's water resources is currently provided by several state agencies. However, water resource issues are inextricably linked and often require communication, coordination, and collaboration among agencies, impacted citizens, and engaged stakeholders to develop and implement meaningful solutions. Just like there are many aspects to water, such as water quality, water supply, stormwater runoff, groundwater, sanitary sewers, rivers, lakes and wetlands, there are many aspects to the way we manage these aspects of water, and many state, federal and local programs to match. Out of necessity, individual work groups such as the Silver Jackets Program group, the River Coordinating Council, or the Illinois Marine Transportation System Task Force have formed to begin to fill this collaboration void. Successful Integrated Water Management creates mutual empowerment for the people and programs that are integrated together so that their whole is greater than the sum of their parts.

Issues

Data Coordination

State agencies lack the ability to easily access common data, tools, plans, knowledge, and resources in a unified approach. Illinois water related information is currently scattered throughout many agencies. For example, locating a stream hydraulic model to design a replacement bridge can be very challenging given that such an existing model could be held by any number of entities such as FEMA, the U.S. Corps of Engineers, IDNR- Office of Water Resources, Illinois State Water Survey, the county, or any number of engineering consulting

firms. Economically and socially marginalized communities and/or individuals often do not even know where to begin the search for water information and may get bounced from one agency to another during their frustrating search. When information is requested from a particular agency, it can be very challenging to track down, verify, and disseminate such information in a timely manner. The 1984 State Water Plan established the Illinois Natural Resources Information Center in the State Water Survey as a referral service relating to any aspect of natural resources data or expertise. However, lack of dedicated annual funding and staffing prevented this conceptual Center from becoming a functioning resource in practice.

Figure 7.1 – Partial Removal of Millhurst Dam on the Fox River *(IDNR, 2013)*

Language Barriers

Due to the extensive diversity in Illinois, there is a need for state agencies to be more inclusive when communicating with individuals they serve, educate, and assist. Outreach materials (e.g., brochures, websites, and social media) are generally provided in English only. Therefore, each state agency must find a way to manage multi-lingual communications.

Funding for the SWPTF

When the State Water Plan Task Force (SWPTF) was originally created by Executive Order, designated appropriations and funding was also provided to sufficiently resource the work and continued planning of the SWPTF. Currently, State Water Plan Task Force member agencies lack dedicated annual funding resources to implement actions included in the State Water Plan and to regularly update the Plan. This Plan update was initiated by the current SWPTF Chair without dedicated funding and completed using very limited agency member resources.

Prioritization

As part of the IDNR's Lake Michigan water allocation program under the Level of Lake Michigan Act [615ILCS50], water use and water loss information is collected annually from over 200 Lake Michigan water allocatees. Those communities with water loss in excess of 10% of water supplied must develop and implement a water system improvement plan. Unfortunately, this reported annual water use information is not being utilized to prioritize water supply system improvement plan needs and/or funding from the existing State Revolving Fund or other sources.

Local Assistance

Many local communities in Illinois, and particularly disadvantaged communities, are challenged with water related problems from flooding to water supply to floodplain ordinance issues with a certain amount of uncertainty about where to turn for help from the state.

Figure 7.2 – Collaboration *(IDNR, 2019)*

Too many state program managers only engage with a community about their specific program and do not consider a holistic approach to problem solving. In some cases, water related challenges are interconnected and need to be addressed as one problem and not separated by state program considerations. These communities need an advocate to help them problem solve water-related challenges and to educate them about available resources, helping them navigate state, federal and local programs and the sometimes confusing application processes.

Non-Uniform Funding Criteria

Distinct programs offered by the Illinois Department of Natural Resources (IDNR), the Illinois Emergency Management Agency (IEMA), the Illinois Department of Commerce and Economic Development (IDCEO), and the Illinois Environmental Protection Agency (IEPA) each have their own funding sources and unique criteria for specific types of flood control and water related improvements. The authorities for justification of state capital projects are currently inconsistent making it more difficult to seek funding from one state agency versus another for similar flood damage reduction purposes. There are only a few criteria that are consistent between the agencies for eligibility requirements for different sources of funding. While all community projects must complete engineering planning, obtain necessary state and federal permits, obtain land rights, create the construction bid documents, and choose a contractor before construction may begin, the timeframe for disbursement of funds to local governments

through each of these programs varies depending upon the program and the agency staffing level.

Non-Coordinated Disaster Recovery

Mitigation decisions utilizing federal and state disaster recovery funding are not well coordinated among agencies and can be inconsistent in implementation requirements. Various state agencies need to coordinate grant programs and projects to ensure consistent funding requirements, leverage state funding efficiencies, promote resiliency, and avoid project overlap.

Justice

Awareness of challenges realized by socially and economically marginalized communities continues to expand within state agency programs. Special needs of those communities and their lacking capacities also continue to be identified and recognized as stumbling blocks to successful utilization of state programs and resources in disadvantaged areas. Unfortunately, many state programs lack uniform criteria and rating methodology for developing a list of communities that are socioeconomically and environmentally disadvantaged.

Recommendations

To strengthen communication, collaboration, and connection across existing water related state, federal, and local agency programs in Illinois and to holistically evaluate and address water related issues in an equitable manner, particularly in under-resourced and disadvantaged communities, the following recommendations are provided to address these concerns.

The State Water Plan Task Force should work with the Prairie Research Institute to establish and fund an **Illinois Integrated Water Information Center (IWIC)** in the Prairie Research Institute at the University of Illinois to foster interdisciplinary collaboration between Illinois state, federal and local agencies on water related issues including climate variability and related social and environmental justice considerations. This collaboration and fostering of communication would serve the public interest which is integral to the University of Illinois' obligations as a Land Grant Institution.

IWIC would serve as a library of water science-based information and technology accessible by Illinois' decision makers, program managers, emergency managers, community officials, home and business owners, and the public. IWIC would serve as a centralized location for water resource related information including, but not limited to, the following:

Figure 7.3 – Potential Water Resource Information to be Housed in IWIC

The IWIC would connect available resources to stakeholders, impacted individuals, and decision makers in a timely manner through directed multi-lingual outreach and education efforts. Multi-lingual assistance would also be provided by IWIC to water related state programs and associated outreach efforts.

A properly resourced State Water Plan Task Force can provide the hub and leadership required to ensure inclusive, deliberate, and meaningful Integrated Water Management in Illinois. Adequately resourced ($500,000/year) Agencies of the State Water Plan Task Force will ensure that the SWPTF can sufficiently:

a. Implement recommendations of the State Water Plan.
b. Update the water plan every 8 years.
c. Raise awareness of state agency programs though inclusive outreach messaging particularly for disadvantaged and socially marginalized communities' benefit.
d. Foster regular interagency collaboration discussions to share and collaborate on current and planned program activities and policies related to water issues in the state and nation via continued participation in interstate water organizations.
e. Serve as a convener to strengthen relationships between state, federal, and local agencies, and affiliated partners.

f. Serve as Public in P3 Partnerships established in the state to promote and develop multi-benefit floodplain and water resource planning and use.
g. Develop research, technology and tools for flood mitigation, water quality, water supply, and water related matters to better empower state, federal and local water related programs to better serve the people of Illinois.
h. Educate water professionals and laypersons alike on water resource issues, technologies, water supply resiliency, social justice, and environmental justice matters including, newsletters, websites, and Water Related Issue Symposiums.

A method for helping communities learn about statewide resources is to reestablish, staff, and fund the Local Assistance Program in the IDNR, Office of Water Resources to "Listen, Learn, and Lead" via intentional community visits to assess community water related resiliency, vulnerabilities and needs for flooding, water supply, infrastructure concerns, NFIP regulatory compliance, and/or social justice issues. The Local Assistance Program would provide community capacity to help plan and develop resilient mitigation and multipurposed/multi-benefits projects that may cross over multi-agency state and/or federal programs and resources.

To ensure water supply system improvement plan needs and/or funding are prioritized by the most need, water loss and water supply system improvement plan information collected by the Illinois Department of Natural Resources should be utilized with the newly defined water resource criteria and rating methodology for disadvantaged communities to prioritize use of existing State Revolving Fund resources available through the Illinois Environmental Protection Agency.

To address equity in funding, the Governor's Office of Management and Budget (GOMB) should develop consistent program funding criteria across all state agencies.[1] Currently, distinct programs offered by IDNR, IEMA, IDCEO and IEPA each have their own funding sources and unique criteria for justifying expenditure of state funds.[1] The Illinois Mitigation Advisory Group (IMAG) should expand their mitigation and resiliency building mission with representatives from various state agencies to coordinate various grant programs and projects to promote program efficiencies and consistent program funding and implementation requirements.[1]

[1] *Recommendations also included in June 2015 Urban Flooding Awareness Act Report*

Table 7.1 – Integrated Water Management Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
State agencies and stakeholders lack the ability to access and share common data, tools, plans, knowledge, and resources in a unified approach.	1. Work with the University of Illinois to establish, fund, and staff an Integrated Water Information Center (IWIC) in the Prairie Research Institute in 2023 to serve as a library of water-based information, programs, and technology to connect resources to stakeholders. ($5.7M Yr 1 and $3.9 M Yr 2). Success is measured by the development of a program management plan, development of IWIC position descriptions, hiring of staff, and determining an annual budget by 2024.	IDNR-OWR	New Annual	Legislation
State Water Plan Task Force member agencies lack dedicated annual funding resources to implement actions included in the State Water Plan and to update Plan status.	2. Draft resolution legislation and/or an Executive Order to permanently establish an Illinois State Water Plan Task Force defining state agency membership, objectives of the Task Force including agency integrated water management, and annual funding ($500,000/year) of the State Water Plan Task Force to carry out the recommended tasks of the Task Force in 2023 and beyond.	IDNR-OWR	New Annual	Legislation
Annual water use information reported to IDNR is not being utilized to prioritize water supply system improvement plan needs and/or funding.	3. IDNR water loss and water supply system improvement plan information and newly defined prioritization of disadvantaged communities will be shared with IEPA to inform federal and state capital funding decisions. Success is measured by the number of disadvantaged communities in Illinois advancing water system improvements.	IDNR-OWR	New Annual	Program
Many local communities need an advocate to help them	4. Reestablish, staff, and fund the Local Assistance Program in the IDNR, Office of Water Resources. The Local Assistance staff will guide underserved communities by educating them about available resources and help them to navigate state, federal and local programs and apply for grants. Success is measured by the	IDNR-OWR	Increased Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
solve their water-related challenges	development of a local assistance program management plan, development of position descriptions, hiring of staff, and determining an annual budget increase necessary by 2024.			
State programs each have their own funding sources and unique inconsistent criteria for justifying expenditure of state funds.	5. The State Water Plan Task Force will work with the Governor's Office of Management and Budget to develop a white paper to help understand the advantages and disadvantages of consistent program funding criteria across all state agencies, including but not limited to: IDNR, IEMA, IDCEO, IDOA, and IEPA and develop recommended draft legislative proposals.	IDNR-OWR	Maintain Annual	Policy
Mitigation decisions utilizing federal and state disaster recovery funding are not well coordinated among agencies and can be inconsistent in implementation requirements.	6. The Illinois Emergency Management Agency should expand the Illinois Mitigation Advisory Group (IMAG) mitigation and resiliency building mission to include representatives from various state agencies of the State Water Plan Task Force to coordinate grant programs and projects to promote program efficiencies and consistent program funding and implementation requirements.	IEMA	None	Program
State programs lack uniform criteria and rating methodology for developing a list of communities that are socioeconomically and environmentally disadvantaged.	7. The State Water Plan Task Force will develop a criteria and rating methodology for developing a geographically diverse list of socioeconomically and environmentally disadvantaged communities with respect to water resources issues for use by the State Water Plan Task Force agencies. Include the impacts of economics, education, gender and age distribution, race, infrastructure, environment, and community capacity in the criteria development.	IDNR-OWR	One-Time	Study

8

LONG-TERM FUNDING

Overview

In 1967, Governor Otto Kerner transmitted the *Water for Illinois, A plan for Action* to the 75th General Assembly. The report was prepared by Illinois' State agencies working together with a Technical Advisory Committee on Water Resources. It was the first statewide plan for Illinois. The report proposed the establishment of an Illinois Resource Development Fund (RDF) in the amount of $1 billion through a public bond issue referendum. The RDF would have been established to finance land acquisition and capital improvements to carry out the programs outlined in the report for water resources development, primarily for recreation, pollution control, and water management. The report also recommended strengthening the administrative organization of State agencies which deal with water resources, planning development, management, and research.

This update documents that, fifty-five years later, investment in effective water resource management remains a critical need in Illinois. Water resource management responsibilities are dispersed throughout the State among diverse parties with different funding needs and priorities that are often viewed only in the context of that specific need. The need for funding is significant across a range of water resources and sometimes competing water-based activities. These include, but are not limited to, the following (not in order of importance):

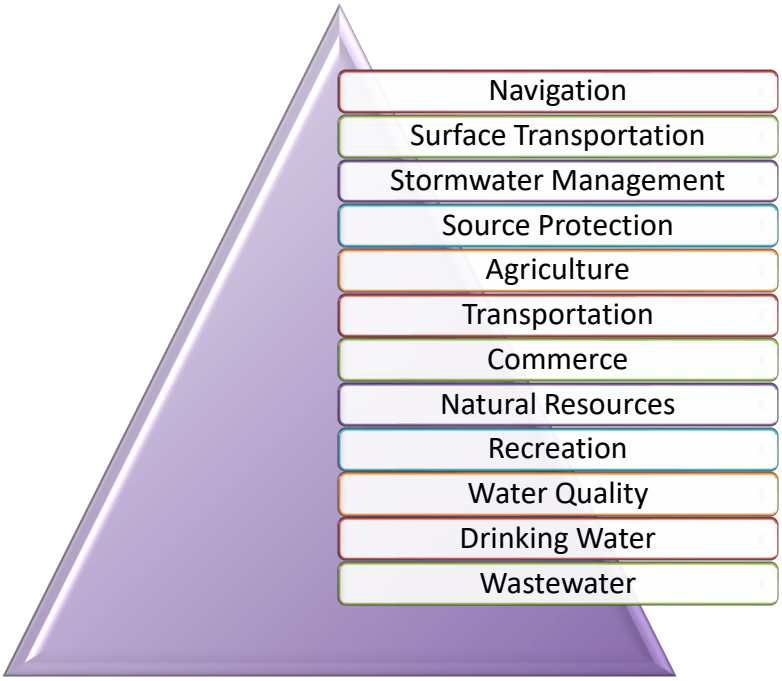


Figure 8.1 – Competing Water Resource Funding Needs

There are funding resources at the local, state, and federal level to deal with these needs, but they are often not understood in the broader water resources context.

Issues

Water resource funding needs vary. They can be one time, short-term, long-term, or continuous needs. Long-term funding for state water resources needs to be identified within the context of the existing funding environment as well as through potential new funding sources.

The critical topic sections in this report identify recommendations, with funding needs, to best manage Illinois state water resources. These are broken down into the following categories:

- Need new one-time capital funding for larger projects
- Need new one-time funding for planning or water resource study/research
- Need programmatic funding
    - Maintain existing State funding for programs
    - Increase state funding for existing programs
    - Provide new on-going state funding for new programs

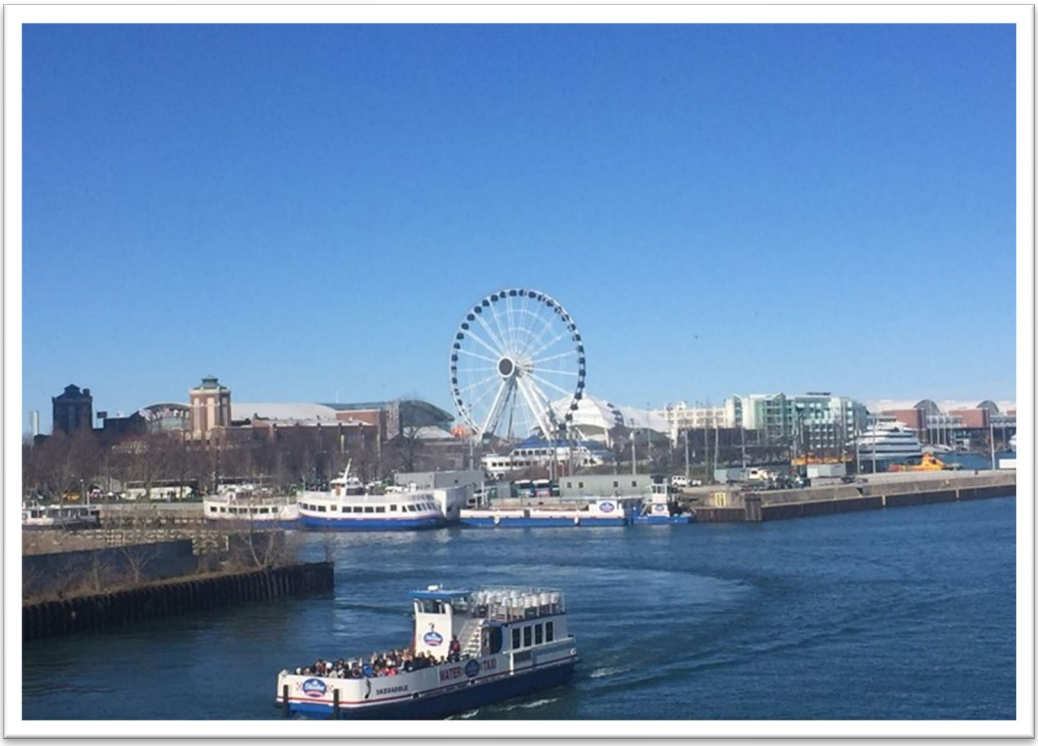


Figure 8.2 – Lake Michigan Water Taxi *(IDNR, 2019)*

In addition to these funding categories, there are also recommendations to rethink how certain programs operate. There may be new technologies or information systems that can help streamline processes to make better management decisions. This may reduce costs in the long run but require investment in planning the new technologies and developing new operations. Further, there is a need to explore Public-Private Partnerships (i.e., trading programs) as a source of funding to address water resource management needs. Special licensing (stamps) or permit fees can also be evaluated.

These problems can be dealt with more effectively when the value of the water resource or the water-based activity or transmission or treatment is assessed. These needs must be considered in the context that there is often a lack of understanding of the real value of state water resources themselves and how they are used. There is also a need for better coordination among the parties that deal with them. This can be done through the range of planning efforts undertaken at the facility, local, regional, watershed, or statewide level. This is often done through asset management or resource inventory, characterization, and planning.

One existing funding source, IEPA's State Revolving Loan Fund (SRF), is focused on wastewater collection and treatment, stormwater management infrastructure that provides a water quality benefit, and public water supply source, treatment, storage, and distribution facilities. As the funding provided must be repaid, a dedicated source of revenue for loan repayment is necessary, usually generated through monthly user fees of those receiving the benefit of the

wastewater or drinking water facilities. Stormwater management utility fees are rare, but do exist, and the concept is growing as a necessary and appropriate way to collect revenue for the needed infrastructure. Due to the program's intended goals, the SRF loan programs in Illinois cannot serve as a solution to ALL of the water quality issues around the state. A new funding program, possibly similar in structure to the revolving funding concept of the SRF loan program, is necessary to fill the gap. This new "Water Resources State Revolving Fund" (WRSRF) program would be used to fund water resource needs not currently addressed by the current SRF program.

State water resource management goals cannot be met through State assistance alone. It requires action at the local level where local officials make many critical on-the-ground water resource management decisions. There are significant State resources that go to local communities, and other units of government to help meet local water infrastructure and resource needs and desires including: water and wastewater systems upgrades; replacement of lead service lines; replacement or lining of sewer laterals to reduce inflow and infiltration to sewer systems; flooding and floodplain management; stormwater management, and local recreation, among others.

Above, it is acknowledged that the State cannot provide all the long-term finances to address all the water resource management needs and desires. An important issue is that some communities that are eligible for state or federal funding do not have sufficient match funding for some financial assistance opportunities. This makes upgrades to existing infrastructure or natural systems more difficult, particularly if they lack resources to also maintain the existing systems. It can also extend to resource challenged communities that do not have access to technical expertise. As such, there is a need for:

- A better understanding of municipal water systems
- More effective planning to coordinate among municipalities
- Strategies to provide more technical assistance for Environmental Justice communities

Recommendations

The following recommendations are provided to address these concerns.

Table 8.1 – Long-Term Funding Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Coordinate funding to ensure water resource issues are addressed in an integrated manner.	1. Provide dedicated State funding for integrated water resource management planning.	IDNR-OWR	Increased Annual	Program
There is a need for long-term funding resources to fund projects not covered under the current Revolving Loan Program.	2. Establish a new State-funded SRF, a "Water Resources State Revolving Fund (WRSRF)" that mimics the current SRF program to provide funds for long-term water resource needs not already addressed by the existing IEPA SRF program in order to distribute critical funding equitably across the state.	IDNR-OWR	New Annual	Legislation Program
Additional Financial Assistance is needed to meet long-term water resource challenges.	3. Establish a State strategic fund or financial assistance program to address critical long-term water resource management issues.	IDNR-OWR	New Annual	Program
Asset management strategies are needed to better operate and maintain utility infrastructure.	4. If receiving state or federal funding, the state should require existing public water supply, wastewater treatment, and stormwater management providers to utilize asset management to review and identify the system cost of service.	IEPA	New Annual	Legislation
Underserved communities often do not have sufficient technical expertise to address water resource issues.	5. Develop technical and financial support tools for underserved communities to address local water resource management issues using a Local Assistance Program as defined in the Integrated Water Management Section.	IDNR-OWR	New Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
Technology upgrades are necessary to improve water resource management efficiency and effectiveness.	6. The state should undertake a comprehensive, state-wide evaluation of current operations to identify technology that optimizes and streamlines state agency operations for water resource management recommendation implementation.	All	New Annual	Program
Alternative financial resource options are needed to address water resource management issues.	7. Support Public-Private Partnerships including guidance development and participation to help meet water resource management recommendations to increase non-government financial resources.	IDNR-OWR	New Annual	Program
Alternative mechanisms are needed to bring in revenue to fund specific water resource needs.	8. Institute license stamps and license fees to generate funds for targeted water resource improvements.	IDNR-ORC	One-Time	Legislation

9

WATER SUSTAINABILITY

Overview

Having access to an adequate and reliable quantity and quality of water is critical to all Illinois residents, businesses, industries, agriculture producers, and to the state's boundless aquatic ecosystems. Water sustainability means that all water users have the water they depend on each day for generations to come. Achieving sustainable water management requires a planning approach that addresses the technical, environmental, societal, and economic challenges faced across the state.

In 2006, Governor Blagojevich issued Executive Order 2006-01 requiring the state to develop regional water supply plans. The order organized regionally based committees to develop and approve regional water supply plans from scientifically based data. The state was divided into ten water supply regions, generally based on surface water, groundwater, and county boundaries (See **Figure 9.1**). Of the ten regions, four have developed plans with one additional region currently developing a plan. The regional water supply plans provide recommendations to address the most critical water supply concerns in the region and lays out a plan of action to be implemented in the following years. Included in the planning process is an analysis of water demand versus water supply, highlighting any existing or future forecasted shortfalls. **Figure 9.2** illustrates a draft example of projected water availability for Northeastern IL through 2070.

Illinois continues to focus on water supply sustainability. The Illinois Department of Natural Resources' Office of Water Resources plans to implement a statewide general assessment of water demand and supply at the county level for privately-owned users and public water supply systems. The intent is to expedite the previously initiated statewide evaluation of sustainability and facilitate a detailed study, like the regional water supply planning approach, once potential areas of concern are identified by the OWR water supply program manager.

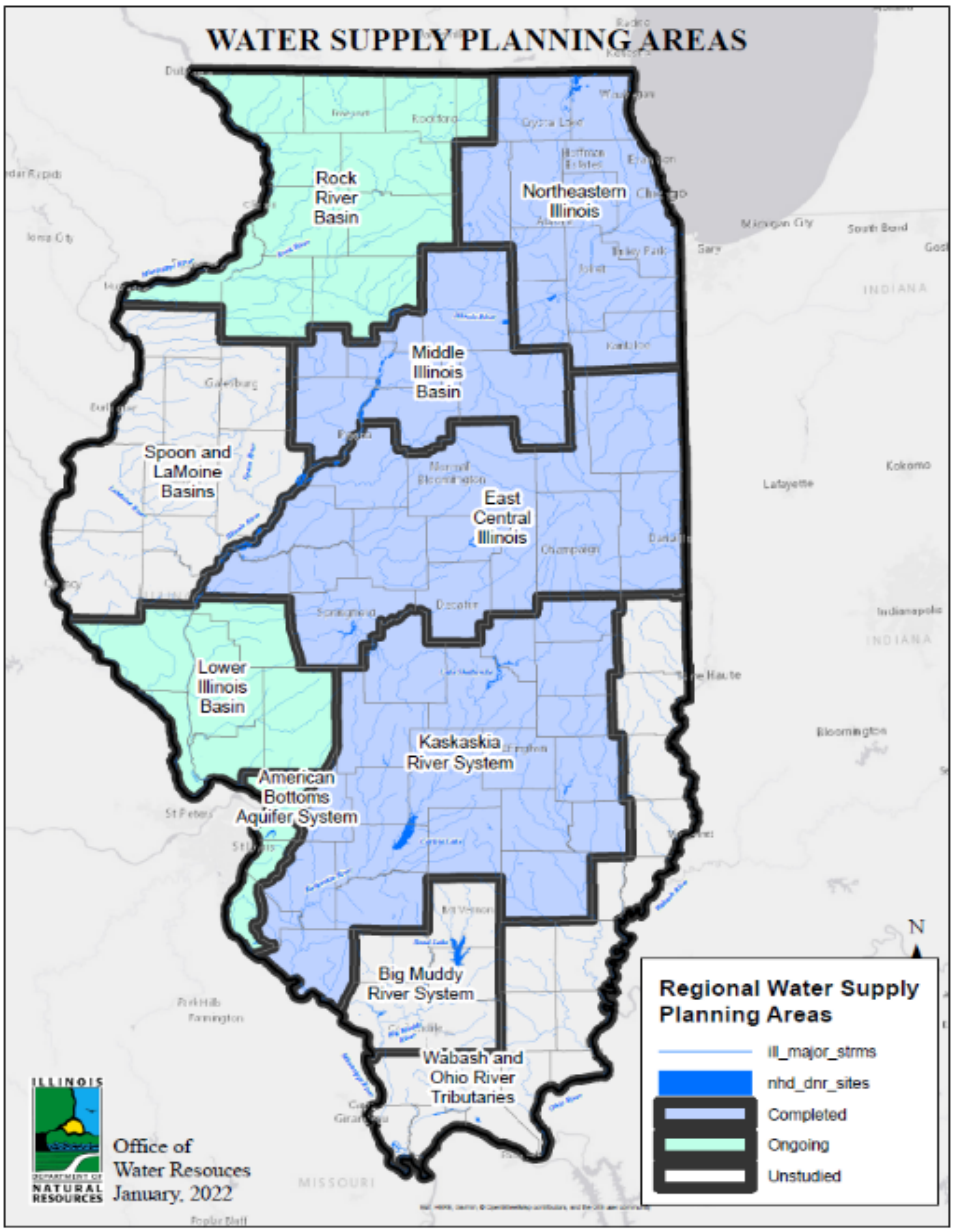
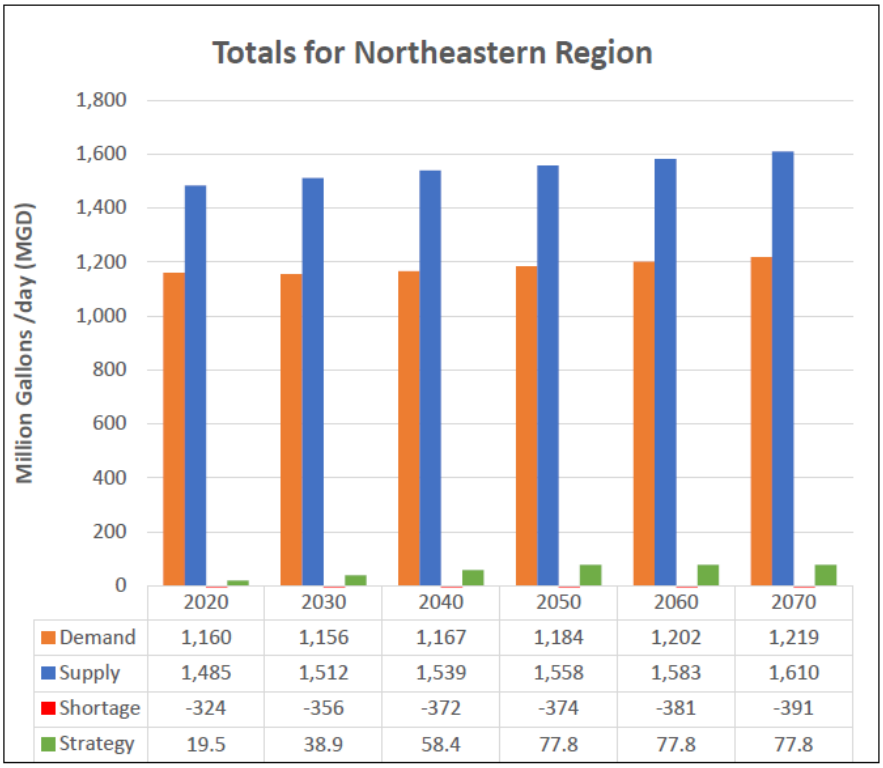


Figure 9.1 – Ten Water Supply Regions and Status of Water Supply Plans (IDNR, 2022)

An example demonstrating the effectiveness of this program includes the City of Joliet. Technical analysis provided by the program predicted the community had approximately ten years prior to failure of some of their water supply wells due to unsustainable withdrawals. The community is now working with the technical team to transition to Lake Michigan as their future water source.

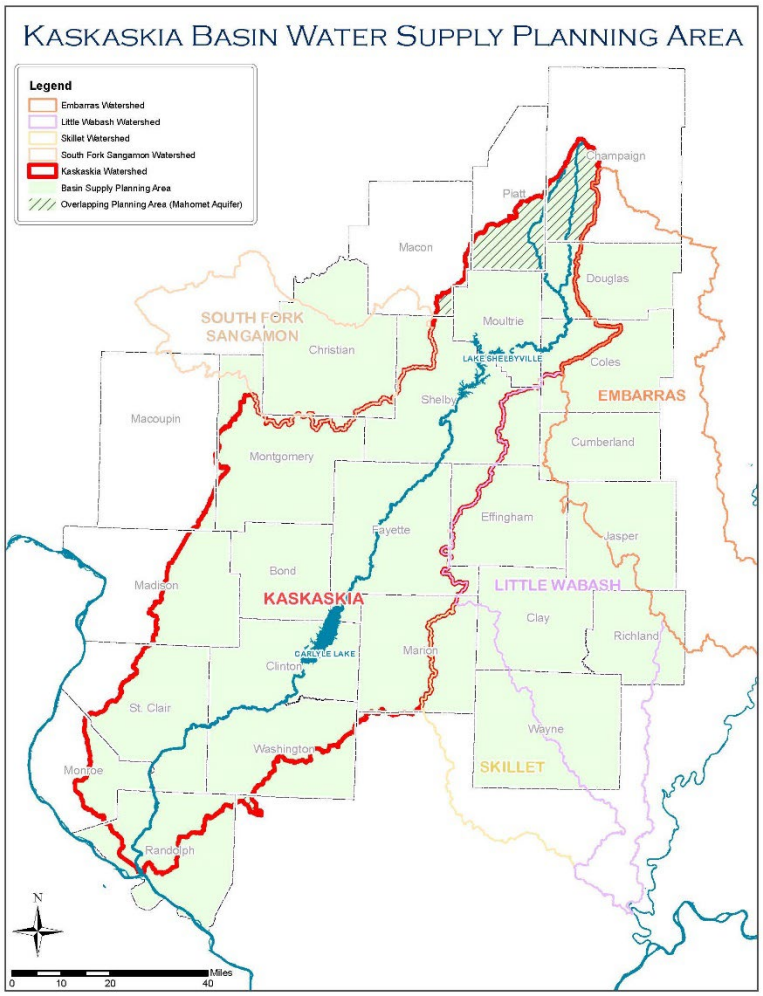
Issues

For decades, communities have relied upon water sources without evaluating long-term sustainability or drought vulnerability. When a community experiences a shortage, often there is not a plan in place to mitigate the temporary or permanent circumstance. It can take a decade or longer to properly plan for, design, and construct an alternative water supply source or backup connection. Lack of planning for these risk exposures and uncertainties puts a community in desperate and often expensive circumstances. These unplanned for events are not only detrimental to the community but also to the water source itself and puts strain on others who rely on that resource. Where communities do plan for emergency and hazard mitigation and response, they can lack adequate data to support thorough and thoughtful planning, and often that planning does not utilize a multi-disciplined approach where economic impacts are considered and incorporated. The potential for climate change with higher evaporative losses and changes to precipitation patterns compounds these exposures and increases water supply sustainability risk. With lack of institutional and financial resources, these modern water supply challenges place even further stress on marginalized communities.



	2020	2030	2040	2050	2060	2070
Demand	1,160	1,156	1,167	1,184	1,202	1,219
Supply	1,485	1,512	1,539	1,558	1,583	1,610
Shortage	-324	-356	-372	-374	-381	-391
Strategy	19.5	38.9	58.4	77.8	77.8	77.8

Figure 9.2 – Projected Water Availability vs. Demand for the NE Region (IDNR, 2022)



Further, there has not been a widespread adoption of regional water planning initiatives across the state where all stakeholders and special interest groups have input and work towards cooperative solutions. Where regional planning committees have formed, they lack routine funding, timely access to accurate water withdrawal data, and guidance towards developing meaningful analysis and recommendations. Even where the information is available, water demand and supply assessments are not always incorporated into local and state decision making. Industry leaders report an unclear understanding of the roles and responsibilities of various state agencies related to water supply.

Figure 9.3. – Example Regional Water Planning Area *(IDNR, 2010)*

Recommendations

The Office of Water Resources will continue to support the Water Supply Program in cooperation with the Illinois State Water Survey and regional water supply planning committee administrators. An emphasis will be to ensure data are easily accessible to the public and kept up to date. In the upcoming years, the program will prioritize the recommendations outlined in **Table 9.1**.

While the efforts primarily fall to the Water Supply Program within the IDNR Office of Water Resources, coordination will be necessary with the Integrated Water Management and Climate Change recommendations.

Table 9.1 – Water Sustainability Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Provide Social Equity in services by giving service to those most in need first.	1. Prioritize services to vulnerable and low-income communities. Communities that meet such criteria will be assisted as top priority for services rendered by OWR and for capital improvement projects.	IDNR-OWR	Maintain Annual	Program
Ensure Illinois has a Sustainable Water Supply for all communities and users.	2. Update the statewide water demand forecasts with annual water use data and population forecasts. Determine sustainable water yield for all water supply sources and update every five years. Annually evaluate shortages. These data will be provided on a GIS application, available to the public, and easily accessible.	IDNR-OWR	Maintain Annual	Program
Solutions to water supply issues need to be derived from local collaboration and not directed from the state level.	3. Establish regional water supply committees throughout the state where there is sufficient local interest. Ensure consistent funding and data are readily available to support regional water supply committees. Add structure to regional plans to have local stakeholders identify and report on capital improvement project needs related to water sustainability.	IDNR-OWR	Increased Annual	Program
Need to identify climate change impacts on evaporation rates.	4. Document the effects of climate change on evaporation. The new study will focus on evaporation impacts due to higher temperatures and more extreme droughts expected from climate change. The resulting evaporation rates, along with other factors will lead to improved assessments of water availability.	ISWS	One-Time	Study
Rivers have no established minimum flow requirements which impacts downstream users and aquatic life.	5. Work with regional water supply planning committees to develop program policy and/or regional ordinances for implementation during emergencies including stream minimum flow protection.	IDNR-OWR	Maintain Annual	Policy

Issue	Recommendation	Lead Agency	Funding	Action
The State's Drought Plan is outdated.	6. Update the State of Illinois Drought Preparedness and Response Plan to ensure clear responsibilities, authorities/decision-making, and action plans are in place when drought conditions occur.	IDNR-OWR	One-Time	Study
Irrigation water use reporting is limited.	7. Improve the accuracy of high capacity (0.1 MGD) well and surface water use reporting by improving outreach and promoting water metering.	ISWS	Maintain Annual	Program

Lake Michigan Waves (Jagadeesh, 2022)

10

LAKE MICHIGAN

Overview

Lake Michigan is a beautiful and treasured Illinois resource. Over 8 million people in Illinois rely on this Great Lake for their daily water use as do many businesses and manufacturing facilities in Northeastern Illinois. In addition to its natural beauty and habitats, the Lake supports large boating, fishing, and tourism economies. The Illinois Department of Natural Resources (IDNR) is responsible for preserving and protecting Illinois' ability to divert water from Lake Michigan through careful water allocation and conservation measures. Additionally, IDNR is dedicated to protecting and enhancing the environmental, economic, and social value of Illinois' Great Lakes coastal region by fostering healthy ecosystems and resilient communities through coastal management.

Effective management of the Illinois coastal region involves a wide range of activities in the areas of policy, regulation, education, science, research, monitoring, conservation, oversight, stakeholder engagement, climate resilience, equity and inclusion, economic development, coastal tourism, habitat protection, and more. The Lake Michigan topic in the State Water Plan includes issues such as equitable water allocation, allocation fees, deteriorating water supply infrastructure, Lake Michigan diversions, water rates, water conservation and reuse, tourism, commercial navigation, economic development and recreation, coastal resiliency, protecting and improving coastal habitats, and offshore wind energy.

Issues

Just like there are many aspects to water, such as water quality, water supply, stormwater runoff, groundwater, sanitary sewers, rivers, lakes and wetlands, there are many aspects to the way we use, manage, and enjoy Lake Michigan. The purpose of this section is to provide a summary of issues affecting the Lake Michigan water supply programs and the Lake Michigan watershed's economic and environmental resiliency.

Water supply and allocations

The Illinois Lake Michigan Water Allocation Program was developed to manage Illinois' diversion of water from Lake Michigan in response to a 1967 Supreme Court Decree amended in 1980. The Program contains numerous components and reporting requirements. Information on water use, water conservation measures, and watershed protection is not easily accessible and understandable by the public, and there is no centralized repository of information. Additionally, water allocation use reporting and data submittal process is complex and permittees are struggling with the tools that are currently available.

Coastal resiliency

Figure 10.1 – Illinois Beach State Park *(IDNR, 2014)*

Lake Michigan's shoreline is dynamic. Fluctuating lake levels, storms, and erosion combine to create an ever-changing Lake Michigan coastal system. In recent years, rapid and costly shoreline changes affected the region; Lake Michigan set its record low water level in 2013, and since then it has swiftly and consistently risen, reaching record high levels in 2020. During this time, communities have witnessed the erosion of key infrastructure, along with the loss of park

space, beaches, and public access points. Habitats along the shoreline are also affected through loss of shoreline habitat, impacts on wetlands due to changing water levels, and habitat conversion. There is a need for collaboration and innovation to address these issues on a regional scale.

Economic development

The Lake Michigan shoreline is a foundational part of our state's economy and includes ports, industrial centers, and other economic engines that support thousands of jobs. However, maritime transportation of commercial goods between the Great Lakes ports and other national and international ports is underutilized, as is the Great Lakes cruise industry. Potential for energy development through offshore wind or wave energy remains uncertain as there is lack of planning on these topics and the state has not yet defined acceptable and unacceptable zones of potential turbine construction. Sustainable economic development focused on opportunities presented by access to numerous waterways can benefit the Lake Michigan coastal region while preserving and enhancing recreation opportunities.

Figure 10.2. Lake Michigan Shoreline in Chicago *(Bayers, 2013)*

Recommendations

The following recommendations are provided to address these concerns.

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Table 10.1 – Lake Michigan Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Information on water use, water conservation measures, and watershed protection is not easily accessible or understandable by the public.	1. Improve public outreach and education related to water use, water conservation measures, and watershed protection particularly to disadvantaged and under resourced communities via the Local Assistance Program as described in the Integrated Water Management Section.	IDNR-OWR	New Annual	Program
Lake Michigan water allocation permittees struggle with meeting the annual water allocation use data reporting requirements specified in the Part 3730 Administrative Rules, "Allocation of Water from Lake Michigan."	2. Simplify and improve annual water allocation use reporting and data submittal processes required by the Level of Lake Michigan Act [615 ILCS 50] and Part 3730 Administrative Rules. Actions to simplify and improve annual water allocation use reporting and data submittal processes shall include limiting the data requirements to those specifically related to the allocation program and a shift from fiscal-based (non-revenue water) metrics to water volume-based metrics. Investigate incorporating this data into the state's Water Inventory Program (IWIP).	IDNR-OWR	New Annual	Program Policy
The non-revenue water regulatory standard provides a limited view of the performance of permittee water systems.	3. Develop a new trend-based approach to regulating a water allocation permittee's conservation effort related to water loss that recognizes the dynamic nature of water loss and moves away from using a single percentage indicator. Update Part 3730 Administrative Rules, accordingly.	IDNR-OWR	None	Policy
Historically, IDNR has	4. Expand IDNR Water Resources Lake Michigan Programs, required	IDNR-OWR	Increased	Program

Issue	Recommendation	Lead Agency	Funding	Action
not had the resources to provide support to communities related to water system improvement planning activities.	to preserve and protect Illinois' ability to divert water from Lake Michigan, to include full-time staff dedicated to working with all communities utilizing Lake Michigan Water, but especially under resourced and disadvantaged communities to assist them with their water supply system improvement plans and funding for those plans. Also work with the communities to improve water conservation programs and help track the status of a community's implementation and progress related to "conservation practices."		Annual	
Currently, funding for the Lake Michigan Water Allocation Programs is inconsistent.	5. Implement water allocation review fees based on the volume of Lake Michigan Water supplied to an allocatee in a given Water Year to support and/or enhance implementation of the Lake Michigan Water Allocation Programs. The fee structure should be capped at $5,000 and graduated so that smaller water users pay less than larger users. Annual funds generated from the fee would be used to both supplement dedicated program staffing to assist communities with the program reporting, water conservation measures, and water system improvement plan implementation, and support a Lake Michigan Water Allocation Grant Program for smaller (<1mgd) and disadvantaged communities to resource professional consulting services for water use data reporting and/or water system improvement plan management.	IDNR-OWR	None	Program Policy
Many of the people that depend on Lake Michigan for their water supply are unaware of the constraints under which Illinois is under per the 1967/1980 U.S. Supreme Court Decree (Wisconsin v.	6. Emphasize the need for Northeastern Illinois communities to work as a unified body to "preserve and protect Illinois' ability to divert water from Lake Michigan," in the state of Illinois (via IDNR) by establishing and leading a workgroup comprised of Lake Michigan water diversion users that focuses on the Illinois Lake Michigan Water Allocation Program (Program) that addresses issues related to allocations and conservation programs.	IDNR-OWR	New Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
Illinois, 388 U.S. 426, 1967 and Wisconsin v. Illinois, 499 U.S. 48, 1980).				
There is a lack of coastal resiliency planning and coordination that would allow for adaptation and mitigation on a regional scale.	7. Partner with the Great Lakes Commission, NOAA, and the US Army Corps of Engineers to explore new and innovative means to enhance regional coastal resiliency with a focus on regional extreme lake level fluctuations and weather events. Support development of tools, develop project guidelines for resilient projects, and identify vulnerable areas. Work with Illinois coastal communities to encourage and improve regional public shoreline management that addresses coastal resiliency. Provide support to under resourced and disadvantaged communities to assist them with utilizing resources.	IDNR-OWR	Unknown	Program
Untapped opportunities exist to expand coastal tourism and improve cruise line industry access to Illinois ports.	8. Work with Illinois port communities to support, increase, and promote sustainable coastal tourism and recreation opportunities including Great Lakes Cruise line industry access to Illinois ports.	IDNR-OWR	Unknown	Program
Maritime commerce and transportation using the Chicago Area Waterway is underutilized.	9. Explore reasons for underutilization. Promote increased maritime transportation of commercial goods between the Great Lakes ports and other national and international ports via the Chicago Area Waterway and Gulf of Mexico by improving economic viability and capacity of Illinois' Lake Michigan coastal ports, harbors, and marinas.	IDOT	New Annual	Program
Coastal habitats are impacted by storms and fluctuating water	10. Protect, enhance, and restore important coastal habitats with an emphasis on public owned and accessible land and wetlands hydrologically connected to Lake Michigan, as measured by acres	IDNR-OWR	New Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
levels.	restored.			
Offshore wind and/or wave green energy viability is uncertain without further planning and research.	11. As a first step in determining feasibility of wind energy, explore the viability of Lake Michigan based offshore wind and/or wave green energy by defining acceptable and unacceptable zones of potential turbine construction that would abide by the Public Trust Doctrine.	IDNR-OWR	One-Time	Study

July 2022 Flooding Metro East (IDNR, 2022)

11

FLOOD DAMAGE MITIGATION

Overview

Flooding is Illinois' most prominent natural disaster, causing major human and economic consequences and adversely affecting community stability. All 102 Illinois counties have experienced flooding severe enough to warrant a Presidential Disaster Declaration. Between 1957 and 2020, there have been 41 federal flood disaster declarations. Since 2001, Illinois has had a flood-related disaster declaration nearly every year. Despite better floodplain mapping, higher floodway standards, restrictive local floodplain regulations, and proactive flood mitigation programs, flood damages continue to increase in Illinois.

Figure 11.1 shows the estimated annual loss related to riverine flooding for each Illinois county with some portions of northeast IL reaching $29 million per year. Building-related-flood exposure within the 1% (or 100-year) annual chance floodplain is estimated to reach $190.25 billion in Illinois (IEMA, 2018). In addition to losses in the mapped floodplain, urban flooding is increasing in Illinois with up to $2.3 billion in damages. According to the *Report for the Urban Flooding Awareness Act* (IDNR, 2015), over 90% of urban flooding damage claims between 2007 and 2014 were outside the mapped floodplain.

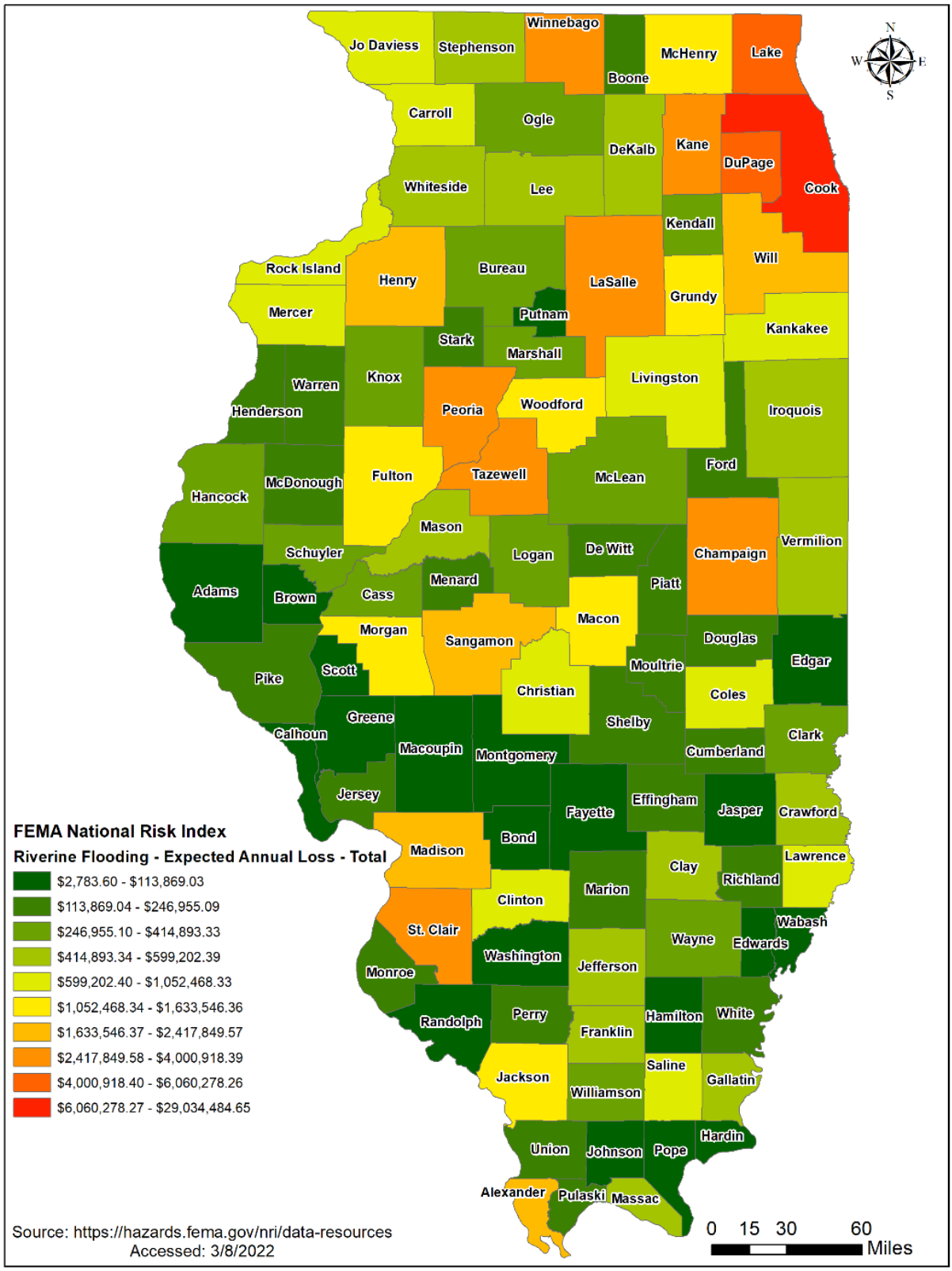


Figure 11.1 – Expected Annual Flood Loss by County

Furthermore, our flood risk continues to evolve as long-term climate records of temperature and precipitation show that Illinois has become warmer and wetter over the past several decades. **Figure 11.2** compares annual precipitation from 1895-2021 which is increasing about 0.47 inches per decade or 4.74 inches over the last century. Moreover, climate models show that more extreme events will occur, which will increase flooding impacts.

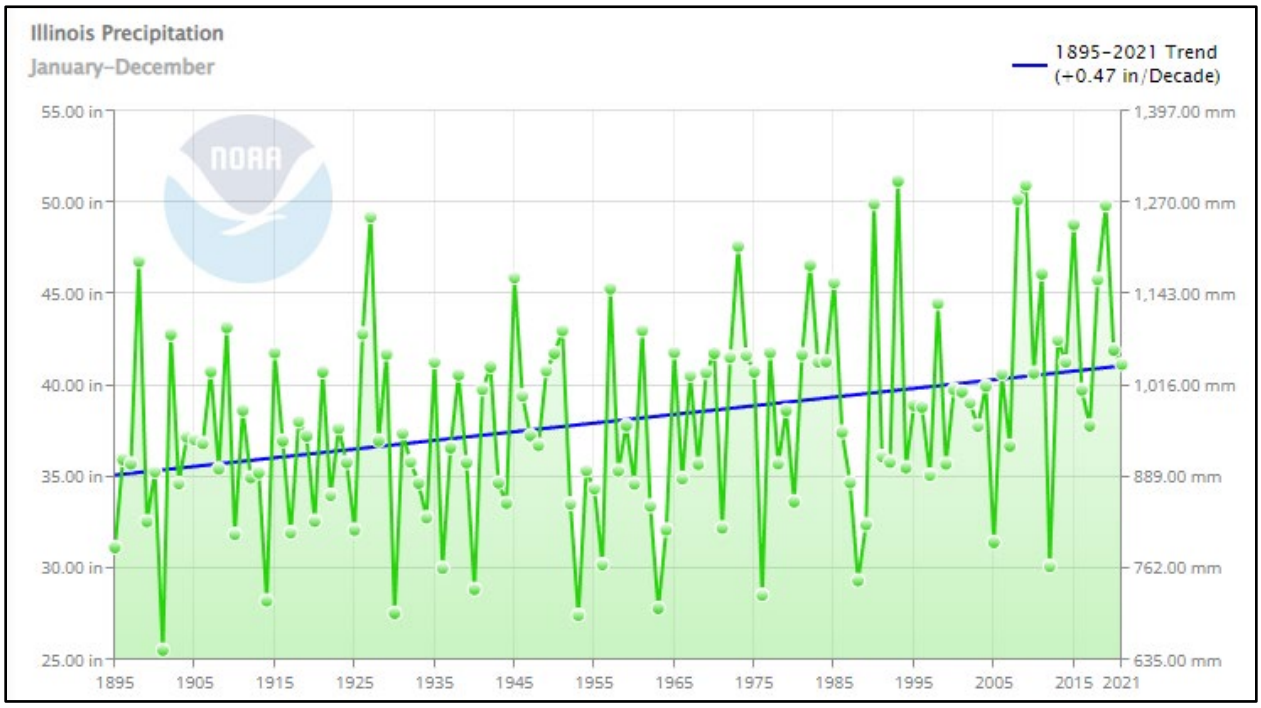


Figure 11.2 – Precipitation Trends from 1895-2021 for Illinois *(NOAA/NCEI, 2021)*

Issues

This report identifies two key areas where improvements could be made to address flood problems within the state: Hazard Identification and Hazard Mitigation.

First, high risk areas need to be identified and the flooding extent needs to be quantified throughout the state for both riverine and urban flooding. Flood Insurance Rate Maps (FIRMs) are produced by the Federal Emergency Management Agency (FEMA) to support the National Flood Insurance Program and are the primary source of information about the extent and depth of likely riverine floods. FIRMs and associated products are used for floodplain management, regulation, and mandatory flood insurance determinations. As of early 2022, there are five counties, Effingham, Macoupin, McDonough, Montgomery, and Richland, and numerous municipalities with no FIRMS. The effective FIRMs for 17 more counties remain in the paper map format. Full digital (DFIRM) coverage for the state is not expected to be completed until 2030. Unfortunately, most DFIRMS were created without new floodplain studies meaning the underlying flood hazard information is based on old rainfall statistics and low-quality

topographic data. Moreover, the original flood hazard mapping for 81.6% of stream miles in Illinois is based on unverified or unknown study data. In conjunction with outdated information, future flooding extents due to climate change impacts are expected to increase. The impacts of climate change will be difficult to investigate with outdated floodplain modeling and mapping. While FEMA continues to fund flood hazard studies in Illinois, the projected schedule of studies will not correct the issue of out-of-date information in the foreseeable future. **Figure 11.3** illustrates when floodplain studies were completed and the majority of the data for Illinois is from the 1970's and 1980's. It is a constant struggle to balance the priority of modernizing the mapping in the remaining rural counties of the state with the need to update studies and floodplain mapping in watersheds where growth may be putting new homes at risk.

While the FIRMs show expected flood inundation from riverine flooding, in urban areas there are additional flooding sources that cause significant damages. Additionally, interactions between urban and riverine flooding need to be better understood. The *Report for the Urban Flooding Awareness Act* (IDNR/OWR, 2015) provides a detailed assessment of the extent and cost of urban flooding in Illinois. Much of the existing stormwater infrastructure is outdated and undersized, creating flooding events and damage in densely populated areas. While much of the urban flooding insurance claims were in northeastern Illinois, urban flooding occurs statewide.

Agriculture is also impacted heavily by flooding. The US Department of Agriculture has declared over 305 instances of county-wide flood related disasters and caused over $2 billion in crop losses between 2012 and 2021. While standing water can destroy crops, flooding also causes erosion which washes away the most fertile top soil layer thus reducing crop yields. In turn, the eroded soil and nutrients from applied fertilizer can enter waterbodies creating sedimentation and water quality issues which are discussed elsewhere in this report.

It is not just building or agricultural damages that are a measure of the impact of flooding. Studies of community resilience show that economics, education, gender and age distribution, race, infrastructure, environment, and community capacity influence the impacts of flood losses, casualties, and the ability of the community to recover from a flood disaster. Vulnerable populations may experience greater and longer-term impacts from flooding. A 2015 flood vulnerability assessment (IEMA, 2018) identified Pulaski, Alexander, White, Peoria, Pike Jackson, Gallatin, St. Clair, Saline, and Lawrence counties as the top ten most vulnerable to flood impacts (listed in descending order). Social and environmental justice issues need to be considered when selecting areas that need assistance and determining feasible solutions to protect all citizens of the state.

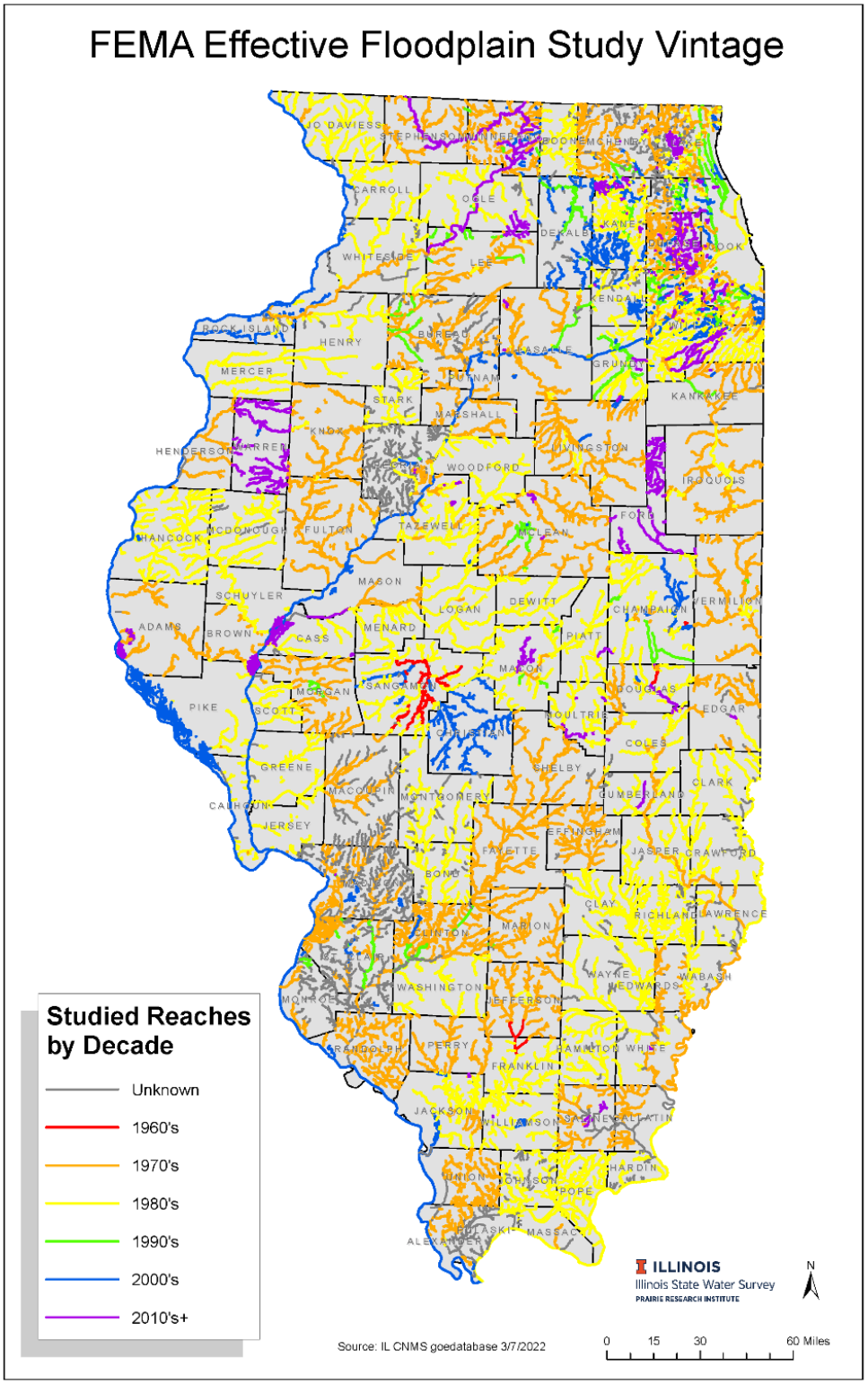


Figure 11.3 – Flood Study Vintage in Illinois

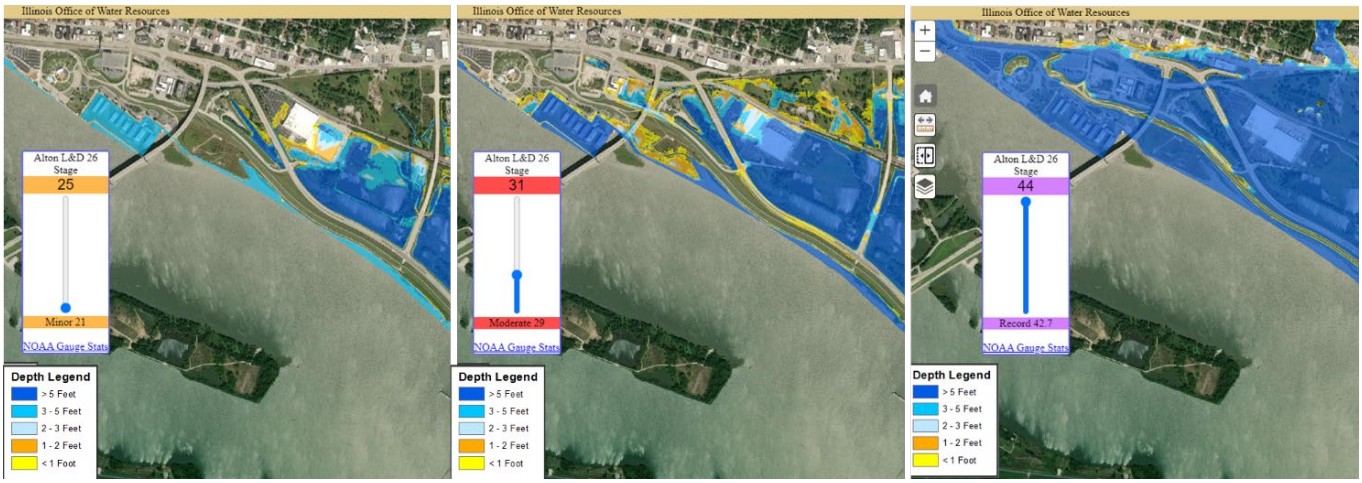
Once problematic areas are identified, mitigation is required to both address damages and reduce the risk of future damages. Studies (National Institute of Building Sciences, 2019) have shown that for every $1 spent on riverine mitigation funding, over $6 are saved in loss avoidance. Using federal, state, and local mitigation funding, Illinois has now mitigated over 5,000 repetitively flooded structures through elevation and acquisition. Illinois leads the nation in overall flood loss reduction and many communities in Illinois now pass major floods unscathed. However, much more needs to be done.

Recommendations

Damages due to riverine and urban flooding is a costly statewide issue. The economic and social costs of flooding need to be systematically reduced. Illinois needs to continue to work toward identifying current and potential future flood hazards and take action to reduce risk in urban and rural areas by implementing the following recommendations. The first seven recommendations listed below relate to identifying the flood hazard and the remaining solutions refer to mitigative efforts.

When developing flood protection recommendations, a broad approach was taken to simultaneously address climate change impacts and social and environmental justice, when possible. Similarly, solutions that addressed more than one critical water issue were also prioritized. For example, natural infrastructure, such as floodplain wetlands and riparian forest buffers, can concurrently provide water quality, nutrient sequestration, flood protection, habitat, climate resilience, recreation, and even, in some cases, aquifer recharge while also benefitting native wildlife. President Biden's Executive Order 14072 recognizes the importance of deploying nature-based solutions to tackle climate change and enhance resilience, providing multiple benefits such as flood risk reduction, biodiversity, and stream base flow and health. Flood damage mitigation recommendations include many such overlapping benefits.

Figure 11.4 below provides an example of the recommended dynamic inundation mapping tool and the Structures at Flood Risk (SAFR) website where continued statewide coverage for both programs are being recommended.



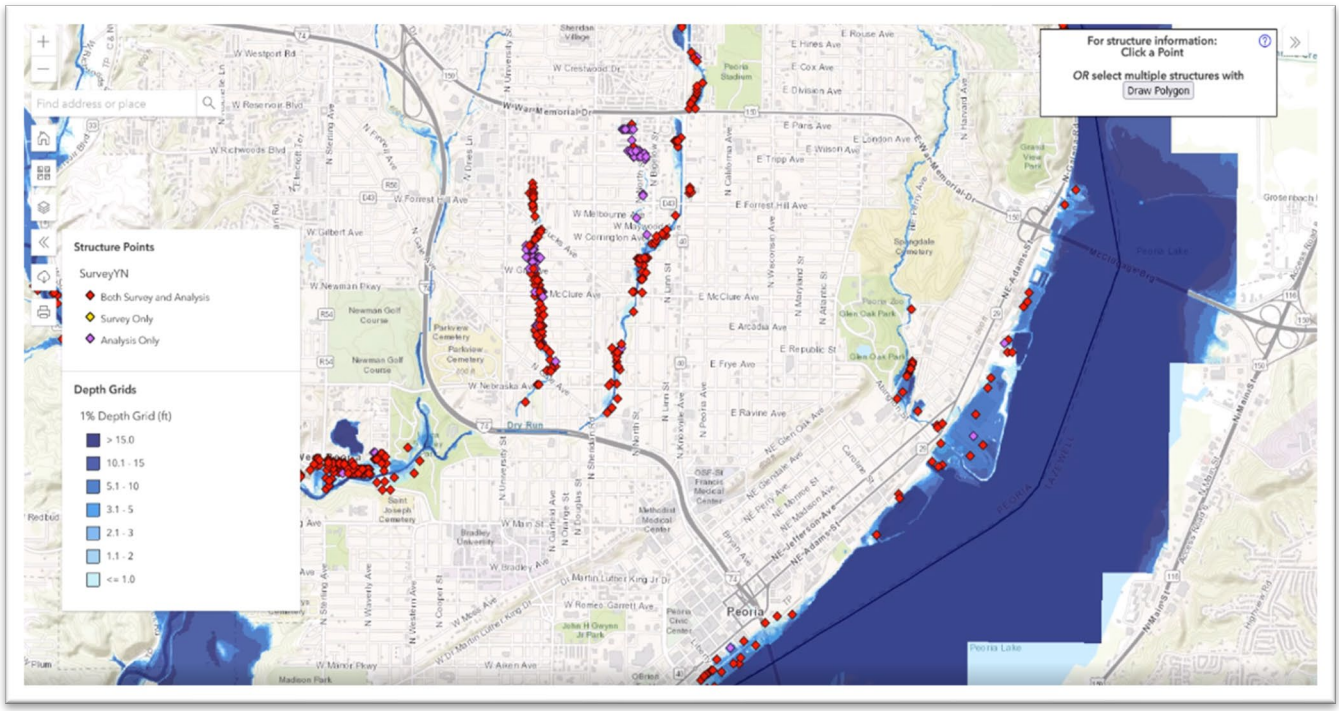


Figure 11.4 – Examples of Recommended Dynamic Inundation Maps and the SAFR Website
(IDNR, 2021)

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Table 11.1 – Flood Damage Mitigation Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Long-term precipitation records show that Illinois has become wetter over the past several decades.	1. Generate rainfall predictions using climate change projections for the entire state as a supplement to Bulletin 75 (Angel et al., 2020). Updates should be completed every 15 years.	IDNR-OWR	One-Time	Study
There is no statewide database of hydraulic models that have been completed.	2. Develop a GIS-based database to track information (metadata and links) for all hydraulic models developed for the watercourses in IL. The database will be housed in the IL Integrated Water Information Center (IWIC), as described in the Integrated Water Management Section.	IDNR-OWR	New Annual	Program
Many areas in the state are utilizing outdated hydraulic models. However, current modeling updates are time consuming and expensive.	3. Explore advances in technology and utilize data from new sources (LiDAR, and other available data) to generate-preliminary-level 2-D models for the entire state for use at the planning and response/recovery stages and for prioritizing where more detailed modeling is required. Upload all information about the 2-D models to the model database (Item 2).	IEMA	New Annual	Program
The public and local officials need a mapping tool to show them what different flood events might look like in their communities with respect to their local flood stage gauges.	4. Develop a priority list of where inundation mapping would be beneficial and data is available. Correlate with the list of disadvantaged communities. Generate flood forecast dynamic inundation mapping tied to river gauges for 3 communities per year. Upload the mapping to a new GIS-based website to serve as a pilot program that can be expanded in the future. The mapping website will be housed in IWIC and outreach will be conducted with the selected communities.	IDNR-OWR	Increased Annual	Program
Community planners need a risk assessment tool to evaluate the structural damages and associated	5. Develop a priority list for where riverine structural damage assessments need to be completed. Correlate with the list of disadvantaged communities. Collect data, model, and upload structural damage assessments to the Structures at Flood Risk	IDNR-OWR	Increased Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
costs for different flood events. Structural damage assessments help to determine best use of flood prevention and mitigation efforts.	(SAFR) website until all prioritized floodprone structures in the state are completed. Add 3 new communities (up to 500 structures each) or one community/county (up to 1500 structures) per year to the website. The SAFR website will be housed in IWIC and outreach will be conducted with the selected communities.			
IL contains many socioeconomically and environmentally disadvantaged communities that are impacted the most during flooding.	6. Utilizing the newly developed prioritization methodology (see Integrated Water Management), select 2 disadvantaged communities per year that require assistance in flood mitigation plan development. Provide an accountability review to make sure that funding is leading to equitable outcomes in these underserved communities.	IDNR-OWR	None	Program
Urban flooding is difficult to predict due to a lack of warning systems. It is also challenging to keep records from these events.	7. To provide advance notice to communities with historic urban flooding issues, purchase and install urban flood warning systems for sewers and roads as a new pilot program. Generate a list of communities that have historic urban flooding issues and prioritize by socioeconomic need. Select 1 community per year to perform testing of the warning system. Work with local communities and drainage districts, and develop partnerships with USACE, USGS and NWS to establish the notification system. Tie the monitoring gauges into the existing community emergency alert systems. Once this program is established, this program can be expanded to help a larger number of communities each year.	IDNR-OWR	New Annual	Program
IL communities have installed a large number of flood control facilities but there is no comprehensive database with details about the infrastructure.	8. Utilizing information already provided in County Hazard Mitigation Plans regarding flood mitigation needs, combine the data into a statewide GIS based database of existing flood protective infrastructure (storm sewers, detention basins, floodwalls, non-federal levees, etc.) and future flood management needs. Allow communities to link their existing infrastructure catalogs and assessments to the database. Add specific	IEMA	New Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
	community assessments and needs to the database as they are developed. The database will be housed in IWIC (see Integrated Water Management Section).			
There are a lot of resources and funding alternatives available for communities to address flooding issues. However, many communities do not understand where to go and when they can get assistance.	9. Develop an outreach tool/flow schematic that community leaders and organizers can use to determine what funding options are available to them based on their needs. Using this tool, Local Assistance Program (see Integrated Water Management Section) staff will work with communities to find the statewide/federal or outside programs that could be used to help fund, design and implement their projects.	IEMA	One-Time	Study
Disadvantaged communities do not always have staff or the knowledge required to assess their existing infrastructure or know what options exist to help them develop a list of their specific community needs.	10. Start a pilot program to help the 2 previously identified disadvantaged communities per year to survey and assess their existing flood management infrastructure and identify future needs. Staff will work with the community to develop a list of their needs and local action items. Enter the data into the new statewide mitigation infrastructure database from Item 8.	IEMA	New Annual	Program
Funding requests sometimes require detailed project plans before funding can be awarded. Disadvantaged communities do not always have staff or the knowledge required to	11. Expanding on the infrastructure assessment and needs work completed in Item 10, start a pilot program to help the 2 per year previously identified disadvantaged communities to develop a project design to advance their community's flood mitigation plan. Once this pilot program is established, this program can be expanded to help a larger number of disadvantaged communities each year.	IDNR-OWR	New Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
develop these requirements.				
Disadvantaged communities do not have the financial resources to implement or construct flood mitigation projects and many times also do not have funds to match or to fund the project up front even if reimbursed later.	12. Provide a pilot program of matching funds, or new funding if no other funding resources are available, to fund larger scale flood protection/mitigation construction projects for the 2 previously identified disadvantaged communities per year. The funding can be used to perform upgrades and/or to develop new flood protection projects (focusing on natural options). Provide management assistance, if required. Once this pilot program is established, this program can be expanded to help a larger number of disadvantaged communities each year and to include other communities whose needs cannot be met within existing mitigation programs.	IDNR-OWR	New Annual	Program
Local and community level planning and mitigation efforts sometimes negatively impact or directly conflict with planning or mitigation efforts being completed by nearby communities.	13. Planning at the watershed level allows communities to optimize opportunities for cost sharing, economies of scale and provides better long-term solutions. Communities need to develop partnerships at the watershed level to better focus on ecosystem functionality. Provide grants to communities for partnering when planning and developing watershed level projects. Focus a portion of the funding on projects that will assist disadvantaged areas by use of designated grants or need-based scoring. Follow the organizational models developed by several legislative flood alliances in the state. Partnerships should include representatives from state and local roadway and stormwater management agencies to encourage shared planning efforts for reducing project costs and associated construction impacts.	IDNR-OWR	New Annual	Program
Illinois is one of the few states that have not enacted a State Building Code.	14. Availability of funding under FEMA's Building Resilient Infrastructure in Communities (BRIC) is limited because the State of Illinois does not have statewide building code. Adopt statewide building codes. Include energy conservation and green	IDNR-OWR	New Annual	Legislation

Issue	Recommendation	Lead Agency	Funding	Action
	construction codes as well to encourage environmentally friendly practices.			
Regulators, planners and disadvantaged communities do not have much knowledge about Natural and Nature-Based solutions that can be used for risk management while also addressing other critical water issues.	15. Natural and Nature-Based solutions provide multiple benefits to the ecosystem while also providing low cost and effective solutions to reduce risk from disasters. Utilize the recommended IWIC hub (Integrated Water Management) for disseminating newly published guidance for nature-based and natural solutions. Include green infrastructure case studies and benefit-cost information. Utilize the recommended Local Assistance Programs (Integrated Water Management) to provide technical support for planning and mitigation using green infrastructure to disadvantaged communities. Develop green infrastructure outreach materials to further promote natural solutions. Provide access to the newly proposed Water Resources SRF (Long Term Funding) for planning/implementing new alternative and environmentally sound practices to minimize impacts to both riverine and urban flooding. Focus a portion of the funding on loan forgiveness for projects that will assist disadvantaged areas.	IDNR-OWR	New Annual	Program

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Black Partridge Creek (Metzke, 2022)

12

AQUATIC & RIPARIAN HABITAT

Overview

Aquatic and riparian habitat that exhibits healthy physical, biological, hydrological, and chemical components supports diverse and self-sustaining plant and animal communities and provides services for ecosystems, including humans. Managing water for the protection and enhancement of aquatic and riparian habitat fosters this ideal.

Following publication of the 1984 Illinois State Water Plan, Illinois state and Federal agencies, and academic institutions implemented monitoring programs to collect water quality, flow, physical habitat, watershed characteristics, and biological information, and developed tools to evaluate condition and trends of aquatic and riparian habitat. Biological indices and rating systems, like the fish index of biotic integrity (fIBI; Smogor, 2000), macroinvertebrate index of biotic integrity (mIBI; Tetra Tech, 2007), National Wetlands Inventory (NWI; USFWS, 2020), Critical Trends Assessment Program (CTAP; INHS, 2019), Illinois Natural Areas Inventory (INAI; White, 1978, IDNR, 2018), and biological streams characterization (Bol et al., 2007), provide tools for assessing surface waters. The Illinois Stream Information System (ISIS) was developed in the 1980s and revised multiple times through the 1990s as a GIS-based tool for characterizing the hydrology, morphology, and biota of streams. ISIS was later supplanted by the Illinois Stream Classification System (Holtrop et al., 2005) and by the Statewide Streams Application (Hinz, Jr. et al., 2017) as higher resolution data became available and computing power improved. The United States Geological Survey (USGS) and Illinois State Water Survey (ISWS) maintain nearly 200 continuous stream discharge gages throughout Illinois. Some of these gages record nutrient, turbidity, and temperature measurements as well. The USGS is

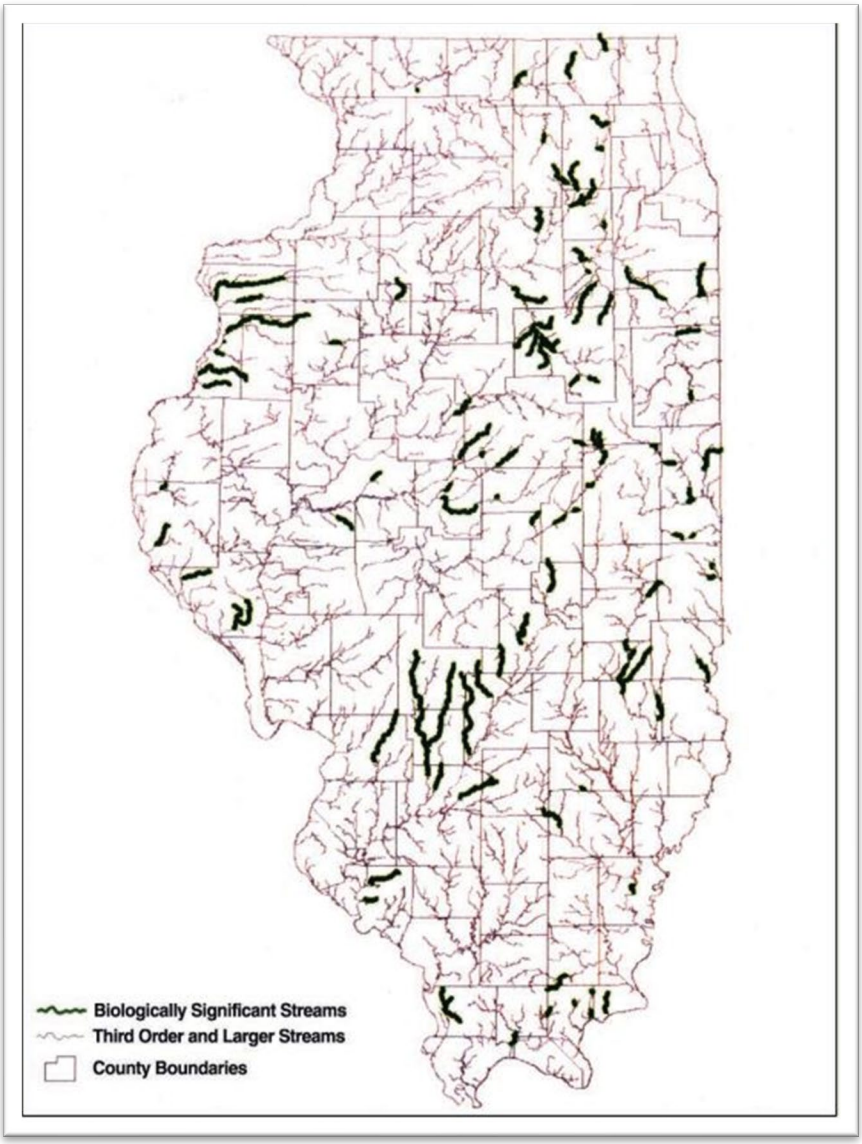

Figure 12.1 - Map of biologically significant streams

contracted by the Illinois Environmental Protection Agency (IEPA) to operate eight super-gages, which record high-frequency nutrient, turbidity, discharge, and physical measurements, as part of the Illinois Nutrient Loss Reduction Strategy. The ISWS also has operated the Benchmark Sediment Monitoring Network (BSMN) since 1980 to compute trends in sediment loads at 15 USGS gaging stations.

Several relevant statutes and programs have been adopted or refined since 1984 to improve protection of aquatic and riparian habitat. The Interagency Wetland Policy Act of 1989 (20 ILCS 830), Natural Resources Restoration Trust Fund Act (20 ILCS 882), Illinois Environmental Protection Act (415 ILCS), Herptiles-Herps Act (510 ILCS), Fish and Aquatic Life Code (515 ILCS), Threatened and Endangered Species Act (520 ILCS 10), Illinois Natural Areas Preservation Act (525 ILCS 30), Rivers, Lakes and Streams Act (615 ILCS 5) and several Federal acts provide authority for identification, protection, and enhancement of aquatic and riparian habitat. The Natural Heritage Database, which provides state agencies information regarding locations of protected species and habitats, was developed to aid regulatory review processes. The Natural Resources Restoration Trust Fund Act (20 ILCS 882/10) secures moneys intended for the investigation, assessment, restoration, or replacement of injured or damaged natural resources, including groundwater, resulting from claims pursued under the laws of the United States, Illinois, or other statutory or common law, ensuring benefits to natural resources and

the services the resources provide. The Consultation for Assessing Impacts to Protected Species and Natural Areas (520 ILCS 10/11) and Incidental Take of List Species Authorization (520 ILCS 10/5.5) statutes provide mechanisms for identifying and mitigating harm to certain aquatic and riparian biota and their habitats. The Rivers and Streams Act (615 ILCS 5) protects Public Waters and their associated natural resources by identifying prohibited activities and describing a process to ensure compliance. The IEPA uses the Illinois Environmental Protection Act (415 ILCS) to regulate discharges and limit water quality degradation.

Issues

Degraded aquatic and riparian habitats

Centuries of anthropogenic disturbances have caused Illinois' aquatic and riparian habitat to fall short of the ideal state (IDNR, 2015). The physical components of nearly half of stream segments in Illinois are highly or very highly degraded (Crawford et al., 2016), and 41% and 63% of stream reaches have riparian areas and watersheds comprised of mostly disturbed land uses, respectively (Holtrop et al., 2005). There are approximately 2,250 permitted point-source discharges (IEPA, 2020a) in Illinois releasing tens of millions of pounds of phosphorus and nitrogen (IEPA et al., 2019) and unenumerated quantities of metals, salts and other pollutants into streams annually. Non-point sources contribute tens of millions of pounds of phosphorus, nitrogen (McIsaac, 2019), and millions of tons of sediments into streams annually.

Figure 12.2 - Degraded stream in an agricultural landscape, Kaskaskia River Basin *(Metzke, 2017)*

There are approximately 1,600 permitted dams in Illinois (National Inventory of Dams [NID], 2020), and perhaps tens of thousands that are not permitted. These dams impound water, create habitat which is less suitable for some stream biota, and limit dispersal of organisms. More than 3,500 kilometers of levees and an unenumerated length of channelized streams disconnect streams from their floodplains. This reduced lateral connectivity fragments ecological processes over space and time and reduces resiliency of streams and riparian habitats and their biota to climate change. Aquatic and riparian habitats and their biota are threatened by dozens of aquatic nuisance species (USACE, 2014); however, the extent of ecological and economic impacts from these species is unknown as robust surveys for most taxa do not occur. Physical and chemical degradation of streams and lakes is reflected in the composition of associated communities. Approximately 42% of assessed stream miles and 52% of lakes do not support protection and propagation of native species and identified causes of degradation are both chemical and physical and result from landscape alteration, point-source discharges, channelization, and impoundments (IEPA, 2018). These evaluations indicate 30-56% of assessed streams are moderately impaired and 3-4% are severely impaired, depending upon the assessed taxonomic group (IEPA, 2018). More than 85% of Illinois' wetlands have been lost to land use and hydrologic disturbance (INHS, 2019). Since 1997 wetlands have declined in floristic quality and insect species richness, both of which may result from increased prominence of invasive species, hydrologic modification, and climate change (INHS, 2019). When acute events contaminate aquatic resources (e.g., hazardous material spills) agency and academic resources can be mobilized to assess damage to biota, habitat, and ecological services, yet coordination of assessment and monitoring is difficult and sufficient compensation rarely collected as no state guidelines have been developed.

Figure 12.3 – Waukegan Dunes Wetlands *(IDNR, 2017)*

Limited Physical, chemical, and biological data

Data used to monitor condition of aquatic and riparian habitat is collected at a coarse resolution in space and time and does not reflect the full breadth of habitats. Most USGS gages are in large rivers or urbans areas and so assessed hydrological patterns may be biased. IEPA conducts water quality evaluations at 196 locations approximately 5-8 times per year for Ambient Water Quality Monitoring assessments (IEPA, 2020b). This frequency of measurements is unlikely to capture a component's concentration curve and does not evaluate many components of concern (e.g., chlorides, temperature). The IEPA and IDNR survey approximately 135 stations annually on a five-year rotating schedule (i.e., 675 stations surveyed over five years) to collect information for Integrated Water Quality assessments. Fish, benthic macroinvertebrates, and point-measures of physical and chemical water quality components are collected at each station during survey events. These stations occur on less than 1% of stream segments in Illinois and occur at a frequency which is unlikely to capture all but the coarsest trends. The CTAP samples approximately 16 wetlands annually to evaluation statewide trends, but the stream assessment portion of the program has been discontinued. Agencies and institutions collecting biological and physicochemical information for Illinois waters store data in separate and isolated databases. Although much of these data are publicly available, the lack of real-time or even periodic integration and adequate spatial association result in inefficient evaluations of aquatic and riparian habitat status and trends.

Private use of water is prioritized

Illinois water law prioritizes private use of aquatic and riparian habitats. Landowners may modify surface and subsurface drainage, and many drainage activities can be performed without the encumbrance of obtaining approval from an authorizing agency or landowners. Landowners hold rights to riparian areas, channel beds, and water use for most of stream miles in Illinois. Construction and land management activities in or near waters may require consultation with IDNR to assess impacts to aquatic and riparian habitats, although only statutorily designated resources may be protected. Certain identified groundwater resources are protected to preserve ecological processes (e.g., Class III groundwater), yet shallow groundwater withdrawal and diversions alter patterns of stream discharge. Existing mechanisms for protection (e.g., Public Waters designation, Outstanding Resource Waters, aquatic life preserves, groundwater injury assessments) are underutilized or lack adequate regulatory authority (e.g., Illinois Natural Areas Inventory) for the protection of aquatic and riparian habitat. Isolated wetlands lack legal protections throughout much of Illinois and no single agency assumes responsibility for these habitats.

Recommendations

The following recommendations are provided to address these concerns.

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Table 12.1 – Aquatic & Riparian Habitat Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Aquatic and riparian habitats on public lands are degraded.	1. Develop watershed Best Management Practices (BMPs) plans for each State Agency. BMPs should protect or enhance physical and chemical components of aquatic and riparian habitats. Implement BMPs on State-owned and leased lands. Prioritize those BMPs with greatest benefit to aquatic and riparian habitat.	IDNR-ORC	None	Program Policy
Aquatic and riparian habitats on private lands are degraded.	2. Enhance incentive programs for the implementation of watershed BMPs on private lands. BMPs should protect or enhance physical and chemical components of aquatic and riparian habitats. Develop or enhance education and outreach for incentive programs. Prioritize those BMPs with greatest benefit to aquatic and riparian habitat.	IDNR-ORC	Increased Annual	Program
Flood-prone areas create financial and human health hazards.	3. Develop a plan that identifies flood prone areas in underserved communities that would benefit from multi-benefit floodplains with the goals of reducing flood impacts and providing access to land and water recreational opportunities. Implement a grant program to assist these communities in funding projects to create multi-benefit floodplains.	IDNR-OWR	New Annual	Program
The Nutrient Loss Reduction Strategy is underfunded.	4. Support the Nutrient Loss Reduction Strategy with dedicated funding.	IDOA	New Annual	Legislation
Aquatic and riparian habitats are fragmented by physical structures.	5. Reduce fragmentation through barrier removal (e.g., dams, perched culverts, levees) or implementing connectivity enhancement (e.g., bypass channels, fish ladders) where removal is not feasible. Amend State 401 certification process to include assessment of connectivity.	IDNR-OWR	New Annual	Program Policy
Fragmented aquatic and riparian habitats have reduced climate resiliency.	6. Restore landscape connectivity by reconnecting streams to their floodplains by removing levees and reducing channelization in areas where reconnection will not jeopardize human health or private property. Enhance wildlife dispersal corridors by restoring contiguous riparian habitat.	IDNR-OWR	New Annual	Program Policy

Issue	Recommendation	Lead Agency	Funding	Action
Groundwater discharge areas are under-protected.	7. Enhance an ongoing study to identify areas that meet Class III groundwater designation criteria. Enroll identified areas to maintain base flows in surface waters and protect water quality and physical structure of groundwater-fed aquatic and riparian habitat.	IDNR-ORC	Increased Annual	Study
Stream gages are not representative of aquatic habitats and do not measure some water quality components of concern.	8. Investigate the state and federal monitoring programs to identify underrepresented aquatic and riparian habitats (e.g., headwaters, unregulated rivers) and physicochemical components of emerging concern (e.g., chlorides, temperature) that may be measured by the programs.	IEPA	One-Time	Study
Biological monitoring is not representative of aquatic habitats.	9. Develop biological monitoring programs to identify underrepresented aquatic and riparian habitats (e.g., headwaters, side-channel wetlands).	IDNR-ORC	One-Time	Study
Wetland monitoring is limited.	10. Expand CTAP wetland monitoring. Periodically reassess wetlands to update NWI.	IDNR-ORC	Increased Annual	Program
Streams are not monitored by CTAP.	11. Restore a revised CTAP stream monitoring effort.	IDNR-ORC	New Annual	Program
Invasive species harm aquatic and riparian habitat.	12. Increase funding for monitoring and control of invasive species. Develop monitoring sufficient for evaluating the extent of invasion for all taxonomic groups.	IDNR-ORC	Increased Annual	Legislative
Aquatic and riparian habitat data are not integrated and accessible among	13. Develop an interagency database to integrate physical, chemical, flow, and biological monitoring data.	TBD	New Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
agencies and institutions.				
There are no flow standards for Illinois streams.	14. Develop environmental flow standards for all public waters with an emphasis on maintaining of enhancing biological composition. Incorporate climate projections into these standards to estimate future flow conditions.	IDNR-ORC	One-Time	Study
Breadth of biological indices for aquatic habitat assessments is limited.	15. Investigate and identify monitoring needs, including required resources, to support development of biological indices in underrepresented habitats (e.g., headwaters, large rivers, lakes) and underrepresented biota (e.g., wetland insects, mussels).	IEPA	One-Time	Study
Ability to compensate public for injured aquatic and riparian resources is limited.	16. Develop policy guidelines to better utilize the Federal Natural Resource Damage Assessment (NRDA) process and/or create a statewide equivalent process to secure compensation sufficient to restore, replace, or acquire the equivalent relative to injured aquatic and riparian resources.	IDNR-ORC	None	Policy
Ability to compensate public for injured groundwater resources is limited.	17. Revise and expand approach to respond to, collect evidence of, and assess injury to all aquatic and groundwater resources and the services (i.e., ecosystem and human) such resources provide.	IDNR-ORC	None	Program
Regulatory processes do not include consideration of environmental flows.	18. Incorporate ecologically based environmental flow standards for Public Waters and waters of conservation concern (e.g., Biologically Significant Stream [BSS], INAI) into regulatory processes. Account for future flow conditions.	IDNR-OWR	One-Time	Program Policy
Funds available for aquatic and riparian habitat protection and restoration are limited.	19. Enact an Aquatic Habitat Stamp for resident and non-resident fishing licenses to generate revenue for increased protection, management, and restoration of lake, river, and stream resources.	IDNR-ORC	None	Legislative

Issue	Recommendation	Lead Agency	Funding	Action
Isolated wetlands are not protected.	20. Establish statewide statutory authority to regulate isolated wetlands that identifies mechanisms for protecting these wetlands and mitigating impacts.	IDNR-OWR	None	Legislative

13

WATER USE LAWS & REGULATIONS

Overview

This chapter outlines the progress that has been made since the 1984 State Water Plan, what issues that have been addressed, what issues remain, and new issues.

Since the Illinois State Water Plan (1984) was published, the topic of water use and regulation has evolved. **Table 13.1** outlines the issues from the 1984 plan and the status today.

Table 13.1 – Status of 1984 Plan Recommendations

Issue	Recommendation	Progress	Status
The State of Illinois should clarify "public waters" defined in the Rivers Lakes act of 1911	The State of Illinois through IDOT-DWR (now IDNR-OWR) should define and identify "public waters of the State of Illinois.	IDNR-OWR's Part 3704 Rules (Regulation of Public Waters) under the Rivers Lakes and Streams ACT [615 ILCS 5] has a listing of all designated Public Bodies of Water in the State of Illinois.	Complete
	IDOT-DWR (IDNR-OWR) will develop appropriate administrative rules and regulatory program to protect the rights and interests in "public waters)	IDNR-OWR has developed and adopted the Part 3704 Rules (Regulation of Public Waters) under the Rivers Lakes and Streams ACT [615 ILCS 5]	Complete
There is no adequate enabling authority for	The State agencies will work with ground water users to	The State has done this on volunteer basis through the	Incomplete

Issue	Recommendation	Progress	Status
groundwater management districts in Illinois	develop legislation to provide for the creation local groundwater management district where need to manage water supplies	IDNR-OWR regional water supply program. There has been no legislative mandate.	
	The IL State Water Survey will provide groundwater data to soil and water conservation districts in fulfilling the requirements of P.A. 83-700, and added support is essential	The IL State Water Survey provides groundwater data to meet the requirements of P.A. 83-700.	Complete
No minimum flow standards for Illinois streams.	Develop minimum flow standard.	Minimum flow standard developed (Illinois SWPTF Special Report No. 6).	Complete
	Implement minimum flow standard.	The minimum flow standard has been utilized for permitting only.	Incomplete
Resolve conflicts caused by prolonged drought	IL State Water Survey will monitor water use and evaluate balance of supplies and demands on a regional basis	IL State Water Survey currently monitors water use and evaluates balance of supplies	Complete
	Imbalances of water supplies should be rectified with legislation to use State Emergency powers to manage and allocate water during an emergency	To date, this has been completed on limited basis.	Incomplete

The Water Use Act of 1983, while comprehensive and visionary, has not been utilized as expected. Mainly, how water is utilized has evolved beyond what was originally foreseen. Similarly, how water is reused and proposed diversions out of the State of Illinois are areas where clear policy and regulation is needed.

Issues

The Water Use Act of 1983 has not been fully implemented. Since the Water Use Act became state law, there has not been a comprehensive assessment of what has been properly implemented. Additionally, many actions proposed in the Act have yet to be fully implemented. There has been significant interest in regulation in water reuse. Legislation may be necessary since there is no clear water reuse authority and reuse requirements have not been identified. The State of Illinois has been approached by several different organizations regarding export of water to states in the American West. Currently, out-of-state diversions (>5 MGD) from the Mississippi River Watershed are subject to review by the members of the Upper Mississippi River Basin Association. Legislation would help provide more clarity to the issue. Metering requirements and low flow protection policy/regulation are needed as well.

Recommendations

The following recommendations are provided to address these concerns.

Figure 13.1 – Hamilton County State Fish and Wildlife Area *(Gray, 2021)*

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Table 13-2 – Water Use Laws & Regulations Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Water Use Act of 1983 has not been fully implemented.	1. A full review of Water Use Act to assess what has been properly implemented, determine how to implement actions proposed in the Act, and determine If modifications to the Act are needed. Enact and implement modifications as needed. It is recommended that a minimum flow standard be implemented.	IDOA	New Annual	Program
Water Reuse is not currently regulated in Illinois.	2. Propose State Legislation defining regulation for water reuse.	IDNR-OWR	New Annual	Legislation
Out-of-State Diversions of water is not currently regulated in Illinois.	3. Legislation is needed to address for diversions of waters outside the State of Illinois.	IDNR-OWR	New Annual	Legislation
Groundwater management districts have no authority.	4. Enable authority for groundwater management districts in Illinois. The State has done this on volunteer basis through the IDNR-OWR regional water supply program. There has been no legislative mandate.	IDNR-OWR	New Annual	Legislation
Water use conflicts arise during drought conditions.	5. Resolve conflicts caused by prolonged drought. To date, this has been completed on limited basis.	IDNR-OWR	Unknown	Legislation
Improve data collection for groundwater use.	6. Improve the accuracy of high capacity well water use reporting by adding metering requirements to Water Use Act of 1983.	ISWS	New Annual	Legislation Program
Isolated wetlands are not protected.	7. Establish statewide statutory authority to regulate isolated wetlands that identifies mechanisms for protecting these wetlands and mitigating impacts.	IDNR-OWR	None	Legislative

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Transport of wind turbine propellors (Martin, 2021)

14

NAVIGATION

Overview

The Illinois Marine Transportation System (IMTS) has over 450 private active waterway terminals, 19 public port districts, 27 lock and dams, and 1,118 miles (see **Table 14.1**) of commercially navigable waterways providing access to the Gulf of Mexico. The IMTS enables economic development, the movement of people and goods, and increases residents' quality of life via navigation on the system by barge tows, ferries, water taxis, cruise ships, and recreational vessels. The IMTS is among the largest inland commercially navigable waterways in the United States. In addition, the State borders on 63 miles of Lake Michigan which provides access to the Atlantic Ocean via the Great Lakes/ St. Lawrence Seaway System.

Table 14.1 – Miles of Commercially Navigable Waterways in IL

Waterway	*Miles*
Mississippi River	580.8
Illinois River	272.9
Des Plaines River	17.1
Cal-Sag Channel	16.3
Little Calumet River	5.9
Lake Calumet	1.4
Calumet River	7.8

Waterway	*Miles*
Calumet Harbor	0.2
Chicago Sanitary and Ship Canal	31.1
Chicago River	14.4
Chicago Harbor	0.9
Ohio River	133.0
Kaskaskia River	35.9
Waukegan Harbor	0.8
Total	**1,118.5**

In 2017, 1.2 billion tons of freight moved through the State. The IMTS moved approximately 9% (108 million tons) of that total.

Not only is this amount of tonnage economically significant, but the movements also aid in relieving surface transportation congestion, increase overall transportation safety, and help reduce transportation emissions in comparison to if such goods were shipped by truck or rail.

The State of Illinois has taken the lead on freight transportation issues relative to the IMTS in coordination with other agencies, states, and the federal government, with the goals of:

- Prioritizing intermodal and/or multimodal port assets
- Mitigating congestion
- Increasing stewardship
- Increasing marine transportation system utility, including resilience
- Better leveraging the overall Illinois Freight Transportation Portfolio

Consistent with these goals, in 2017, Illinois Department of Transportation (IDOT) began providing technical and capital assistance to port districts. In FY 2019 Governor Pritzker signed a $45 billion Rebuild Illinois Capital Plan which included $150 million for a six-year Port Facilities Capital Investment Grant Program. However, beyond this one-time port investment, no continuous dedicated or formal funding program for Marine activities is currently provided by the State.

IDOT has been successful in providing technical oversight to and funding for multiple port master plans, a port expansion study, two industry research projects, an Illinois Marine Transportation System Plan & Economic Impact Analysis Study (IMTS Plan), and has awarded

over $15 million in National Highway Freight Program funds toward port related projects through the Illinois Competitive Freight Program.

In the Spring of 2019, the Rebuild Illinois Capital Bill appropriated the sum of $150 million to the Illinois Department of Transportation (IDOT) for the Illinois Port Capital Investment Grant Program with $40 million going directly to the Alexander-Cairo Port District.

The Illinois Port Facilities Capital Investment Grant Program provides grants to public agencies for the planning and development of facilities within public port districts that are included in the Illinois Marine Transportation System. The IMTS is comprised of ports located on these navigable waterways: the Mississippi River, Illinois River, Chicago Area Waterway System, Kaskaskia River, Ohio River, Lake Michigan, and the landside infrastructure that allows transportation to, from, and on water.

Figure 14.1. Wind Turbine Blade Storage Area (Martin, 2021)

The grant application process, eligibility requirements, selection process, and the restrictions on the use of the grant money was developed by a committee of staff from the IL Department of Transportation, IL Department of Commerce and Economic Opportunity, IL Environmental Protection Agency, IL Department of Natural Resources and have been formalized using the Legislative Joint Committee on Administrative Rules (JCAR) process. IDOT sought input from, port stakeholders, and the public to develop this competitive program to prioritize grants for projects within public port districts to enhance the movement of commodities on the IMTS. On January 26, 2022, Gov. JB Pritzker and the Illinois Department of Transportation announced

that almost $108.3 million had been awarded to 12 projects to 8 public ports in Illinois as part of the historic, bipartisan Rebuild Illinois capital program.

Despite these efforts, the IMTS and the overall National Marine Transportation System (NMTS) continue to face significant hurdles. For example, operations, maintenance, and major rehabilitation programs administered through the U.S. Army Corps of Engineers (USACE) are unable to provide adequate funding to ensure the navigation system operates at an acceptable level of performance. The Mississippi Valley Division Regional Backlog of Maintenance for navigation is valued at over $1 billion (FY 2017 value). The USACE Rock Island District's portion, which includes large portions of the IMTS, is nearly 40 percent of this amount. Illinois is the third-largest agricultural exporter in the country and relies heavily upon the IMTS and NMTS. Current planning efforts will help identify how the state can help address marine transportation system issues, including navigational needs and improvements.

Although some progress toward addressing this backlog and numerous other burdens is anticipated in the immediate future, it is to the advantage of Illinois (and the nation) to help provide insightful strategic direction for further development of the IMTS and NMTS. IDOT believes the IMTS Plan, integrated with the Illinois State Water Plan, will help provide a unified vision for stakeholders that include the USACE, U.S. Department of Maritime Administration, U.S. Committee on the Marine Transportation System, and U.S. Coast Guard along with local, state and federal policymakers.

The IMTS Plan examines statewide port and terminal facilities, users, operators, and carriers, as well as waterborne commodity flows, volumes, utilization, and capacity. The Plan also assesses the economic impact of port districts on the state and the economic contributions of major industries that rely on the IMTS. Additionally, the Plan provides a system-level identification of needs for port districts, terminals, waterways, and associated navigation facilities, along with programmatic recommendations for action.

Issues

Navigation issues can be categorized as:

- Infrastructure (ports, locks/dams, bridges)
- Technological Improvements
- Channel Health (size/depth, maintenance/dredging/environmental concerns)

Infrastructure

The future success of the port districts and waterways system is contingent on having reliable infrastructure that can respond to changing market conditions. Providing funding to a level that consistently matches system conditions and needs will improve the safety and efficiency of the IMTS. Delays in needed maintenance can result in the need for total rehabilitation which will cost more than regular maintenance. The consistent passage of a Water Resources

Development Act on a two-year cycle is one way to manage this need. Another is to approve "flex" funding for waterway infrastructure using existing funding sources. Consistent underfunding of the IMTS could affect Illinois' position in the global marketplace attributing to a decline in economic wellbeing for the state.

Ports

Port Districts and private terminal operators will continue to improve infrastructure and capacity for their facilities. The State of Illinois will support the replacement of and upgrades needed to existing infrastructure, thereby improving efficiency and providing for additional marine-based economic opportunities. In addition to funding the Illinois Port Facilities Capital Investment Grant Program, the State of Illinois can assist public port districts in the collection, organization, and dissemination of data related to port and waterway infrastructure and conditions.

Locks/Dams

The majority of locks on the IMTS were built between the 1930s and 1950s. Locks that are single chambers or less than 1,200' long can restrict the capacity of the overall system. Barge tows today are generally 1,200 feet long, so moving through a 600-foot-long older lock requires the tow to be split and doubles the time required to travel through the locks. These locks also require constant maintenance which can lead to further delays. There is currently a backlog of projects maintained by the USACE to improve the lock and dam system. The agency does not have a clear definition of "deferred maintenance," there is a dispute as to how much of a backlog there truly is; however, nationally more than six billion dollars' worth of authorized projects are waiting to be funded. Specific maintenance and rehabilitation projects will need to be undertaken to preserve system integrity and to avoid unscheduled maintenance or closure.

Figure 14.2 – New gates for William G. Stratton – Thomas A. Bolger Lock and Dam *(McKinney, 2022)*

Every shipping delay at locks, planned or not, imposes additional costs on the shipper, and ultimately the consumer of said commodities. The State of Illinois and transportation partners will continue to pursue additional funding for lock and dam maintenance on the National Marine Transportation System utilizing the Waterway Trust Fund and other funding opportunities.

Bridges

Bridges can impede waterway navigation if there are issues with either horizontal clearance, vertical clearance, or alignment. The USACE sets minimum clearance for all new construction to ensure safe and efficient movement along waterways. Vertical bridge clearance can impact the height of towboat pilot houses and thus pilot visibility. Additionally, vertical bridge clearance can impact the amount of container on vessel stacking that is feasible. The decision to open a movable bridge must weigh the impact of the opening on the hindering of surface transportation traffic while allowing the passage of waterborne traffic. Bridge alignment and clearance issues can be eased with new construction, but that will continue to be an expensive and gradual solution. IDOT will address bridge clearance issues as existing bridges are upgraded or replaced.

Technological Improvements

Technology-driven advancements such as electronic data interchange between freight carriers, shippers, and receivers have significantly improved how ports and terminal operators function and have allowed for greater focus on the important issues of safety and security. Taking full advantage of available technology is essential to the overall global competitiveness and longevity of port districts, terminal operators, and the IMTS. Marine system fleet and harbor operators can continue to improve operations by taking advantage of technological advancements.

Channel Health

The basic artery of travel is the navigation channel. Its practical traffic capacity is limited by its width, depth, alignment, and current velocity.

Width/depth

The width of the channel must be sufficient to allow two barge tows to pass safely. On the Illinois River, Ohio River, and Mississippi River south of St. Louis, the channel width is approximately 300 feet. The width of the channel on the Mississippi River north of St. Louis varies from 200 to 400 feet. Artificial channels generally have narrower widths than natural channels; for example, the Chicago Sanitary and Ship Canal is 160 feet wide; the improved Calumet-Sag Channel is 225 feet wide; the Marseilles Canal has a width of 200 feet. The channel depth determines the draft to which barges can be loaded and profoundly influences towing resistance. The current minimum barge draft is 9-foot. The USACE continues to maintain and improve the marine navigation channels on the IMTS. The State of Illinois can support the USACE in their channel maintenance dredging program to maintain adequate width and depth by continuing to pursue additional funding for these programs.

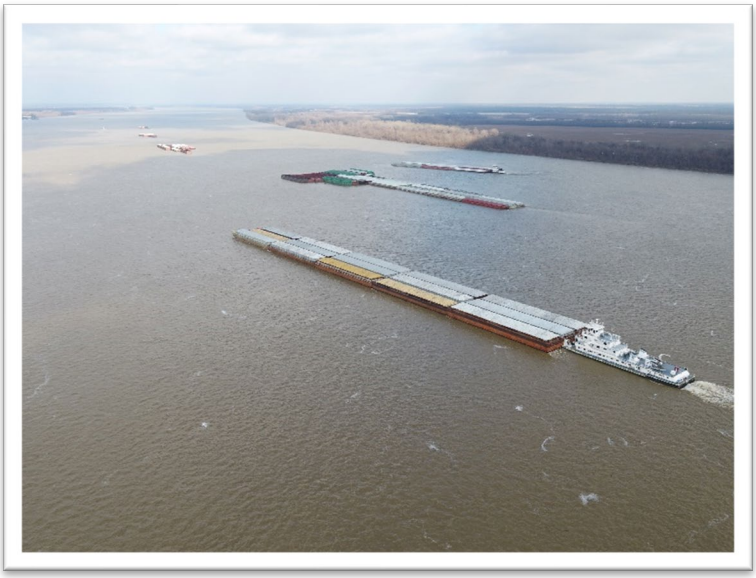

Figure 14.3 – Illinois Marine Transportation System *(IDOT, 2021)*

Maintenance/dredging

The need for periodic dredging (the removal of built-up underwater sediment) remains a key concern in channel health and maintaining water levels at an adequate navigable depth. Flooding of riverside lands, which has become more frequent and severe, pushes more sediment into the navigational channel requiring more frequent dredging to maintain commercial navigation. There is no reliable source of federal funding devoted solely to dredging. Unfortunately, the current USACE budget does not allow for keeping all channels open to the authorized levels at all times. Thus, some rivers are labeled “low use” and given low priority for dredging. This in turn forces shippers to choose different shipping methods, or different modes of transportation altogether. Not only does the dredging process itself need to be safe and cost-effective, but so does the management (disposal and storage) of dredge materials. Illinois has stricter water quality standards and restrictions on the use of dredged materials than some neighboring states. This is impacting the maintenance of Illinois’ navigational channels. The USACE continues to maintain and improve the marine navigation channels on the IMTS. The State of Illinois can support the USACE in their channel maintenance dredging program by identifying beneficial uses for dredged material in infrastructure projects.

Environmental Concerns

The Mississippi River System has been deemed a nationally significant ecosystem by the US Congress in recognition of the over 300 species of birds, 50 species of mammals, and 150 species of fish found within the system. This ecosystem can be threatened from fertilizer and chemical run off, sedimentation, shore-side logging, and land development, and thus, these concerns must be taken seriously. The IMTS is a natural resource that is a vitally important ecosystem and provides great economic benefit to the state; any actions taken must be done in a responsible manner.

Finding safe passage over dams for fish, restoring channels, protecting shorelines, and restoring floodplains are important to improving the environmental sustainability of the IMTS. Efforts to inhibit the spread of the Invasive Carp, zebra mussels and other known invasive species throughout the IMTS may have unintended consequences by negatively affecting commercial navigation. The US Coast Guard and the U.S. Environmental Protection Agency (USEPA) can continue ballast water exchange and flushing to reduce the risk of further invasive species introduction. The USEPA should encourage the federal government to set new national ballast water standards. Universities and other institutions should continue to conduct research on improved decontamination methods for ballast water. The IMTS is a precious natural resource, and the State should approach it in a balanced manner, taking into consideration both environmental and economic ramifications.

Recommendations

The following recommendations are provided to address these concerns.

Figure 14.4 – Captain Swift Bridge on Big Bureau Creek *(Iordache, 2019)*

Table 14.2 – Navigation Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Current Infrastructure funding does not adequately address conditions and needs.	1. Providing funding to a level that consistently matches system conditions and needs will improve the safety and efficiency of the IMTS. Delays in needed maintenance can result in the need for total rehabilitation which will cost more than regular maintenance. The consistent passage of a Water Resources Development Act (WRDA) on a two-year cycle is one way to manage this need. Another is to approve "flex" funding for waterway infrastructure using existing funding sources.	IDOT	Maintain Annual	Program
Dedicated state port infrastructure funding has been inconsistent.	2. The State of Illinois will support the replacement of and upgrades needed to the existing infrastructure through the Illinois Port Facilities Capital Investment Grant Program and other funding opportunities. This will improve efficiency and provide for additional marine-based economic opportunities. The existing Grant Program has special funding consideration for ports within underserved areas.	IDOT	Maintain Annual	Program
Inconsistent funding for maintenance and upgrades leads to increases closures of Locks/Dams.	3. The State of Illinois and transportation partners will continue to pursue additional funding for lock and dam maintenance on the National Marine Transportation System (NMTS) utilizing the Waterway Trust Fund and other funding opportunities. Delays in lock/dam maintenance can result in the need for total rehabilitation which costs more than regular maintenance. Some existing programs include special funding for underserved communities.	IDNR-OWR	Maintain Annual	Program
Bridges can impede waterway navigation if there are issues with either horizontal clearance, vertical	4. Bridge alignment and clearance issues can be eased with new construction, but that will continue to be an expensive and gradual solution. IDOT and the Federal Railroad Administration (FRA) will address bridge clearance issues as existing bridges are upgraded or replaced. Addressing bridge alignment and clearance issues will	IDOT	Increased Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
clearance, or alignment.	allow for more and larger vessels to utilize the IMTS for economic benefit.			
Technological improvements have not been adapted readily.	5. USACE, Port districts, terminal operators, marine system fleet, and harbor operators should all continue to improve operations by taking advantage of technological advancements. Coordinate with and track all operations for optimization. Investing in technological improvements will allow the IMTS to fairly compete with other water systems and modes of transportation in terms of safety and efficiency.	IDOT	Unknown	Project
There is Insufficient funding for dredging to maintain adequate channel width and depth which impacts navigation.	6. The State of Illinois should promote the USACE in their channel maintenance dredging program by advocating for the need to maintain adequate width and depth by continuing to pursue additional funding for these programs. Adequate channel size is imperative for the IMTS to utilize modern vessels and the future viability of the system.	IDNR-OWR	Increased Annual	Program
Dredged material is inadequately utilized.	7. The State of Illinois can support the USACE in their channel maintenance dredging program by identifying beneficial uses for dredged material in infrastructure projects. Dredged material can be of benefit to both public and private construction projects by providing a readily available resource which may reduce the cost of the project, and adequate channel depth is imperative for the IMTS to utilize modern vessels and the future viability of the system.	IDOT	Maintain Annual	Program
The environment can be potentially harmed as a result of new or improved infrastructure.	8. The IMTS is a precious natural resource, and the State should approach it in a balanced manner taking into consideration both environmental and economic ramifications. The environment should not be negatively impacted as a result of improved infrastructure projects. Waterway and watershed protection is vital to the economic growth of the system.	IDNR-OWR	None	Study
The public at large is unaware of the full	9. Improve public outreach and education on Navigation via the IWIC as described in the Integrated Water Management section.	ISWS	Maintain Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
utilization, benefits, and potential of the IMTS.	The more citizens that are educated about the IMTS, the more advocates there will be for its sustainability.			
There is not currently an established IDOT Marine Transportation Investment Program.	10. Explore and establish a centralized IDOT Marine Transportation Section with roles and responsibilities as recommended in the Marine Transportation Plan. This will allow the IDOT team to stay informed of current and future trends thus enabling the team to effectively assist all Marine stakeholders.	IDOT	New Annual	Program

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Rocky Run (Iordache, 2019)

15

EROSION & SEDIMENTATION

Overview

Lands across Illinois' 36 million acres are in continuous transition. These include agricultural lands, urban and rural communities, natural areas, and other open lands across the state. As development persists on these types of land, Illinois communities will continue to experience the costs and benefits of this development pattern. The Illinois Erosion and Sediment Control Program, often referred to as the T by 2000 program, was designed to preserve the long-term productivity of Illinois soil and to protect water quality.

Historically, T by 2000, and more recently the Illinois Nutrient Loss Reduction Strategy, Partners for Conservation, IDNR Conservation Reserve Enhancement Program, and the Illinois EPA 319 Grant Program have reinvigorated a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. Each of these initiatives have noted that most of the soil erosion and sedimentation in tributary rivers and streams across Illinois is caused by human activity. While agricultural practices are the principal source in many sub-basin areas, construction activity and the relative imperviousness of the built environment also contributes to sediment loads and transport dynamics. Exacerbated by climate changes, more frequent and intense rain events can increase sediment loading from stormwater runoff. Stronger storms, higher river levels, and faster stream velocity can increase erosion and result in increased suspended sediment (turbidity) in water bodies as well as affect normal distribution of sediment along river, lake, and stream beds. These climate impacts can challenge efforts to maintain water quality through effective erosion and sediment control management efforts. Excessive levels of suspended stream sediment (turbidity) or a

change in sediment distribution resulting from more frequent and intense storms can negatively impact ecosystem health.

Moreover, soil erosion is a persistent water quality pollutant in Illinois' surface water bodies. Amplified levels of nitrogen (N) and phosphorus (P) in surface waters are principal contributors to reduced water quality. One of the pressing outcomes that is commonly associated with soil erosion and sedimentation is the impact of P- and N-rich sediment in triggering eutrophication, or a noteworthy growth of algae and other aquatic plants in nutrient-enriched waters that depresses dissolved oxygen levels. The N, and particularly P, can move from working lands into lakes and streams when sediments are transported through surface water runoff and soil erosion.

In particular, the death and subsequent decomposition of algae and other plants consumes oxygen in the water, having a dramatic and negative effect on fish, invertebrates, elevated turbidity, and alterations in aquatic vegetation and fauna populations. Increased sedimentation in rivers, lakes and streams can also affect water quality and availability of drinking water sources. For example, increased sedimentation can affect the storage capacity of reservoirs and increase the need for treatment at water utilities. Likewise, agricultural productivity is reduced through erosion, resulting in lower yields and/or higher fertilizer requirements, limits use of water resources and incurs significant infrastructure costs, including harbor dredging.

While excessive sedimentation and soil erosion continues to be a critical water quality issue that has both environmental and economic consequences across Illinois, a 36-year trends analyses by the Statewide Benchmark Sediment Monitoring Network established by the Illinois State Water Survey found that suspended sediment concentrations and loads have not increased and at 7 of the 15 stations, concentrations have decreased and 4 of the 15 stations sediment loads have decreased. Many of these decreases occurred at sites with some of the highest concentrations and at sites that drained watersheds with concurrent small-to-moderate increases in human-related land uses (i.e., urban and agricultural land uses), suggesting efforts to minimize sediment pollution to streams and rivers may be having the desired effect in some places due to changes in watershed land use, implementation of conservation practices in the watershed, and/or climate conditions.

Issues

Soil erosion and sedimentation is a gradual progression that transpires when the impact of water or wind separates and removes soil particles, causing the soil to deteriorate. Soil deterioration and low water quality due to erosion and surface runoff have become severe problems across Illinois' natural and working lands. The challenge may become so concerning that the land can no longer be cultivated and thus abandoned. Many agrarian-built nations have declined due to land and natural resource negligence, and the fate of such civilizations should be a notable reminder to protect and preserve our natural and working lands.

Erosion and sedimentation are a grave challenge for productive agricultural land and for water quality fears. Controlling the soil and sediment must be an essential part of any water quality plan to protect and preserve both the state's water and soil quality. Eroded topsoil can be transported by wind or water into streams and other waterways. Sediment is a product of land erosion and originates mostly from sheet and rill erosion from upland areas, and to a lesser degree, from cyclic erosion activity in gullies and drainageways.

Figure 15.1 – Sedimentation in Creek *(Iordache, 2019)*

The effect of soil erosion and sedimentation on water quality becomes significant, predominantly as soil surface runoff. Since sediment production and soil erosion are closely related, the most effective way to minimize sediment production is the stabilization of the sediment sources by controlling erosion.

Controlling sediment problems are critical to an effective statewide water plan. The objective of this section is to recommend best management practices to reduce soil erosion and sedimentation across Illinois.

Figure 15.2 – Stabilized Shoreline *(Knocke, 2022)*

Recommendations

The following recommendations are provided to address these concerns.

Table 15.1 – Erosion & Sedimentation Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Soil and water conservation programs need to be coordinated.	1. Reinvigorate the Soil Erosion and Water Quality Advisory Committee (SEWQAC) and its two subcommittees: (i) State Watershed priority committee and (ii) Education Committee. The local Soil and Water Conservation Districts are currently assisted by the Association of Illinois Soil and Water Conservation Districts.	IDOA	Maintain Annual	Program
Soil erosion and water quality long-range planning requires collaboration.	2. Review and revise a state soil erosion and water quality long-range plan that encourages all county, state and federal agencies to align annual work plans consistent with the plan and provide a forum to discuss annual work plans. This will require changes in the Administrative Rules for the Illinois Soil and Water Conservation Districts Act.	IDOA	Increased Annual	Study Policy
Additional public outreach and education for leaders related to soil erosion and sedimentation measures particularly to the agricultural industry, urban revitalization efforts and those that lead construction activities is needed.	3. Educate industry decision makers such as landowners, financial institutions, insurance providers, urban planners, agricultural producers, and industry partners; and invest in the expansion of the Saving Tomorrow's Agriculture Resources (STAR) program to assist farm operators and land owners in evaluating their nutrient and soil loss management practices on individual fields.	IDOA	Increased Annual	Program
Additional education materials and manuals related to soil erosion and sedimentation	4. Invest in the expansion of the Illinois Urban Manual (IUM) program to help Illinois Soil & Water Conservation Districts (SWCDs) in their efforts to assist planners, developers, engineers, and government officials in selecting Soil Erosion & Sediment Control (SESC) Best Management Practices (BMPs) for their development projects.	IEPA	Increased Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
measures are needed.				
Additional outreach is needed at the elementary and higher education levels.	5. Target education programs from elementary to higher education on the impact of soil erosion and sedimentation and highlight best management practices to reduce human impact on soil erosion and sedimentation.	IDOA	One-Time	Program
Additional career training and incentives are needed for soil and water quality conservation.	6. Establish micro-credentialling and apprenticeship programs dedicated to soil and water quality conservation in partnership with academic institutions to revitalize and advance continued education that leads to an expanded human capacity needed to address the growing challenges.	IDOA	New Annual	Program
Soil erosion and sedimentation data needs to be collected for all counties.	7. Complete a soil erosion and sedimentation survey in all counties by the year 2025, outlining the best management practices needed to reduce erosion and sediment loss at the local level. This will Increase expectations of all SWCD's to meet established soil erosion goals within local watersheds.	IDOA	Increased Annual	Program
IDOA requires additional staffing to assist local conservation efforts.	8. Expand the critical staffing capacity needed to advance efforts that reduce soil erosion and sedimentation loss at the local level.	IDOA	Increased Annual	Program
Many communities that require assistance do not have knowledge or resources to affect change.	9. Review and align the efficient and effective use of financial and technical resources by targeting resources into areas with the greatest resource concerns and needs.	IDOA	Unknown	Study
Additional funding is needed to install	10. Expand existing state cost-share assistance for installation of conservation practices on land for which a valid complaint has been	IDOA	Increased Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
conservation soil practices.	filed under the Illinois Soil and Water Conservation Districts Act or other federal initiatives.			
Marginal lands have not been identified in the state.	11. Initiate a statewide inventory to identify marginal lands currently in production. Evaluate and monitor marginal lands to ensure best management practices are advanced or land is put into less intensive land use practices.	IDOA	One-Time	Study
Additional outreach is needed to illustrate how best practices perform.	12. Expand efforts that share available information that shows that erosion and sediment control practices infield can be used to greatly reduce the quantity of eroding soil on agricultural land, and that edge-of-field practices can effectively reduce sediment transport.	IDOA	Increased Annual	Legislation
Watershed level planning is needed to optimize conservation efforts.	13. Establish performance-based Producer-Led Watershed Councils across the state to reduce phosphorus runoff, improve water quality and enhance agricultural productivity.	IDOA	New Annual	Legislation
Additional funding is needed to support innovation and shared learning opportunities.	14. Establish a state-funded Producer-Led Watershed Protection Grant program that fosters innovation and shared learning among members to bring about continuous measurable improvements in areas such as water quality and soil health by exploring innovative on-farm conservation practices.	IDOA	New Annual	Legislation
Federal funding is not leveraged fully.	15. Foster a revenue leveraging atmosphere that seeks to identify and secure federal funds that augment all state funds dedicated to soil erosion and sedimentation efforts.	IDOA	None	Study
Additional funding is needed to expand the SESC program to allow more SWCDs to participate.	16. Expand funding through the IEPA's Soil Erosion & Sediment Control (SESC) Inspection program so more SWCDs can participate and provide technical assistance to the urban community through involvement on the Illinois Urban Manual (IUM) Technical Review and Steering Committees, review of construction site plans, and regular SESC inspections of construction sites.	IDOA	Increased Annual	Legislation

Issue	Recommendation	Lead Agency	Funding	Action
The CREP easement program can be expanded to reduce flooding impacts.	17. In collaboration with the Illinois Department of Natural Resources (IDNR) and other partners, promote and enroll frequently flooded and environmentally sensitive cropland in CREP easements.	IDNR-OWR	Maintain Annual	Program
Incentives bring more participation into conservation practices.	18. Develop new and refine existing incentives to encourage landowners and industry partners (i.e., financial institutions, insurance companies, etc.) to participate in the adoption of soil conservation practices.	IDOA	Increased Annual	Program
Additional research is needed to study new conservation economics and new practices.	19. Encourage and support expanded research through the Illinois Nutrient Research and Education Council (NREC) that outlines conservation economics and the advancements of best management practices that enhance nutrient utilization, increase crop production, and protect water quality.	IDOA	None	Program
The IUM needs to be updated to include the most recent practices and innovations.	20. Encourage and support expanded research through the Illinois Urban Manual (IUM) program to ensure the IUM stays up to date and maintains technical accuracy so that it can continue to be used as a tool for planning and maintaining standards and practices on construction sites as well as for National Pollutant Discharge Elimination System (NPDES) permit compliance.	IDOA	None	Program
Additional funding is needed to support NLRS working groups.	21. Advance funding to support the Nutrient Loss Reduction Strategies (NLRS) working groups that guide state efforts to improve water quality at home and downstream by reducing nitrogen and phosphorus levels in our lakes, streams, and rivers.	IDOA	Increased Annual	Legislation
The groundwater monitoring well network needs to be expanded.	22. Expand the Illinois Groundwater Monitoring Well Network program run by the Illinois Department of Agriculture to: (i) focus energies and resources towards monitoring nutrient loss strategies that impact soil erosion and sedimentation; and (ii) support the statewide measurement programs for stream flow, water quality, and sedimentation as measures of the problem and progress.	IDOA	Maintain Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
Additional coordination is needed for watershed-level conservation programs	23. Continue to coordinate existing conservation and watershed programs and initiate a complementary conservation management program administered by IDOA and other agency partners to direct state and federal resources into projects which will help protect important water resources, control soil erosion and sedimentation on agricultural land, and monitor nutrient loss reduction strategies.	IDOA	Maintain Annual	Program
Expand IDOA staffing capacity to assist in statewide conservation efforts.	24. Fund the development of 4 additional Bureau of Land and Water Resource Regional Representatives.	IDOA	Increased Annual	Legislation
Additional staffing is needed to develop outreach materials in support of the efforts suggested herein.	25. Establish an IDOA Division of Natural Resources Education position responsible for the development and dissemination of educational programs and materials.	IDOA	New Annual	Program

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Kankakee River At Momence, IL (Beardsley, 2012)

16

DATA MANAGEMENT

Overview

The collection of continuous streamflow data is the foundation by which resource managers, planners, policy makers and scientists can make decisions regarding safety, human welfare, socio-economic development, and characterization of streamflow and stream water levels over time. Streamflow data collection in Illinois dates to the early 1900's. As of 2022 there are approximately 193 continuous streamflow stations and 62 continuous water level stations. These are a portion of the larger network of approximately 8,500 stations operated by the United States Geological Survey. This integrated network is a proven source of reliable scientific information to support well-informed decision making in both the public and private sectors across a wide variety of water resource planning, management, design, and operational functions.

Streamflow data is used in nearly every critical issue identified in the State Water Plan. Dozens of federal, state, local agencies, utilities, universities, institutions, and private business, in one form or another, utilize this data as a key component in developing and implementing policy, programs, projects and infrastructure to improve and benefit the economy, environment and everyday lives, as well as limit or prevent the loss of life and property. Some detailed examples are:

Bridge Safety

Water level data from the streamgage network is used in IDOT systems that warns whether levels are close to the critical elevation of bridge structures. These could potentially cause

erosion around abutments and piers due to the increased water force thereby undermining the foundation, supporting elements and damaging the bridge. River streamflow and level data is a critical component of sizing bridges, culverts and for predicting scour during design and verifying results from studies that utilize design storm modeling.

Flood Forecasting

National Weather Service (NWS) forecasts river levels and provides warnings for flooding with the primary goal of protecting lives and property. Flood flows are estimated using peak streamflow data from gaged sites or regional regression equations for ungaged streams. Streamgaging stations are an essential part of this process as observations from continuous record of stream levels and flows are the key to providing these forecasts and warnings.

Flood Damage Mitigation

Accurate mapping of floodplains and flood risk relies heavily upon a robust streamflow data collection network. Flood flows are estimated using peak streamflow data from gaged sites or regional regression equations for ungaged streams.

Climate Change Adaptation

Flows in streams and rivers respond to changes in precipitation and water use. Historical streamflow data provides critical information about changing climate over long periods of time. Because streamflow is affected by many other factors (such as urban and land use changes), it provides insights into impacts on the agricultural and water supply sectors (Wuebbles et al., 2021).

Water Data Tools

U.S. Geological Survey (USGS) maintains the National Water Information System (NWIS) providing current and historical streamflow and related data. Its *WaterWatch* and *WaterAlert* systems describe real-time, recent, and past streamflow conditions for specific sites, respectively. They also provide other platforms such as *StreamStats*, a Web application that provides access to an assortment of GIS based analytical tools that are useful for water-resources planning and management, as well as for engineering and design purposes (https://streamstats.usgs.gov/ss/).

Watershed Management

Streamflow data is an integral part of watershed modeling efforts for calibrating and validating hydrologic and water quality responses. Consequently, it allows the development of accurate watershed models for evaluating impacts of best management practices, which are used to prepare stakeholder watershed implementation plans.

Water Sustainability

Long-term continuous streamflow records provide data for (1) characterizing water availability from rivers and streams during a wide range of climatic and hydrologic conditions; (2) determining safe yield of water supply reservoirs; (3) detecting long-term trends or changes in

water availability; and (4) calibrating and validating hydrologic models to assess the impact of climate change and variability on water availability. Long-term continuous streamflow records are also critical information for drought preparedness and response as they can help identify short-term and/or long-term drought impacts on water resources systems.

Lake Michigan Diversion Accounting

An extensive network of streamflow and precipitation gages are used to calculate strict accounting of water diverted from Lake Michigan into Illinois due to inter-jurisdictional water use laws for the Great Lakes.

Aquatic and Riparian Habitat

Streamflow data is a key piece in explaining aquatic biological assemblages through development of flow models where streamflow is a predictor of assemblages. In terms of biological protection, low flow extremes are used to determine protection flow level based on aquatic ecological conditions.

Issues

For over a century, Illinois stream gages have been providing the core streamflow and water level data from which advanced hydraulic and hydrologic studies are conducted. Flood forecasting, floodplain mapping, flood frequency analyses, flood inundation, drought preparedness and response, bridge design, water supply planning, municipal water supply and industrial discharge permits are just some of the applications that utilize long-term stream gage data as the basis for analyses. Over time, Illinois water demands have changed, natural resource programs adjusted, climate has changed, and funding sources reduced. Consequently, these changes resulted in stream data collection at fewer stations thereby increasing the watershed areas monitored, relocation of stations to urban settings, new technology and station closings. The following are specific issues identified as not meeting some current needs of data users, regulatory agencies and water resource managers.

Fewer Stations in Rural/Smaller watersheds

Upon inspection of the 2 maps below (**Figure 16.1**), between 1971 and 2022, there are fewer continuous streamgage monitoring stations in rural, smaller HUC8 (https://water.usgs.gov/GIS/huc.html) watersheds which, for example, can be used to better alert the public of floods. Streamflow in smaller watersheds react differently to extreme rainfall events than in larger rivers. Approximately one-fourth of the stations in the state monitor less than a 50 sq. mi. watershed and almost two-thirds of the stations monitor greater than 100 sq. mi.

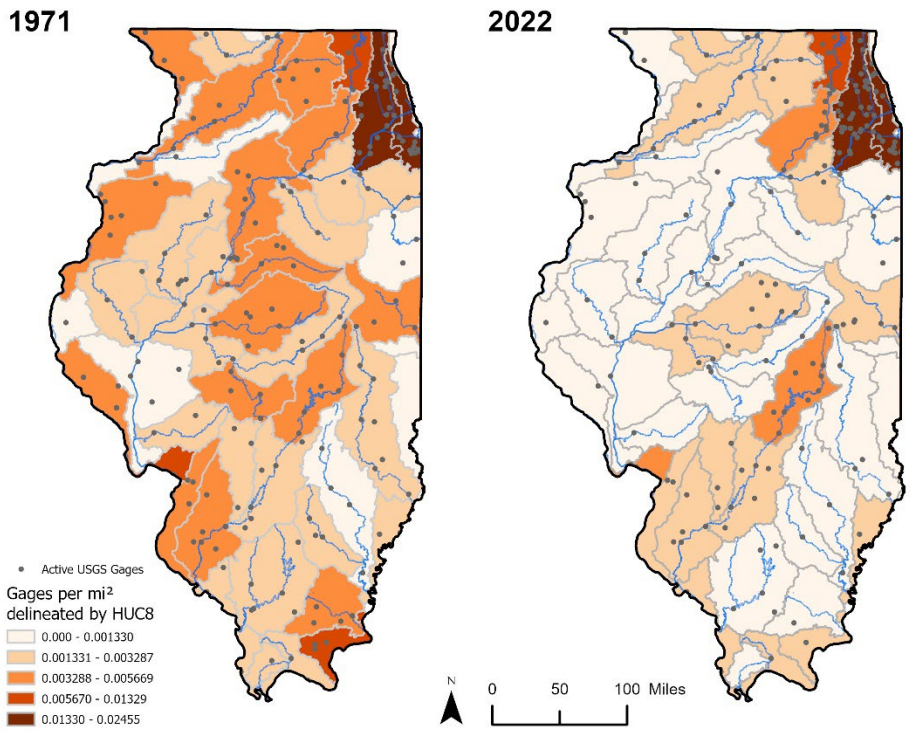

Figure 16.1 – Changes in Stream Gage Locations over Time

- While hydrologic models can make river forecasts with minimal observational locations, it is a known fact that additional gaging along a river/stream is beneficial to a flood forecast further downstream. For example, a location that is known to have critical impacts due to flooding would be served well if it has gages upstream to provide additional observations for water flow through a river system. These observations greatly help provide improved forecasting and flash flood warning. However, the number of rural and small tributary watershed stations needs to increase along with evaluation of unique conditions in critical areas. Real-time monitoring of water levels is not available downstream of confluences, complicating flood forecasting and warning of flood impacts.
- Streamflow data is generally collected in large rivers or urban streams making it difficult to assess hydrologic patterns in smaller tributary streams where important aquatic ecosystem services are located. There is also less confidence in flow model estimates when the data used from larger stations is outside range of the biological data collected and the scale of physical aquatic space in question.
- As locations of the current set of streamgaging stations are shifted to larger drainage areas or urban settings, regression equations have greater dependence on fewer stations for ungaged areas to predict streamflow. A denser stream data collection network with long-term stream flow data means a greater the level of accuracy of the regression equation streamflow predictions.

Need Long-Term Datasets

Long-term streamflow data are used for developing statistic methods to estimate streamflow statistics at ungaged locations and calibrating hydrologic models. Longer datasets at more locations are needed to determine critical trends. Trends inform resource managers and policy makers of resource plan effectiveness to sustain those resources. Of the nearly 193 active continuous monitoring stations in the state, approximately one-quarter have records less than 30 years and only 10% have records greater than 100 years. Long-term stream gage data from a diverse streamgage network across the State ensures accurate estimates of streamflow at ungaged locations (https://streamstats.usgs.gov/ss/). A key factor for climate applications and studies, are long, continuous streamflow records. As the climate rapidly changes, maintaining the dataset in usable forms for both archived and ongoing observations is critical for developing responses to these changes.

Organization Coordination

There is a need for additional coordination between organizations to collaborate when objectives overlap for data and find common ground on future streamgage data needs. As agency budgets tighten, streamgaging becomes even more important to address different programmatic needs of various agencies/organizations. This has created consequential shifts in a limited number of stations especially when costs to operate and maintain stations is not offset by increases in overall budgets. What used to be supported almost exclusively by federal agencies decades ago now includes funds from state and local cooperators. Interagency cooperation to maintain the streamgaging network is strong but the sustainability of so many budgets is problematic and competition between programmatic needs is straining resources. These funding models are unlikely to change but committed, strategic collaboration, coordination and planning between organizations can leverage funds and strengthen the utility of the entire network for everyone.

Lack of Water Quality Data Collection Coordination

As with inter-government cooperation for streamgaging, there could be future needs for similar water quality data collection that could benefit from coordination among agencies and local cooperators to leverage and maximize fewer resources.

Recommendations

Expansion of stream monitoring in rural or small watersheds.

Streamflow dynamics are different in rural or small HUC8 watersheds as opposed to larger rivers. Shifts in climate to more extreme rainfall events and flash droughts makes it important to have real-time streamflow, or water-level, data for water management and planning, such as hazards warning or future water security, for these vulnerable areas. The “Stream Data Measurements” critical issue in the 1984 State Water Plan recommended analysis of the streamgaging networks to meet programmatic needs by state and regional agencies and major users. Two assessments were performed in 1986 and 2003. The 2003 assessment concluded

that the network was meeting most of the current-use needs at that time but there was a desire to reinforce the resiliency of the network by increasing it by 15-20 percent to address peak flood estimation for smaller rural watersheds, as well as biological and conservation issues and new stream-watershed restoration activities (Knapp and Markus, 2003). Since this assessment was conducted over 20 years ago, the number of stations has not appreciably changed and the 15-20 percent increase in stations in small, rural watersheds did not occur but decreased.

Long-term continuous monitoring stations

Maintaining current long-term stations, refraining from closing short-term stations so they develop into long-term ones and establishing new stations is an investment in future long-term data records.

Stream data networks

Evaluate the current, various stream data networks within the state, assess the expanding needs of federal, state and local entities for more streamflow and water-level data, including vulnerable urban and rural communities. The previous assessment was conducted over 20 years ago. Develop a business plan that would leverage, coordinate, seek funding, and promote support for a state-wide *Streamgaging Data Collaborative/Council*. The collaborative's goal would be to sustain, enhance, and expand a streamgaging network based on periodic network assessments and draw on successful models in neighboring states.

Figure 16.2. - USGS Super Gage continuous monitoring station at Joslin on the Rock River *(IEPA, 2021)*

Central location for water & environmental data

Resource managers, program directors, decision makers and citizens can benefit from a central location to discover the water and environmental data they need to plan and protect their water resources. Support for the development of the Integrated Water Information Center (IWIC), as mentioned in the *Integrated Water Management* critical issue section (**Section 7**) would provide integrated physical, chemical, streamflow, and biological monitoring data.

The following recommendations are provided to address these concerns.

Table 16.1 – Data Management Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
There are fewer stations in rural/smaller watersheds and there is a need for more longer-term stations.	1. Initiate a comprehensive evaluation of streamgaging network's ability to meet current and future multiple agency programmatic data needs. Particular emphasis on (a) increasing stations in rural/smaller watersheds to continuously measure streamflow and/or water level data, and (b) identifying current shorter-term stations as future long-term stations.	ISWS	One-Time	Study
Many organizations utilize streamgaging data but they have different missions and data needs. Collaboration would help coordinate use of existing and future streamgages to optimize data collection for all groups.	2. Create a working group to explore the feasibility of a state-wide *Streamgaging Data Collaborative/Council* between federal, state, and local institutions, as well as a conceptual business model, with the objective to promote collaboration and leveraging of current and future stations with mechanisms to reliably secure funding. If feasible. The next goal would be to formalize the creation of the Council as a program with annual funding.	IDNR-OWR	One-Time	Study
Lack of central location to discover water and environmental data collected by various groups.	3. Support development of the Integrated Water Information Center (IWIC) mentioned in the Integrated Water Management critical issue section to link data provided at all statewide streamgages to integrate physical, chemical, flow, and biological monitoring data	TBD	New Annual	Program

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I & M Canal 6.5 lb. Largemouth Bass (Love, 2022)

17

RECREATION

Overview

Water-based recreation is important to many Illinoisans. A 2013-2014 Illinois Outdoor Recreation Survey indicated that over 90% of participants pursued some sort of water-based activity (e.g., fishing, motor boating, paddle sports, etc.) (IDNR, 2015). Indeed, Illinois is an aquatic enthusiast's paradise, with 26,000 miles of rivers and streams (IDNR, 2015), thousands of inland lakes, and access to Lake Michigan. Despite the numerous recreational opportunities available within our state, several issues impede the public's ability to utilize these waterbodies. Much like a river, these issues are wide-ranging and complex. Therefore, the objective of the Recreation Committee is to ensure that water-based recreation continues to be a viable outdoor activity for years to come.

Figure 17.1 – Recreation at Kickapoo State Recreation Area *(Gray, 2021)*

Issues

Invasive Species

An invasive species can be defined as a non-native organism which negatively impacts a native ecosystem (NOAA, 2022). Around 50,000 invasive species have been introduced into the United States and these introductions cost about $120 billion annually in environmental damages and control efforts (Pimentel et al., 2005). Many of us are familiar with terrestrial invaders such as Common Buckthorn (*Rhamnus cathartica)* and Emerald Ash Borer *(Agrilus planipennis*). However, aquatic invasive species also exist and include aquatic plants, invertebrates, and fish.

Figure 17.2 – Example Outreach Materials to Control Invasive Species *(IDNR, unk)*

Invasive aquatic vegetation, such as Eurasian Watermilfoil *(Myriophyllum spicatum)* or Curlyleaf Pondweed (*Potamogeton crispus*), can quickly take over waterways and compete with native plant species for available resources. Invasive Carp, such as Bighead (*Hypophthalmichthys nobilis*) and Silver Carp (*Hypophthalmichthys molitrix*), compete with native planktivores for resources and pose a substantial threat to aquatic ecosystems (Love et al., 2018). Invasive invertebrates, like the Rusty Crayfish (*Orconectes rusticus*), have reportedly altered aquatic communities by reducing aquatic plant abundances, altering complex trophic interactions, and competing with native crayfish species (Wilson et al., 2004). While invasive species obviously pose severe threats to invaded ecosystems, they can also impact water recreation. Dense invasive aquatic vegetation can easily hamper boating and paddling by making vessel propulsion nearly impossible. Non-native fish species may negatively impact desirable sportfish populations (Chick et al, 2020) and some invasive fish (e.g., Invasive Carp) exhibit jumping behaviors which can pose a physical hazard to boaters. While removal and eradication are a key component to management, public outreach is a critical preventative measure as many invasive species spread through aquatic hitchhiking.

Access

Access is invaluable to water users and comes in a variety of forms. State managed or owned waterbodies can often be accessed at Illinois DNR State Fish and Wildlife Area or Park sites, and municipalities (e.g., park districts or county forest preserve districts) will often maintain access

points to waterbodies within their jurisdictions. Maintenance is an ongoing issue at both state and municipal sites, and funds are limited to improve or maintain watercraft launching areas, roads, parking lots, and fishing piers. Naturally, access to private waterbodies is also limited. While the Illinois Recreational Access Program (IRAP) is often associated with providing hunting access, it is an avenue to increase angling access to private waterbodies as well. Furthermore, a separate program should be developed to provide access to privately owned property in support of recreational, non-motorized activities on rivers, lakes, and streams.

Information

Information is critical in helping people successfully utilize our state's waterways. Illinois residents routinely travel to neighboring states to canoe or kayak, and non-residents may desire to recreate in Illinois waters. Due to differences between state's water use and access laws, providing easy-to-understand information regarding access regulations (e.g., private property and public waterways) would help recreational users have a better understanding of access laws. While access information helps users understand where they can launch a vessel, boater safety information can help keep them safe while on the water (particularly when navigating waters with low-head dams).

Recommendations

The following recommendations are provided to address these concerns.

Figure 17.3 – Picnicking at Cave in the Rock State Park *(Gray, 2021)*

Table 17.1 – Recreation Recommendations

Issue	Recommendation	Lead Agency	Funding	Action
Invasive species can cause widespread harm to native ecosystems. This in turn can cause a loss of recreational opportunities.	1. Adopt an Aquatic Conservation Stamp with earmarked funds that could provide further funding for Aquatic Nuisance Species (ANS) management.	IDNR-ORC	None	Legislation
Aquatic Nuisance Species is commonly spread by humans moving from one place to another. Information about decontamination procedures can be a powerful tool in minimizing their spread.	2. Create an invasive species education center as part of the Brandon Road Interbasin Project. Aquatic Nuisance Species (ANS) are often aquatic hitchhikers, making public outreach a critical component to preventing ANS expansion.	IDNR-ORC	New Annual and One-Time	Program Project
Maintenance is an ongoing issue at state managed sites, and funds are limited to improve or maintain watercraft launching areas, roads, parking lots, and fishing piers.	3. Increase funding to maintain and improve State Fish and Wildlife Areas and Park's waterbody access sites (e.g., boat ramps, roads, and fishing piers). Select one access site in an underserved community per year.	IDNR-OLM	Increased Annual	Program
Maintenance is an ongoing issue at municipal sites, and	4. Increase funding for the Boat Access Area Development (BAAD) Program grant which aids local governments in maintaining or creating boat (motorized and non-motorized) related access to	IDNR-ORC	Increased Annual	Program

Issue	Recommendation	Lead Agency	Funding	Action
funds are limited to improve or maintain watercraft launching areas, roads, and parking lots.	public waterbodies. Select one access site in an underserved community per year.			
Access to private waterbodies for angling opportunities is limited.	5. Increasing access would increase the number of recreational opportunities. Select one site in an underserved community per year to provide angling opportunities. Coordination is needed between the Illinois Recreational Access Program (IRAP) and IDNR Division of Fisheries to increase angling opportunities on private property.	IDNR-ORC	None	Program
IDNR maintained angling information spans multiple websites, making it difficult for anglers to find pertinent information.	6. Having angling information in one, easily accessible mobile application would be very beneficial to the recreational community. Develop a mobile application of the IDNR Division of Fisheries' "iFish Illinois" website to provide users with a multitude of information (recreational access points, fishing regulations, fishery information, etc.).	IDNR-ORC	New Annual	Project
Due to differences between state's water use and access laws, providing easy-to-understand information regarding access would help recreational users have a better understanding of access laws.	7. Utilize multiple media platforms (pamphlet, webpage, etc.) to provide easy-to-understand information to water users on Illinois' waterway access laws and regulations.	IDNR-OWR	One-Time	Study

Issue	Recommendation	Lead Agency	Funding	Action
Lack of boater safety knowledge and information can cause safety issues while on the water, particularly when navigating waters with low-head dams.	8. Develop a webpage focused on low-head dam safety as well as a mobile application that can be used by boaters to safely navigate.	IDNR-OWR	One-Time	Study
Lack of access to private waterbodies for recreational, non-motorized boating.	9. Develop and fund a new program (Outdoor Access for Recreation - OAR) to provide access to privately owned property in support of recreational, non-motorized boating activities on rivers, lakes and streams in Illinois.	IDNR - ORC	New Annual	Program

Jo Daviess County, Near Galena (Kelly, 2019)

18

RECOMMENDATIONS & CROSS-CUTTING IMPACTS

Recommendations

After the 13 critical topics were selected, the first step in the SWP update was for each committee to develop a list of issues of concern for each topic. Then the groups developed a list of potential solutions for those issues. Using public and Task Force input, the committees refined the recommendations for each issue. One of the objectives of this update were to ensure that the recommendations could be accomplished in a 5–10-year timeframe when the next SWP update will be undertaken. Generally, there were more issues than could be reasonably addressed in this time frame so the final list of recommendations contains the most pressing needs at this time. The other issues will be tracked by the committee for inclusion in future updates.

Another intent of the update was to frame the recommendations so that success would be measurable. Internally, the committees were tasked with determining exactly what outcome was expected and how it would be accomplished. While not included in the Plan, this effort will help when developing annual updates to measure the progress and success of the recommendations. Further information about monitoring the SWP progress is outlined in **Section 19**.

Detailed recommendations were provided in the section for each critical topic (**Sections 5-17**). All the recommendations have been summarized for inclusion in this Section for comparative purposes (**Table 18.1**). There are **147 recommendations** in this updated SWP. This ties closely with the original 1984 report which had 151. Ten years after publication of the 1984 report, progress had been made for 132 of the tasks due to the support of the General Assembly and adequate funding. With similar support, we expect that the Task Force will be able to

accomplish the solutions as laid out in this update within the next 7 years. From there, a new update will be generated to assess what work remains and to bring forward issues that were unable to be included this round as well as new issues that have been encountered in the interim.

If after looking at these lists and further information is needed, please refer back to the individual sections. In addition to describing the solutions in more detail, the detailed sections assign which agency is recommended to lead the effort, type of funding if required and what main type of action is required. **Section 19** provide summaries of the types of recommendations by these categories.

The tables provided in this section are sorted by main topic. A second summary recommendation table is provided in the Appendix which has been generated by sorting by lead agency for further comparative use (see **Appendix D**).

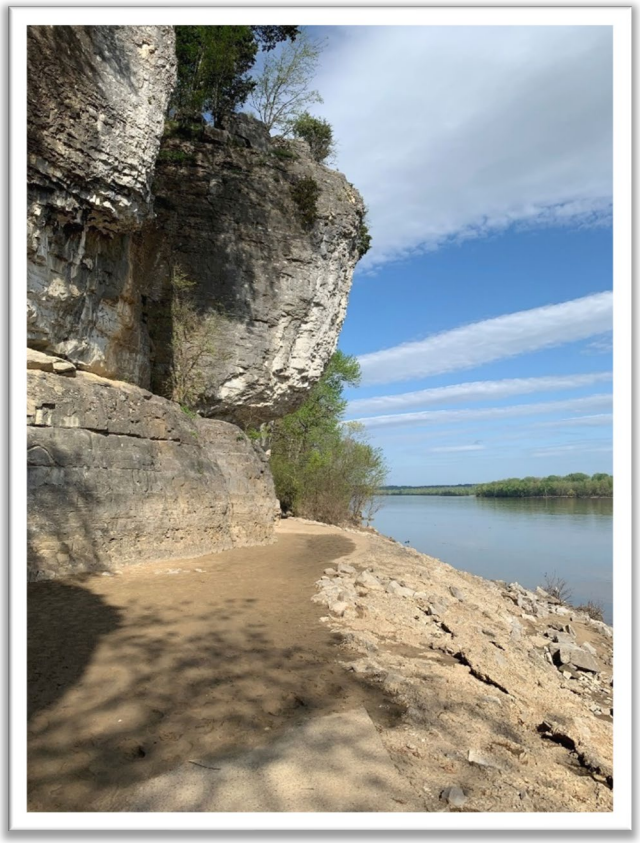

Figure 18.1 – Cave in Rock State Park, Ohio River *(Gray, 2019)*

Table 18.1 - Summary of Recommendations

	Water Quality
1	Support Nutrient Loss Reduction Strategy implementation
2	Support green infrastructure and water quality programs, and focus on underserved communities
3	Support voluntary nutrient reduction programs and focus on underserved communities
4	Support continued operation of USGS "Super Gages"
5	Harmful Algal Bloom Monitoring and Nutrient Monitoring in IL River Basin
6	PFAS and contaminant monitoring in fish
7	Expand groundwater monitoring network to include chronic and emerging health conditions
8	Protect and Restore Upper MS River
9	Outreach for proper well abandonment and water supply protection
10	Support underserved small public water system infrastructure improvements
11	Support regionalization efforts of underserved small public water systems
12	Support efforts of underserved small public water systems to meet long-term resiliancy
13	Expand stream and groundwater monitoring to test for emerging WQ issues
14	Water Quality Outreach and Education through IWIC

	Climate Change
1	Expand climate monitoring sites in sensitive areas - suburban, urban and agricultural areas
2	Develop web-based climate toolkits
3	Develop detailed local climate models
4	Research and develop online tools to illustrate concurrent climate events
5	Research and provide climate impact information to urban and fringe areas
6	Research and develop online tools to illustrate how agricultural practices affect crops and climate
7	Update existing rainfall data
8	Model future climate change related rainfall data
9	Research effects of changing seasonal rainfall impacts on river systems
10	Evaluate impacts and provide information about flash droughts
11	Research and outreach about rapid melt events

	Integrated Water Management
1	Establish the Integrated Water Information Center (IWIC)
2	Fund and support State Water Plan Task Force
3	Prioritize funding for water system improvements to underserved communities
4	Reestablish Local Assistance Program to guide underserved communities
5	Develop consistent funding criteria for all agencies
6	Expand IMAG collaboration for increased efficiency and consistent funding
7	Develop methodology for identifying and prioritizing underserved communities for water resource needs

	Long Term Funding
1	Dedicated funding for water resource management planning
2	Establish new Water Resources State Revolving Fund (WRSRF)
3	Establish strategic fund for critical long-term issues
4	Mandate that water, wastewater and stormwater providers utilize asset management
5	Technical and financial support for underserved communities using the Local Assistance Program
6	Adopt technology to streamline state agency operations to save costs
7	Support Public-Private Partnerships
8	Enact stamps or license fees to generate targeted funds

Table 18.1 - Summary of Recommendations

	Water Sustainability
1	Prioritize services to underserved communities
2	Determine sustainable water yield for all water supply sources and share online
3	Establish and support regional water supply committees
4	Study evaporation impacts from climate change
5	Develop minimum stream flow protection for during emergencies
6	Update IL Drought Preparedness and Response Plan
7	Improve water use accuracy with outreach and metering

	Lake Michigan
1	Outreach about Lake MI programs using the Local Assistance Program
2	Improve water allocation reporting
3	Update Rules regarding water loss and conservation
4	Expand Lake MI programs and prioritize services to underserved communities
5	Implement water allocation review fees to fund Lake MI Water Allocation Programs
6	Establish workgroup for Lake MI water diversion
7	Strengthen coastal resiliency with regional management
8	Promote coastal tourism and recreation
9	Increase transportation of commercial goods and upgrade ports
10	Protect and restore coastal habitats
11	Evaluate feasibility of alternative energy in Lake MI and define acceptable locations

	Flood Damage Mitigation
1	Update rainfall data by modeling future/seasonal data changes
2	Develop a hydraulic model database
3	Generate 2-D hydraulic modeling for targeted areas in the state
4	Develop dynamic inundation mapping for targeted areas in the state
5	Perform structural damage assessments for targeted areas in the state
6	Identify 2 underserved communities per year that require flood planning assistance
7	Develop a pilot urban flood warning system
8	Develop GIS-based database of existing flood protective infrastructure and future needs
9	Develop outreach tool to help find flood impact funding opportunities
10	Assess infrastructure and identify future needs for underserved communities as a pilot program
11	Develop project design for underserved community's flood mitigation plan as a pilot program
12	Provide funding for construction of the flood protection project for underserved communities as a pilot
13	Encourage watershed level planning efforts
14	Adopt statewide building codes
15	Encourage natural and nature-based flood prevention measures

Table 18.1 - Summary of Recommendations

Aquatic & Riparian Habitat	
1	Develop and implement watershed BMPs that benefit habitat
2	Enhance incentives for the implementation of watershed BMPs on private lands and provide outreach
3	Create multi-beneficial floodplains in underserved communities
4	Support Nutrient Loss Reduction Strategy
5	Enhance hydrologic and hydraulic connectivity
6	Enhance landscape connectivity
7	Establish and maintain stream and groundwater base flows criteria
8	Install more stream gauges to measure flow and water quality
9	Install more biological monitoring programs
10	Expand CTAP wetland monitoring
11	Expand CTAP stream monitoring
12	Monitor and control invasive species
13	Interagency monitoring data database
14	Develop flow standards for all public waters including climate change impacts
15	Develop biological indices in underrepresented habitats and biota
16	Develop policy guidelines to obtain adequate compensation for injured aquatic resources
17	Develop assessment approach and collect data to compensate for injured aquatic resources
18	Incorporate climate change flow standards into private water use regulations
19	Enact Aquatic Habitat Stamp on licenses to fund habitat protection
20	Establish authority to regulate isolated wetlands

Water Use Laws & Regulations	
1	Review Water Use Act for success and modify as needed
2	Propose legislation to regulate water reuse
3	Propose legislation for water diversions outside of IL
4	Authorize groundwater management districts
5	Resolve water use conflicts caused by prolonged drought
6	Meter high capacity well water use
7	Establish authority to regulate isolated wetlands

Navigation	
1	Maintain and upgrade IMTS infrastructure
2	Maintain and upgrade port infrastructure
3	Maintain and upgrade locks and dams
4	Upgrade bridge alignment and clearance issues
5	Adopt technology to streamline operations to save costs
6	Support USACE channel maintenance dredging programs
7	Utilize dredged material in infrastructure projects
8	Protect the IMTS environment
9	Navigation Outreach and Education using IWIC
10	Establish IDOT Marine Transportation Section

Table 18.1 - Summary of Recommendations

Erosion & Sedimentation	
1	Reinvigorate the Soil Erosion and Water Quality Advisory Committee (SEWQAC)
2	Expand soil and water conservation program coordination
3	Educate industry leaders, invest in STAR program
4	Update and expand the Illinois Urban Manual program
5	Target elementary and higher education with programs about soil erosion & sedimentation
6	Establish credentialing and apprenticeship program to train workers for this field
7	Statewide erosion/sedimentation survey and BMP recommendations
8	Expand staffing to assist local planning and implementation
9	Prioritize resources by targeting underserved areas and those with greatest need
10	Expand funding to install conservation practices in areas where valid complaint has been filed
11	Identify and monitor marginal land use
12	Expand outreach efforts about success of infield and edge-of-field practices
13	Establish Watershed Councils to reduce nutrient levels
14	Establish Watershed Protection grant program
15	Identify and secure federal funding for soil erosion and sedimentation reduction efforts
16	Expand funding of SESC inspection program to allow more participation
17	Enroll more land into the CREP program
18	Develop new and expand existing incentives to encourage participation in soil conservation practices
19	Expand research to outline conservation economics and BMPs
20	Update IUM to include new technology and maintain accuracy
21	Expand funding to support the NLRS programs
22	Expand groundwater monitoring of nutrient loss strategies
23	Initiate conservation management program
24	Expand IDOA staffing to assist in conservation efforts
25	Establish IDOA outreach/educational position

Data Management	
1	Assess streamgage network ability to meet current and future water data needs for everyone
2	Create working group to explore feasibility of Streamgaging Data Collaborative to secure funding for data
3	Develop central location to view data using IWIC

Recreation	
1	Enact Aquatic Conservation Stamp on licenses to fund ANS management
2	Create invasive species education center as part of the Brandon Road Interbasin Project
3	Maintain and improve state waterbody access and focus on underserved locations
4	Expand funding for BADD program to create boat access to public waterbodies with underserved focus
5	Increase angling opportunities on private property with focus on underserved locations
6	Develop mobile app with multitude of angling information
7	Outreach about waterway access laws & regulations
8	Develop a webpage and mobile app focused on low-head dam safety and navigation
9	Develop a new program to allow access for non-motorized boating on private property

Cross-Cutting Overview

The 1984 SWP had pulled out several cross-cutting topics including Integrated Water Management, Conflict Resolution, and Public Participation. During the developing of the SWP update, the Task Force quickly realized that there was much more overlap and interaction between the critical topics. Sometimes, separate committees recommended identical or very similar solutions. The recommendations were separately listed within each topic but duplicates will be highlighted in this section where they occur. In other cases, it was clear that a solution provided for one topic would also positively impact other critical topics. Those instances are also outlined in this section.

A cursory overview of all the recommendations indicates that there were several over-arching categories as illustrated below (**Figure 18.2**). The duplicate and cross-cutting impacts are addressed in detail later in this section. Social and Environmental Justice are weaved into many of the recommendations and this category will be monitored for success annually as part of the progress reporting process. Similarly, it was noted that many recommendations were made in part or completely due of climate change impacts both now and in the future.

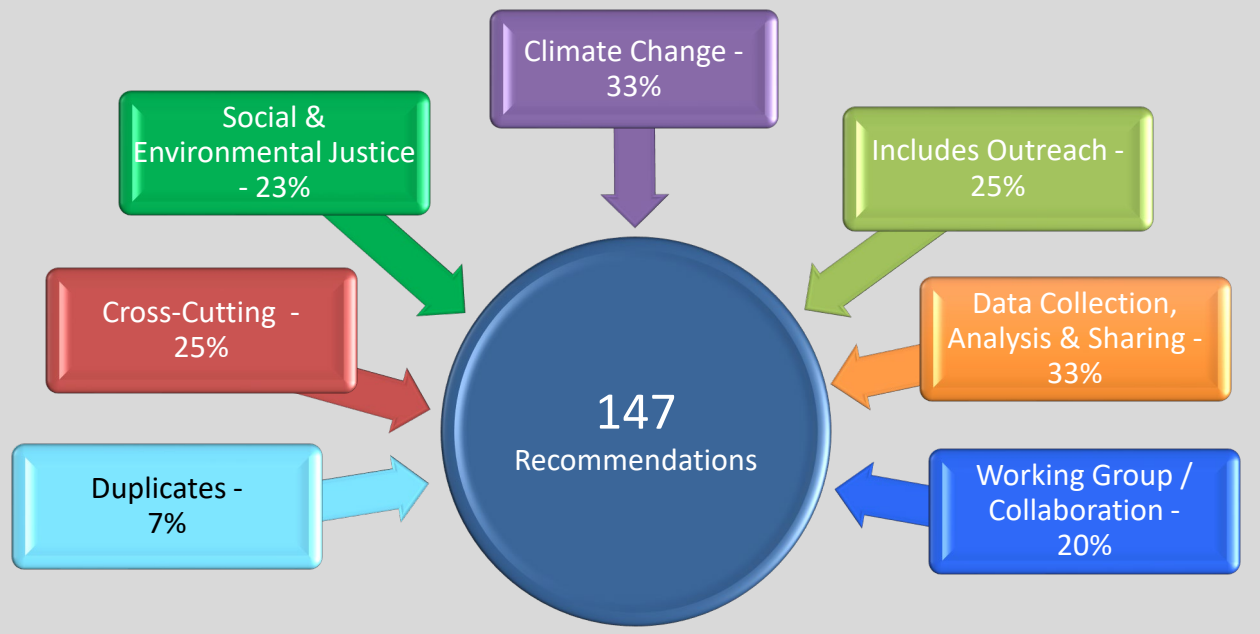

Figure 18.2 – Overarching Recommendation Categories

The next three categories help highlight the importance of two of the recommendations provided in the Integrated Water Management Section. Specifically, the recommended Integrated Water Information Center (IWIC) will help foster collaboration and house a library of information for all things related to water resources. Similarly, the recommendation related to

the Local Assistance Program will help provide needed technical support and outreach. The large number of recommendations from other critical topics related to outreach, data sharing, and overall collaboration point to the great need for these suggested resources.

The main purpose of this section is to illustrate the shared needs and related overlapping impacts of the recommendations provided in the SWP. This helps to justify that the recommended solutions have far reaching impacts. Investment and support for these recommendations will have compounding results.

Duplicate Recommendations

The following graphics highlight where separate committees came up with identical or similar recommendations (**Figure 18.3**). There were ten duplicate recommendations with one being recommended by two other topic groups and another being recommended by four topic groups.

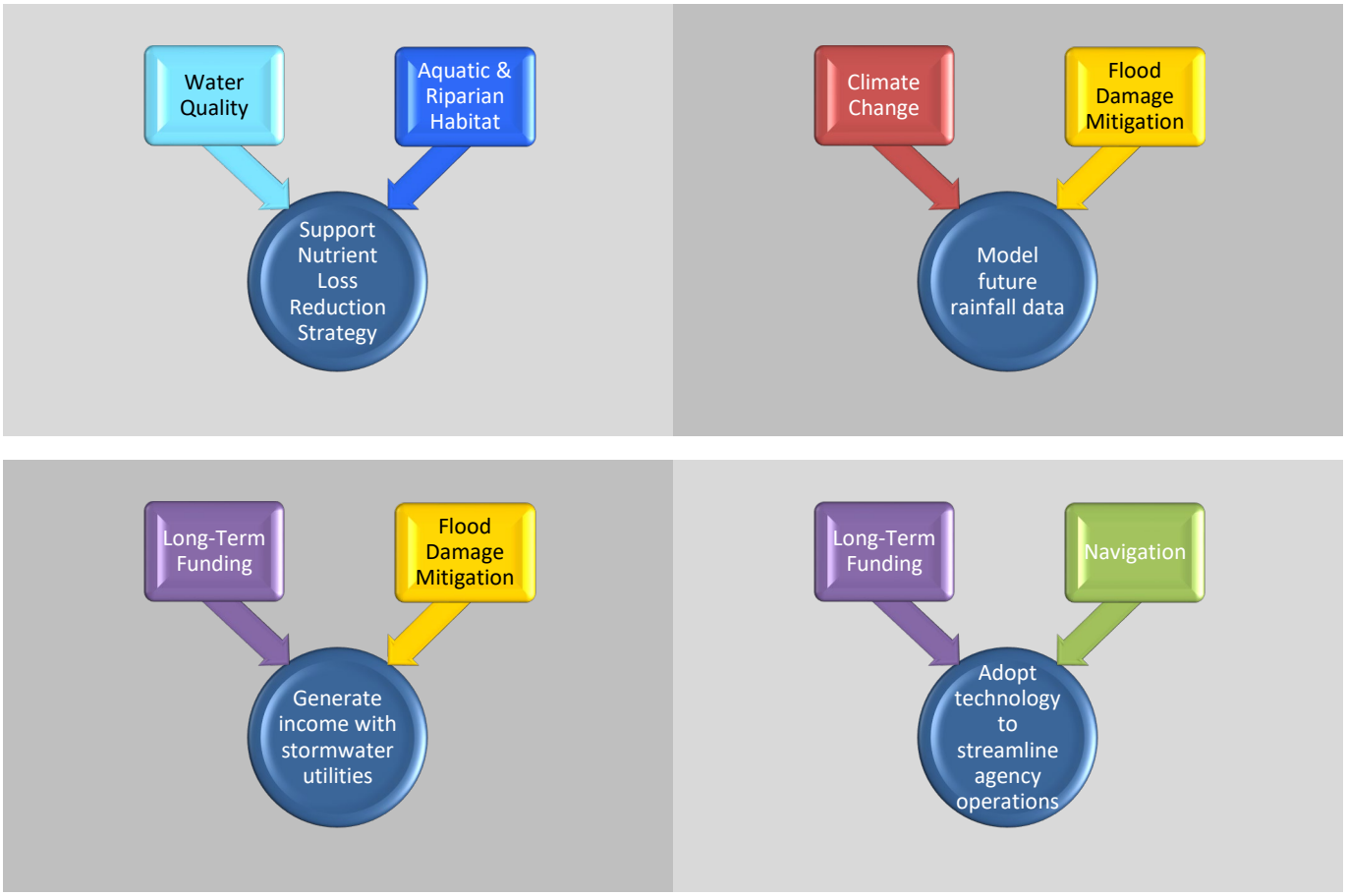

Figure 18.3 – Duplicate Recommendations

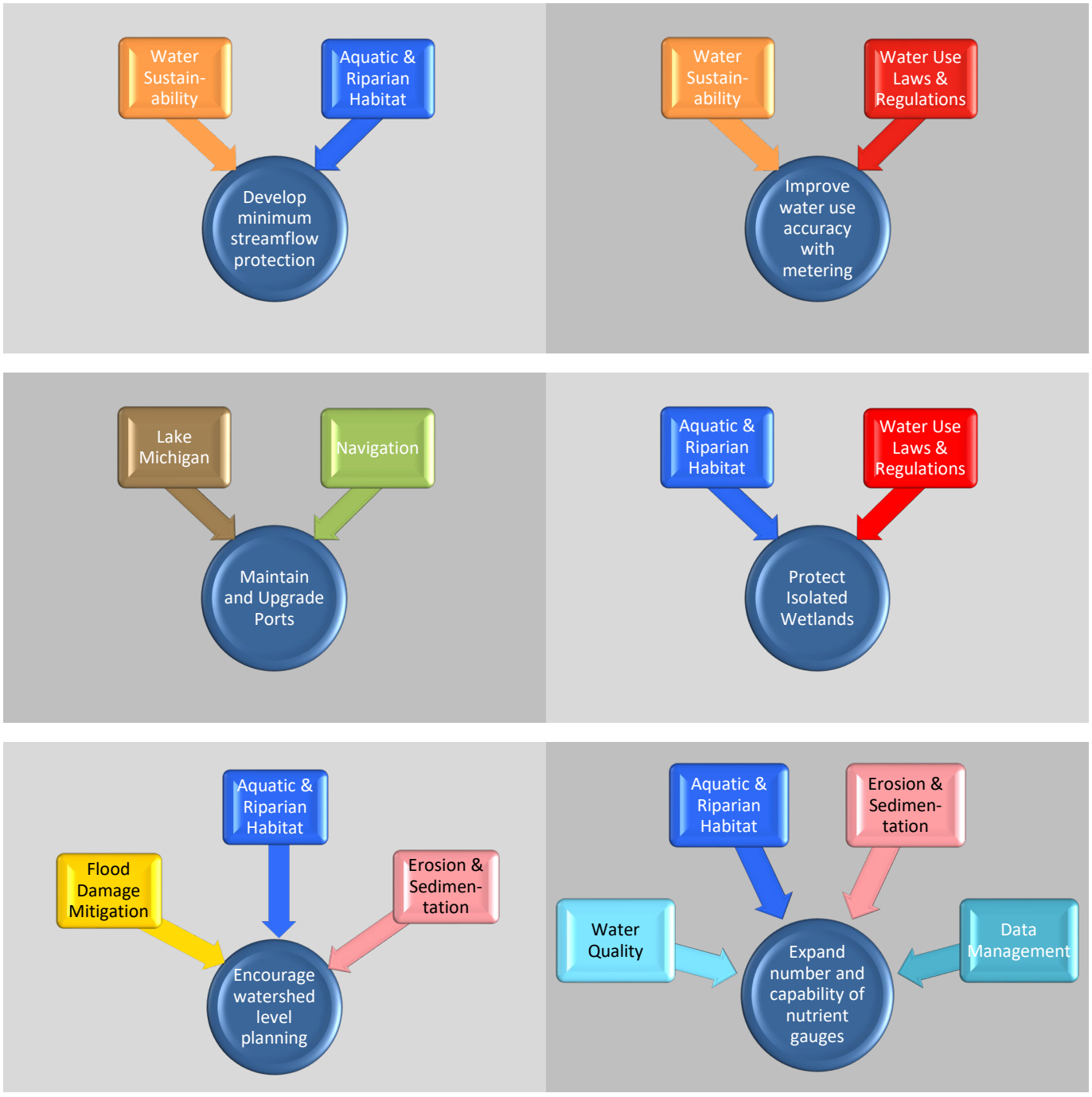

Figure 18.3 – Duplicate Recommendations (Cont.)

Cross-Cutting Impacts

The next reviewed items include recommendations where the solutions will also positively impact other critical topics. Almost every recommendation impacted one or two other topics so they were not included in this evaluation. Of the 147 recommendations, 43 of the recommendations were found to directly impact between 3 - 8 other critical topics. **Appendix E** provides graphics that show the direct multiple connections between the recommendations and topics. This demonstrates that when funding and support is provided for one recommendation, many other positive impacts will result. Since the Integrated Water Management topic already covers overlapping impacts, it was not brought forward in these graphics. Similarly, the long-term funding recommendations are not illustrated since every topic that needs funding is touched by the various recommended funding options.

Table 18.2 provides a summary of fifteen of the most common themes found in the recommendations for the critical topics. For example, forested riparian buffers and floodplain restoration provides multiple concurrent benefits, such as reducing erosion, improving stream health, providing habitat corridors, and reducing flood risk. Consequently, the restoration of freshwater ecosystems is an essential strategy that impacts many critical topics. While many of the issues and themes are cross-cutting, so too are the solutions.

Figure 18.4 – River Transportation and Erosion Protection in Illinois *(IDOT, 2021)*

Table 18.2 - Common Recommendation Themes Found in All Critical Topics

Common Recommendation Themes	Water Quality	Climate Change	Int. Water Mgmnt.	Long-Term Funding	Water Sust.	Lake Mich-igan	Flood Damage Mit.	Aq. & Rip. Habitat	Water Laws / Regs	Naviga-tion	Erosion & Sed.	Data Mgmnt.	Recrea-tion
Nutrient Loss Reduction Strategy	x							x			x		
Watershed level	x				x	x	x	x			x		x
Additional Monitoring	x							x			x	x	
Protect/Restore Ecosystems	x					x		x		x	x		
Outreach/Educationto the Public	x				x	x				x	x		x
Support for Underserved Communities	x		x	x	x	x	x				x		x
New Research/Models/Studies/Database		x			x		x				x	x	
Share Water Resource Data			x										
Expand/Fund New Staff			x								x		
Determine Consistent Funding			x	x		x		x			x		x
Adopt Technology for Efficiency				x		x			x	x			
Support Partnerships and Working Groups				x			x			x	x	x	
Develop/Update Standards/Regulations					x	x		x	x				
Promote Tourism/Public Use						x				x			
Green Infrastructure and Natural Solutions	x				x	x	x	x			x		x

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Social and Environmental Justice Recommendations

The following recommendations specifically focus on providing earmarked services to underserved communities in the state (**Table 18.3**). These specific recommendations either include a way to identify communities who have special need, those that need additional support or that require funding assistance. They are listed below to help track success with respect to social and environmental justice for each critical topic and include the item number for those tracking this category.

Climate Change Recommendations

The next listed recommendations are related to climate change (**Table 18.4**). These specific recommendations are needed due to impacts already defined or projected to worsen due to climate change. They are also listed below to help track success with respect to climate change for each critical topic and include the item number for each.

Figure 18.5 – Why Water Matters! *(IDNR, 2022)*

Table 18.3 - Social and Environmental Justice

Water Quality	
1	Support Nutrient Loss Reduction Strategy implementation
2	Support green infrastructure and water quality programs, and focus on underserved communities
3	Support voluntary nutrient reduction programs and focus on underserved communities
5	Harmful Algal Bloom Monitoring and Nutrient Monitoring in IL River Basin
6	PFAS and contaminant monitoring in fish
7	Expand groundwater monitoring network to include chronic and emerging health conditions
10	Support underserved small public water system infrastructure improvements
11	Support regionalization efforts of underserved small public water systems
12	Support efforts of underserved small public water systems to meet long-term resiliancy
Climate Change	
5	Research and Provide Climate Impact Information to urban and fringe Areas
Integrated Water Management	
1	Establish the Integrated Water Information Center (IWIC)
3	Prioritize funding for water system improvements to underserved communities
4	Reestablish Local Assistance Program to guide underserved communities
5	Develop consistent funding criteria for all agencies
7	Develop methodology for identifying and prioritizing underserved communities for water resource needs
Long Term Funding	
5	Technical and financial support for underserved communities using the Local Assistance Program
Water Sustainability	
1	Prioritize services to underserved communities
Lake Michigan	
1	Outreach about Lake MI programs using the Local Assistance Program
4	Expand Lake MI programs and prioritize services to underserved communities
7	Strengthen coastal resiliency with regional management
Flood Damage Mitigation	
4	Develop dynamic inundation mapping for targeted areas in the state
5	Perform structural damage assessment for targeted areas in the state
6	Identify 2 underserved communities per year that require flood planning assistance.
7	Develop a pilot urban flood warning system
9	Develop outreach tool to help find flood impact funding opportunities
10	Assess infrastructure and identify future needs for underserved communities as a pilot program
11	Develop project design for underserved community's flood mitigation plan as a pilot program
12	Provide funding for construction of the flood protection project for underserved communities as a pilot
Aquatic & Riparian Habitat	
3	Create multi-beneficial floodplains in underserved communities
Navigation	
2	Maintain and upgrade port infrastructure
3	Maintain and upgrade locks and dams
9	Navigation Outreach and Education using IWIC
Erosion & Sedimentation	
9	Prioritize resources by targeting underserved areas and those with greatest need.
Recreation	
3	Maintain and improve state waterbody access and focus on underserved locations
4	Expand funding for BADD program to create boat access to public waterbodies with underserved focus
5	Increase recreational opportunities on private property with focus on underserved locations

Table 18.4 - Climate Change Related

Water Quality	
5	Harmful Algal Bloom Monitoring and Nutrient Monitoring in IL River Basin
8	Protect and Restore Upper MS River
12	Support efforts of underserved small public water systems to meet long-term resiliancy
13	Expand stream and groundwater monitoring to test for emerging WQ issues
Climate Change	
1	Expand climate monitoring sites in sensitive areas - suburban, urban and agricultural areas
2	Develop web-based climate toolkits
3	Develop detailed local climate models
4	Research and develop online tools to illustrate concurrent climate events
5	Research and provide climate impact information to urban and fringe areas
6	Research and develop online tools to illustrate how agricultural practices affect crops and climate
7	Update existing rainfall data
8	Model future climate change related rainfall data
9	Research effects of changing seasonal rainfall impacts on river systems
10	Evaluate impacts and provide information about flash droughts
11	Research and outreach about rapid melt events
Integrated Water Management	
7	Develop methodology for identifying and prioritizing underserved communities for water resource needs
Long Term Funding	
3	Establish strategic fund for critical long-term issues
Water Sustainability	
1	Prioritize services to underserved communities
2	Determine sustainable water yield for all water supply sources and share online
4	Study evaporation impacts from climate change
5	Develop minimum stream flow protection for during emergencies
6	Update IL Drought Preparedness and Response Plan
Lake Michigan	
3	Update Rules regarding water loss and conservation
7	Strengthen coastal resiliency with regional management
10	Protect and restore coastal habitats
11	Evaluate feasibility of alternative energy in Lake MI and define acceptable locations
Flood Damage Mitigation	
1	Update rainfall data by modeling future/seasonal data changes
4	Develop dynamic inundation mapping for targeted areas in the state
6	Identify 2 underserved communities per year that require flood planning assistance
7	Develop a pilot urban flood warning system
13	Encourage watershed level planning efforts
15	Encourage natural and nature-based flood prevention measures
Aquatic & Riparian Habitat	
3	Create multi-beneficial floodplains in underserved communities
5	Enhance hydrologic and hydraulic connectivity
6	Enhance landscape connectivity
7	Establish and maintain stream and groundwater base flows criteria
12	Monitor and control invasive species
18	Incorporate climate change flow standards into private water use regulations
20	Establish authority to regulate isolated wetlands
Water Use Laws & Regulations	
2	Propose legislation to regulate water reuse
3	Propose legislation for water diversions outside of IL
Navigation	
5	Adopt technology to streamline operations to save costs
Erosion & Sedimentation	
3	Educate industry leaders, invest in STAR program
5	Target elementary and higher education with programs about soil erosion & sedimentation
6	Establish credentialing and apprenticeship program to train workers for this field
11	Identify and monitor marginal land use
Data Management	
1	Expand streamgage monitoring to include rural locations and longer-term stations
Recreation	
2	Create invasive species education center as part of the Brandon Road Interbasin Project

Integrated Water Management Recommendations

The following recommendations specifically focus on the recommendations related to those outlined in the Integrated Water Management section and include the items related to outreach (**Table 18.5**), data coordination (**Table 18.6**) and collaboration requirements (**Table 18.7**). They are listed below to demonstrate the need for the recommended Integrated Water Information Center (IWIC) and Local Assistance Program as recommended in this Plan.

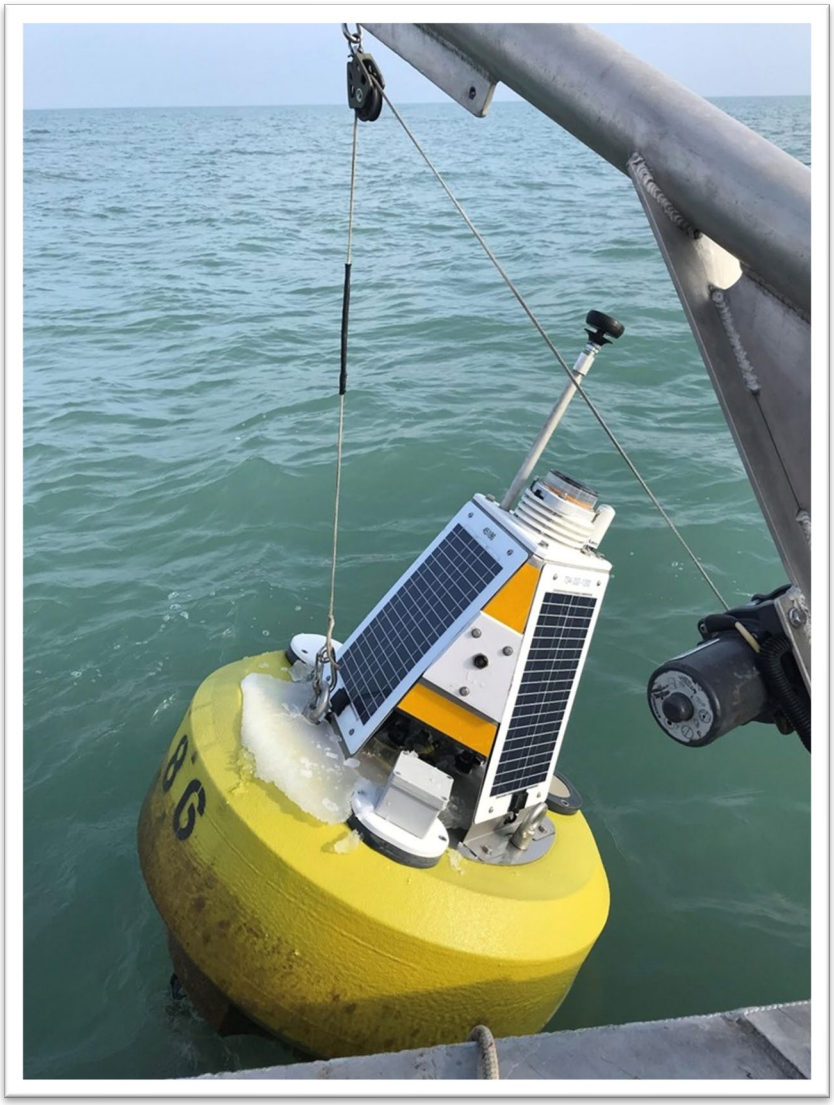

Figure 18.6 – Lake Michigan Buoy *(IDNR, 2019)*

Table 18.5 - Includes Outreach

Water Quality	
6	PFAS and contaminant monitoring in fish
9	Outreach for proper well abandonment and water supply protection
14	Water Quality Outreach and Education through IWIC
Climate Change	
2	Develop Web-based Climate Tools
4	Research and Develop online tools to illustrate concurrent climate events
5	Research and Provide Climate Impact Information to urban and fringe Areas
6	Research and Develop online tools to illustrate how agricultural practices affect crops and climate.
10	Evaluate impacts and provide information about flash droughts
11	Research and Outreach about rapid melt events
Integrated Water Management	
1	Establish the IL Water Information Center
4	Reestablish Local Assistance Programs
Long Term Funding	
6	Technical and financial support for underserved communities using the Local Assistance Program
Water Sustainability	
2	Determine sustainable water yield for all water supply sources and share online
6	Update IL Drought Preparedness and Response Plan
7	Improve water use accuracy with outreach and metering
Lake Michigan	
1	Outreach about Lake MI programs using the Local Assistance Program
4	Expand Lake MI programs and prioritize services to underserved communities
8	Promote coastal tourism and recreation
Flood Damage Mitigation	
4	Develop dynamic inundation mapping for targeted areas in the state
5	Perform structural damage assessment for targeted areas in the state
7	Pilot urban flood warning system
9	Develop outreach tool to outline flood impact funding opportunities
15	Encourage natural and nature-based flood prevention measures
Aquatic & Riparian Habitat	
1	Develop and implement watershed BMPs that benefit habitat
2	Enhance incentives for the implementation of watershed BMPs on private lands and provide outreach.
3	Create multi-beneficial floodplains in underserved communities
Navigation	
9	Navigation Outreach and Education using IWIC
Erosion & Sedimentation	
3	Educate industry leaders, invest in STAR program
5	Target elementary and higher education with programs about soil erosion & sedimentation
6	Establish credentialing and apprenticeship program to train workers for this field
12	Expand outreach efforts about success of infield and edge-of-field practices
25	Establish IDOA outreach/educational position
Data Management	
4	Develop central location to view data using IWIC
Recreation	
2	Create invasive species education center as part of the Brandon Road Interbasin Project.
6	Develop mobile app with multitude of recreational information
7	Outreach about waterway access laws & regulations
8	Develop a webpage and mobile app focused on low-head dam safety

Table 18.6 - Data Collection, Analysis and Sharing

Water Quality	
4	Support continued operation of USGS "Super Gages"
5	Harmful Algal Bloom Monitoring and Nutrient Monitoring in IL River Basin
6	PFAS and contaminant monitoring in fish
7	Expand groundwater monitoring network to include chronic and emerging health conditions
13	Expand stream and groundwater monitoring to test for emerging WQ issues
Climate Change	
1	Expand climate monitoring sites in sensitive areas, urban and agricultural areas
3	Develop Detailed Local Climate Models
4	Research and Develop online tools to illustrate concurrent climate events
5	Research and provide climate impact information to urban and fringe areas
6	Research and Develop online tools to illustrate how agricultural practices affect crops and climate.
7	Update existing rainfall data
8	Model future climate change related rainfall data
9	Research effects of changing seasonal rainfall impacts
10	Evaluate impacts and provide information about flash droughts
11	Research and Outreach about rapid melt events
Integrated Water Management	
1	Establish the IL Water Information Center
7	Develop methodology for identifying and prioritizing underserved communities for water resource needs
Water Sustainability	
2	Determine sustainable water yield for all water supply sources and share online
4	Study evaporation impacts from climate change
7	Improve water use accuracy with outreach and metering
Lake Michigan	
2	Improve water allocation reporting
11	Evaluate feasibility of alternative energy in Lake MI and define acceptable locations
Flood Damage Mitigation	
1	Update Existing Rainfall Data and Model Future/Seasonal Data Changes
2	Hydraulic Model Database
3	Generate 2-D hydraulic modeling for targeted areas of the state.
4	Develop dynamic inundation mapping for targeted areas in the state
5	Perform structural damage assessment for targeted areas in the state
7	Develop a pilot urban flood warning system
8	Develop GIS-based database of existing flood protective infrastructure and future needs.
Aquatic & Riparian Habitat	
7	Establish and maintain stream and groundwater base flows criteria
8	Install more stream gauges to measure flow and water quality
9	Install more biological monitoring programs
10	Expand CTAP wetland monitoring
11	Expand CTAP stream monitoring
12	Monitor and control invasive species
13	Interagency monitoring data database
14	Develop flow standards for all public waters including climate change impacts
16	Develop policy guidelines to obtain adequate compensation for injured aquatic resources
17	Develop assessment approach and collect data to compensate for injured aquatic resources
Water Use Laws & Regulations	
6	Meter high capacity well water use
Erosion & Sedimentation	
7	Statewide Erosion/Sedimentation survey and BMP recommendations
11	Identify and monitor marginal land use
19	Expand research to outline conservation economics and BMPs
20	Update IUM to include new technology and maintain accuracy
22	Expand gw monitoring of nutrient loss strategies
Data Management	
1	Expand stream gauge monitoring to include rural locations and longer-term stations
3	Develop central location to view data using IWIC
Recreation	
6	Develop mobile app with multitude of angling information
8	Develop a webpage and mobile app focused on low-head dam safety and navigation

Table 18.7 - Coordination, Working Groups and Collaboration

	Water Quality
3	Support voluntary nutrient reduction programs and focus on underserved communities
6	PFAS and contaminant monitoring in fish
8	Protect and Restore Upper MS River
12	Support efforts of underserved small public water systems to meet long-term resiliancy
	Integrated Water Management
6	Expand IMAG collaboration for increased efficiency and consistent funding
	Long Term Funding
6	Adopt technology to streamline state agency operations to save costs
7	Support Public-Private Partnerships
	Water Sustainability
3	Establish and support regional water supply committees.
5	Develop minimum stream flow protection
6	Update IL Drought Preparedness and Response Plan
	Lake Michigan
6	Establish work group for Lake MI water diversion
7	Strengthen coastal resiliency with regional management
8	Promote coastal tourism and recreation
	Flood Damage Mitigation
8	Develop GIS-based database of existing flood protective infrastructure and future needs.
13	Encourage watershed level planning efforts
	Aquatic & Riparian Habitat
13	Interagency Monitoring Data database
	Navigation
5	Adopt technology to streamline operations to save costs
6	Support USACE channel maintenance dredging programs
	Erosion & Sedimentation
1	Reinvigorate the Soil Erosion and Water Quality Advisory Committee (SEWQAC)
2	Expand soil and water conservation program coordination
3	Educate industry leaders, invest in STAR program
5	Target elementary and higher education with programs about soil erosion & sedimentation
6	Establish credentialing and apprenticeship program to train workers for this field
13	Establish Watershed Councils to reduce nutrient levels
	Data Management
2	Create working group to explore feasibility of Stream Gaging Data Council to secure funding for data
	Recreation
5	Increase angling opportunities on private property with focus on underserved locations
6	Develop mobile app with multitude of angling information
8	Develop a webpage and mobile app focused on low-head dam safety and navigation
9	Develop a new program to allow access for non-motorized boating on private property

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Moraine View State Park (Gray, 2022)

19

CONCLUSIONS

When the well is dry, we learn the worth of water.

Ben Franklin, Poor Richard's Almanac, 1773

Summary

Water touches every citizen in Illinois and the water resources in the state have immeasurable value. Many IL State Agencies have initiated programs and policies to keep our water resources safe. However, as the Illinois population and use of land changes with time, so too do our water related challenges. In order to serve the needs of all Illinois residents, water resource programs and policies need to adapt to new and emerging threats while also maintaining support for existing successful work. The purpose of this report is to outline the most critical and new challenges facing water resources in Illinois today and to define the associated work and support that is required to keep water safe and available for everyone in the state.

The key to the success of this plan is to obtain the General Assembly's support and funding to implement the recommended critical water resource needs for the state.

The first two steps of the SWP update were to identify critical water issues and make recommendations to address the issues. The issues are interrelated and so are the potential solutions. From there, the recommendations will need to be implemented by the Task Force over the next few years. As discussed later in this section, periodic updates will be provided by the Task Force to evaluate the status and success of the implementation of the recommendations. The critical issues will be continually reevaluated and additional SWP updates to both the website and report will be provided to address the required changes.

Figure 19.1 provides a word cloud summary of the main ideas, themes and issues described in this report. The words are depicted in different sizes depending on how often it is mentioned within this report. Some of the most frequent words found in this report are water, recommendations, program, issues, data, management and plan. This illustrates how important coordination of these topics was for developing this update to Illinois' State Water Plan and the future when working together to implement the recommendations outlined in this report.

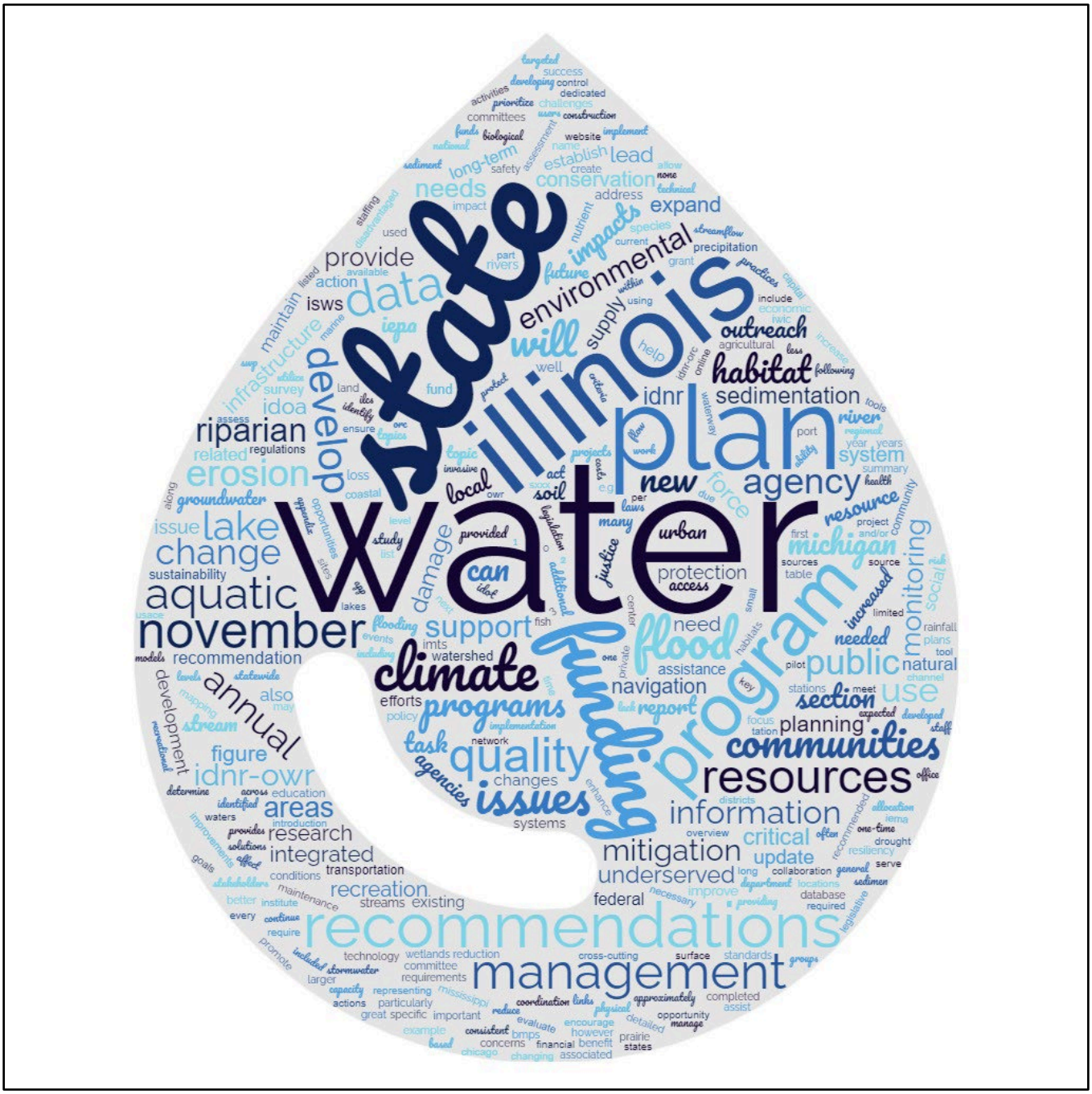


Figure 19.1 – Word Cloud Summary

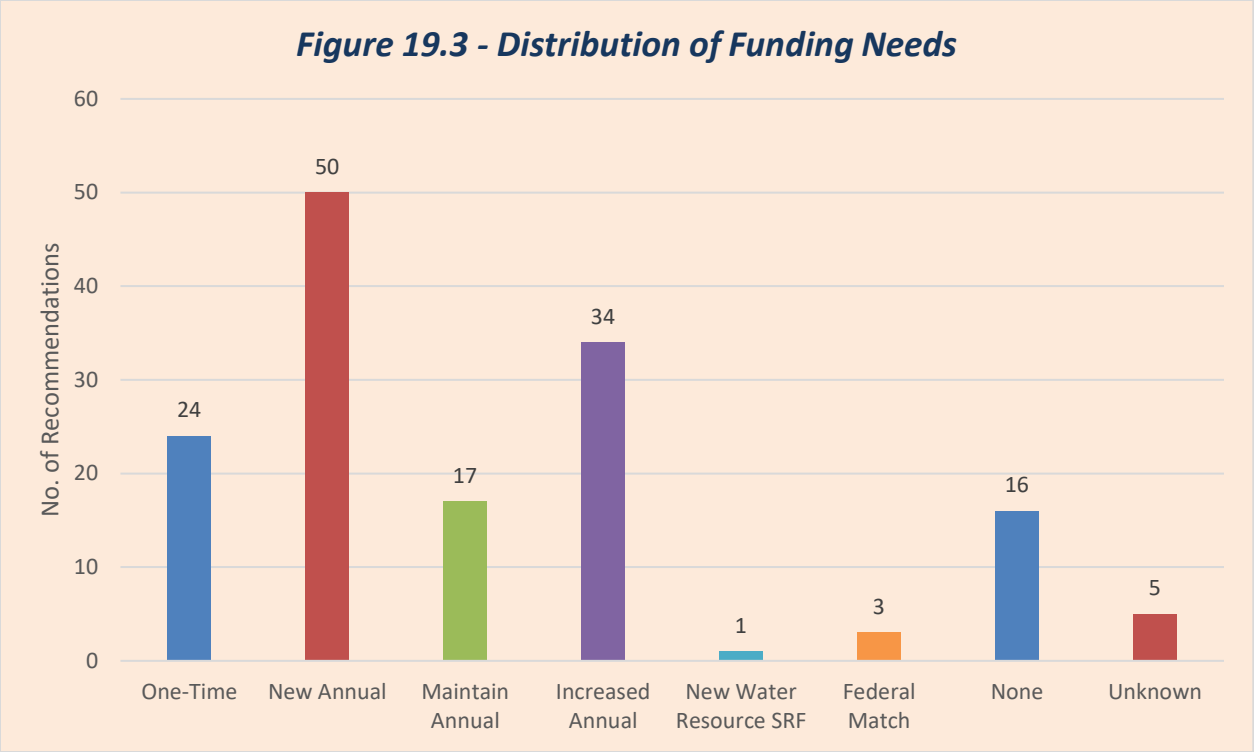
All together, the principles used to successfully develop the Plan will be employed when implementing the solutions:

The needs outlined in this report have been developed by leaders of all the state agencies involved in water resource issues as well as with input from the people they serve. The Task Force will continue to work with the General Assembly to develop the detailed funding, policy and legislative changes required to enact these changes. The Task Force, in turn, requests that the General Assembly review the recommendations provided in this report and take the needed action to assist the agencies in implementing them successfully.

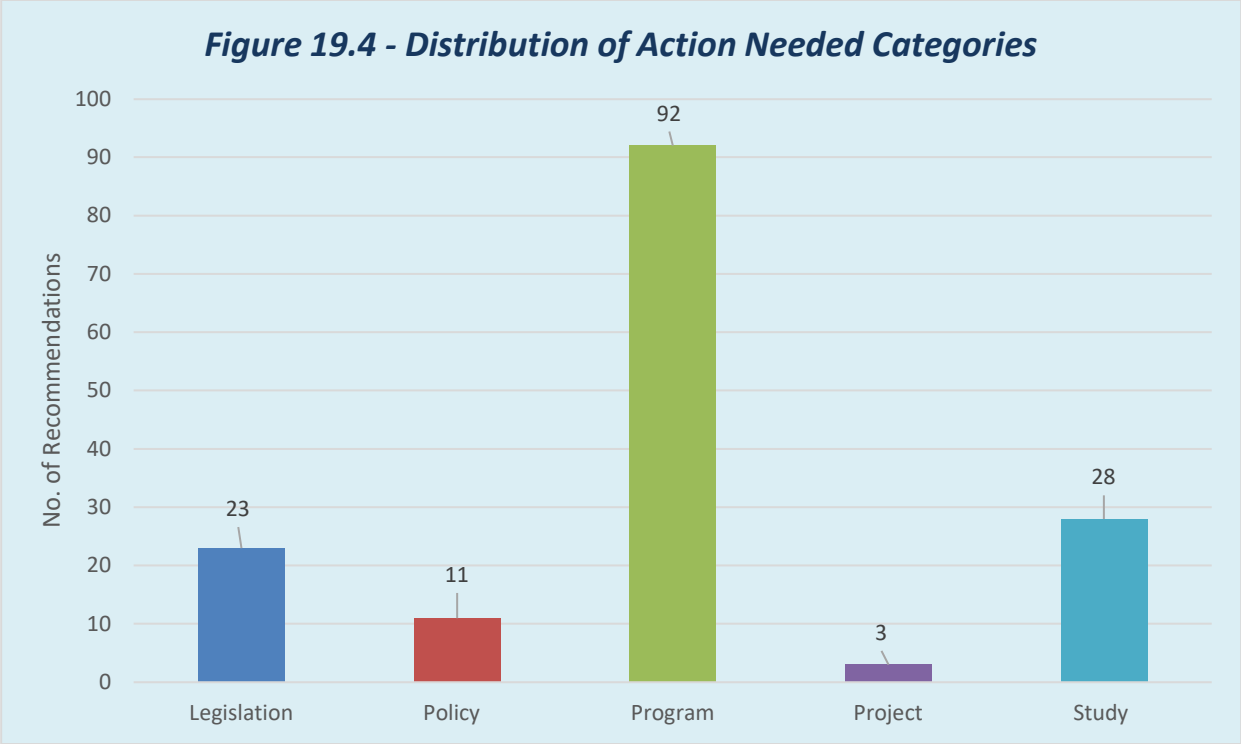
Detailed recommendations are provided for each topic in **Sections 5-17**. A brief summary of each recommendation for each critical topic is presented in **Section 18**. The recommendations are considered the most important issues affecting the critical topics that could be achieved within the next 7 years. It must be recognized that there are other issues of concern that were not included on these lists since they were less urgent, but that does not mean they are not significant. Each Task Force committee will continue tracking the remaining issues and will bring them forward in the next SWP update along with other new recommendations as they arise. The recommendations are listed in the order presented in this report and do not indicate that one critical topic is more important than the other. Similarly, each recommendation is not listed in any priority order since they are all considered critical. When developing these recommendations, it was determined that several topics had identical needs and those were noted. These detailed cross-cutting impacts were presented in the previous section to illustrate how many of the individual solutions impacted the other topics. This drives home the fact that support and funding for these recommendations have compounding impacts.

Figure 19.2 – Successful Water Resources Project, Stratton Lock Extension (IDNR, 2022)

There are **147** total individual recommendations for all 13 topics. Funding support by the General Assembly is critical to the advancement of these recommendations. Over the next year, the Task Force and committees will work closely together to develop budgets for each of the recommended initiatives that require funding. **Figure 19.3** provides a summary of the types of funding needed to move forward. The majority (75%) of need is related to either maintaining, expanding or providing new funding on an annual basis. One-Time single funding is requested for about 16% of the recommendations. The remaining funding types are related to matching federal, the proposed new Water Resources State Revolving Fund (WRSRF) or are unknown at this time. Almost 11% of the recommendations require no funding at all. Note that some recommendations contained need for more than one type of funding category.

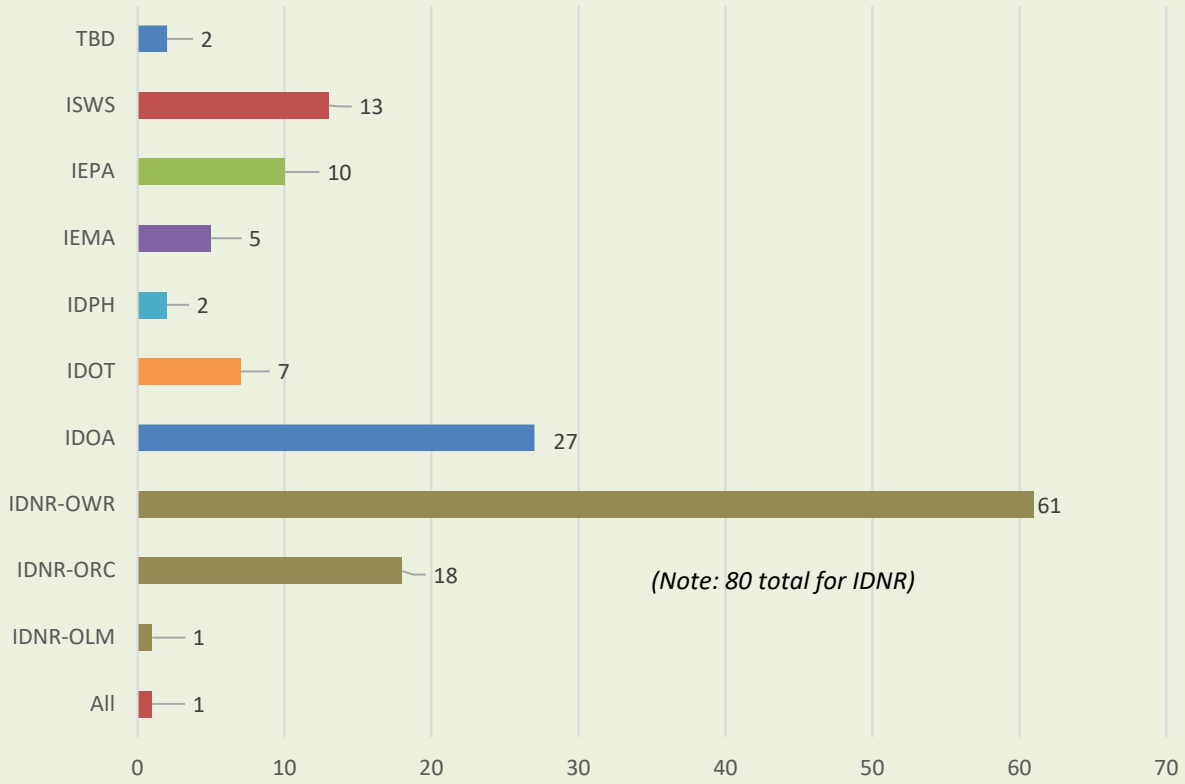


Besides funding, there are many additional ways the General Assembly can support advancement of the SWP by helping agencies initiate studies or research, new programs or policies, or projects. Specifically, some recommendations require legislation to be updated or newly enacted. When initiating new agency programs, it is assumed that additional staff will be hired or reallocated to support them and those costs will be rolled into the budget requests for each item. **Figure 19.4** outlines distribution of actions required. Program updates or new program development is by far the largest type of action needed by the various agencies. Studies or research effort is the next largest need. From there, new or updates to legislation or policy are needed. There are only three larger scale projects identified that will require capital funding.



The SWP Task Force is comprised of representatives from nine state agencies and centers. All have contributed to this update. It was decided early on in the development of this update that each recommendation would be assigned to a single agency to provide accountability for success. However, please note that the outlined recommendations require input, support and collaboration from many agencies in addition to the lead. In general, the lead agency was determined as the one who will receive the funding or develop the policy or legislation required along with assistance from the Task Force. Therefore, the Task Force will need to coordinate closely with Directors and leaders from each of these lead agencies and organizations to ensure interconnection of the SWP with departmental goals. **Figure 19.5** provides a summary of the number of recommendations assigned to each agency. IDNR will be tasked with the largest number of recommendations (54%). In order to better assign the work to the appropriate group, IDNR leads have been designated by main Office: OLM, ORC, or OWR. The next three highest agencies include IDOA (18%), ISWS (9%) and IEPA (7%). The rest of the leads include other Task Force agencies or agency partnerships.

Figure 19.5. Number of Recommendations for each Lead Agency



Measuring Success

To ensure that progress is made as a result of this document, it was necessary to clearly identify how success will be measured. The recommendations proposed were developed with the intent to be measurable and finite. Following the publication of this report, the emphasis of the State Water Plan Task Force and their future meetings will be on the progress of implementing the recommendations herein. Each topic committee will continue to meet in order to refine the recommendations to include specific funding and staffing requirements or detailed policy or legislation changes, as needed. The quarterly Task Force meetings will document progress, timeline and funding necessary to complete the recommendation. Additional priorities may also be identified in future meetings. The State Water Plan Website will be updated to include a summary of this progress following the example format in **Table 19.1**. Social and Environmental justice issues will also be checked to ensure that the proposed solutions are meeting inclusion intents. This summary table format is subject to future revisions.

Table 19.1 – Example Progress/Status Report

Task	Lead Contact	Est. % Comp.	Est. Date Comp.	Description of Status	Funding Needs	Restrictions / Obstructions
4. Climate Change Impacts on Evaporative Demands	Wes Cattoor wes.cattoor@illinois.gov	50%	8/1/2024	Study underway	$50,000 in FY24	Limited Staffing for review

The Status Summary is anticipated to be published following each Task Force meeting. An annual report will be developed as well to provide greater detail and narrative. The annual report will be in PDF format and published to the website as well as provided to the General Assembly. The annual report will be published by the end of April to allow for coordination of fiscal requests for the upcoming fiscal year.

General Assembly Next Steps

This Illinois State Water Plan update creates opportunity. The Plan highlights opportunities in state programs, policies, and justice matters in water resources to ensure that the water resources of the state are available to all people in Illinois regardless of race, income, housing status, or geography. In many instances, the key to fueling these opportunities rests with the Illinois General Assembly. Determining legislative champions in the General Assembly to help move vital legislative and/or appropriation measures is critical to successful implementation of the plan's actions for change.

Figure 19.6 – Rafting on the Fox River, Yorkville *(OWR, 2011)*

The State Water Plan Task Force is also pivotal to successful implementation of the Plan's actions for change, so it makes sense the Task Force work closely with the General Assembly to implement the Plan. The State Water Plan Task Force also needs to keep the Illinois General Assembly regularly appraised of the ongoing plan actions and the successfully implemented actions under the plan. The General Assembly needs to permanently affirm and

annually resource the State Water Plan Task Force member agencies so that the Task Force can provide the hub and leadership required to ensure inclusive, deliberate, and meaningful implementation of the plan. Adequately resourced ($500,000/year) Agencies of the State Water Plan Task Force will ensure that the SWPTF can sufficiently implement and regularly update recommended resilient actions of the State Water Plan.

Website and Plan Updates

The State Water Plan Task Force website will continue to provide the latest information on upcoming meeting details as well as past meeting minutes. The contact list will be updated with the current task force member leading each topic. Links to pertinent information and web maps will be provided and updated, as needed. When applicable, additional information will be posted as secondary pages pertaining to specific topics. Any newly developed resources or tools will be listed as well. When established, links to the Local Assistance Program (recommended herein) will be provided. The SWP Website will eventually tie into the IL Integrated Water Information Center (IWIC) website (recommended herein) that provides water related information for all 13 of the critical topics.

Once the IWIC has been established and translation staff is available, future updates to the webpage will include providing multiple languages for the website, starting with Spanish. The addition of a public feedback portal will be considered to obtain public input on improvements to the website, as well as new issues or concerns not addressed in current plan for future consideration.

The State Water Plan Task Force will be the primary source for ongoing information regarding the State Water Plan. The website will include quarterly updates of progress and annual summary reports as described in the measuring success section of the chapter. A dashboard with graphics will be utilized to summarize the progress being made. Near the end of the page, the Published Documents segment will be updated with any supporting documents that pertain to the 13 critical topics. The next full update of the State Water Plan is expected to occur on a 10-year interval. This allows for eight years of implementation followed by two years to develop a new report.

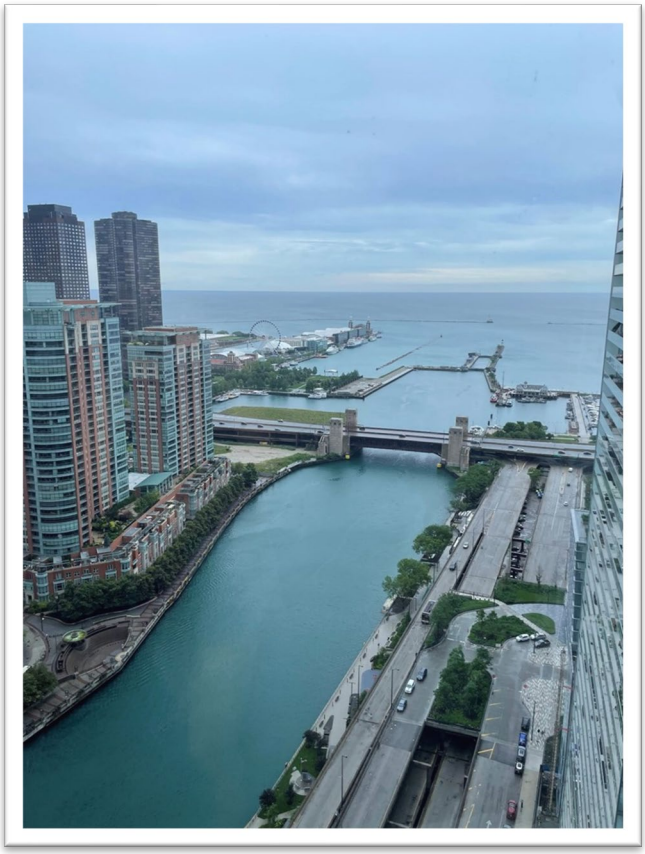


Figure 19.7 – Illinois' Varied Waterways *(Jagadeesh, 2022 and Iordache, 2022)*

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APPENDIX A

LIST OF PARTICIPANTS

Committees

Each critical topic leader assembled a committee of volunteers to help develop each section in this report and are listed below. Some committees met formally and some shared segments of the report digitally to get input from other agencies, stakeholders and the public. If you are interested in sitting on a committee, please reach out to the Topic Leads (emails are posted on the website). The committees will be working on implementing the recommendations outlined in this report.

Section 5 – Water Quality

Lead: Michael Brown, IEPA

Name	Representing
Cobb, Rick	IEPA
Ettinger, Albert	Sierra Club
Hudson, Holly	Chicago Metropolitan Agency for Planning
Kordas, Molly	Openlands
Maybanks, Ashley	The Nature Conservancy
Skrukrud, Cindy	Sierra Club
Summers, Mike	IEPA
Twait, Scott	IEPA

Section 6 – Climate Change

Lead: Dave Kristovich, ISWS

Name	Representing
Bauer, Erin	ISWS, Prairie Research Institute
Beardsley, John	ISWS, Prairie Research Institute

Name	Representing
Cattoor, Wes	IDNR – OWR
Ford, Trent	ISWS, Prairie Research Institute
Getahun, Elias	ISWS, Prairie Research Institute
Ghadiri, Maryam	U of I, Civil and Environmental Engineering
Heavisides, Tom	IDNR – ORC
Keefer, Laura	ISWS, Prairie Research Institute
Lin, Yu-Feng	Illinois Water Resources Center
Markus, Momcilo	ISWS, Prairie Research Institute
McConkey, Sally	ISWS, Prairie Research Institute
Sharma, Ashish	ISWS, Prairie Research Institute
Shein, Karstan	ISWS, Prairie Research Institute
Stevenson, Kip	ISWS, Prairie Research Institute
Weckle, Amy Lorraine	Illinois Water Resources Center
Zhang, Zhenxing	ISWS, Prairie Research Institute

Section 7 – Integrated Water Management

Lead: Loren Wobig, IDNR–OWR

Name	Representing
Cattoor, Wes	IDNR – OWR
Dorothy, Olivia	American Rivers
Heistand, Glenn	ISWS, Prairie Research Institute
Keefer, Laura	ISWS, Prairie Research Institute
Lurkins, Lauren	Illinois Farm Bureau
Mauer, Paul	IDNR – OWR
Maybanks, Ashley	The Nature Conservancy

Section 8 – Long Term Funding

Leads: Chris Davis, Gary Bingenheimer, IEPA

Name	Representing
Cattoor, Wes	IDNR – OWR
Cobb, Rick	IEPA
Maybanks, Ashley	The Nature Conservancy
Smith, Colleen	Illinois Environmental Council
Williams, Justin	Metropolitan Planning Council

Section 9 – Water Sustainability

Lead: Wes Cattoor, IDNR–OWR

Name	Representing
Abi-Akar, Reema	Tri County Regional Planning Commission
Beck, Nora	Chicago Metropolitan Agency for Planning
Casey, Jim	IDNR – OWR
Castle, Anna-Lisa	Great Lakes Commission

Name	Representing
Emmerich, Eric	E.J. Water Cooperative
Fritsche, Jessica	Carollo Engineers
Gallet, Danielle	Metropolitan Planning Council
Han, Wei	IDNR – OWR
Hirschfeld, Robert	Prairie Rivers Network
Holtrop, Ann	IDNR – ORC
Keller, Justin	Metropolitan Planning Council
Kelly, Walt	ISWS, Prairie Research Institute
Kessen, Jay	IDNR – OWR
Lurkins, Lauren	Illinois Farm Bureau
Payette, Daniel	Blackhawk Hills Regional Council
Twait, Rick	City of Champaign (retired)
Wallers, Pete	Engineering Enterprises
Zhang, Jason	ISWS, Prairie Research Institute

Section 10 – Lake Michigan

Lead: Ania Bayers, IDNR–Coastal

Name	Representing
Jagadeesh, Tara	U of I – IL Sustainable Technology Center
Kessen, James	IDNR – OWR

Section 11 – Flood Damage Mitigation

Lead: Terra McParland, IDNR–OWR

Name	Representing
Al-Basha, Sam	IEMA
Bennett, Viv	The Nature Conservancy
Castle, Anna-Lisa	Alliance for the Great Lakes
Darguzas, Joe	City of Chicago Heights Flood Reduction Organizing
Davis, Christine	IEPA
Davis, Ron	IDNR- OWR
Dorothy, Olivia	American Rivers
Evasic, Kate	Chicago Metropolitan Agency for Planning
Grosso, Ryan	Prairie Rivers Network
Heistand, Glenn	ISWS, Prairie Research Institute
Jenkins, Jennifer	The Nature Conservancy
Krug, Zachary	IEMA
Mack, Bob	Knight E/A, Inc.
Milner, Bill	IDNR – OWR
Pohlman, Rick	IDNR – OWR
Sucoe, Marilyn	IDNR – OWR
Wilson, Ryan	Metropolitan Planning Council
Wolf, Anna	Illinois Environmental Council

Section 12 – Aquatic & Riparian Habitat — Lead – Brian Metzke, IDNR–ORC

Name	Representing
Beardsley, John	ISWS, Prairie Research Institute
Hinz, Leon	IDNR – Natural Heritage
Holtrop, Ann	IDNR – Natural Heritage
Keefer, Laura	ISWS, Prairie Research Institute
Sauer, Randy	IDNR – Fisheries

Section 13 – Water Use Laws & Regulations — Lead – Steve Altman, IDNR–OWR

Name	Representing
Beck, Nora	Chicago Metropolitan Agency for Planning
Clark, Gary	IDNR – OWR (retired)
Ettinger, Albert	Attorney
Hirschfeld, Robert	Prairie Rivers
Mauer, Paul	IDNR – OWR
Meyers, Stacy	USEPA
Mool, Bob	IDNR – OLC (retired)
Rennecker, Brian	IDOA
Simba, Iyanna	Illinois Environmental Council

Section 14 – Navigation — Lead – BJ Murray, IDOT

Name	Representing
Bieneman, Holly	IDOT
Lyne, Jamy	WSP Consultants
Meyers, Alan	WSP Consultants
Miliszewski, Adam	WSP Consultants
Smith, Scudder	WSP Consultants
Stambaugh, Clayton	IDOT
Vanderhoof, Mike	IDOT

Section 15 – Erosion & Sedimentation — Lead – Michael Woods, IDOA

Name	Representing
Abi-Akar, Farah	Waterborne Environmental
Adams, Kaitie	The Savanna Institute
Baskerville, Megan	Illinois Nature Conservancy
Becker, Talon	U of I Extension
Bloomquist, Michelle	IDNR – CREP
Brawley, Emy	The Conservation Fund
Bruner, Emily	American Farmland Trust

Name	Representing
Burke, Travis	U of I Extension
Bush, Erin	Champaign County Soil & Water Conservation District
Chard, Steve	Assn. of Illinois Soil & Water Conservation Districts
Clay, Eliot	Illinois Environmental Council
Curran, Ashley	Assn. of Illinois Soil & Water Conservation Districts
Curry, Rachel	U of I Extension
Davis, Christine	IEPA
Dorothy, Olivia	American Rivers
Dwyer, Megan	Illinois Corn Growers
Farr, Dean	Illinois Izaak Walton League
Frabotta, David	Farm Journal
Gray, Deborah	IDOA
Hammer, Grant	Assn. of Illinois Soil & Water Conservation District
Hazzard, Andrea	Hazzard Free Farm
Heiniger, Ryan	Trust in a Food: A Farm Journal Association
Henrikson, Bruce	Parkland College
Hobart, Liz	Growmark
Jones, Jennifer	Illinois Soybean Association
Jones, Kristi	IDOA
Kar, Shibu	U of I Extension
Kiel, Adam	Soil and Water Outcomes Fund
Kostel, Jill	The Wetlands Initiative
Lagacy, Elliot	IDOA
Lewis, Megan	Delta Institute
Lurkins, Lauren	Illinois Farm Bureau
Maybanks, Ashley	The Nature Conservancy
McManus, Marty	IDOA
Miller, Megan	Illinois Soybean Association
Moran Stelk, Liz	Illinois Stewardship Alliance
Ojo, Oluwaseun	IDOA
Petersen, Karen	Illinois Nature Conservancy
Peterson, Abigail	Illinois Soybean Associations
Ray, Shelly	IDOA
Rennecker, Brian	IDOA
Rettig, Todd	IEPA
Reynolds, Kristopher	American Farmland Trust
Rupel, Liz	Illinois Stewardship Alliance
Sample, Trevor	IEPA
Schick Siegel, Rachel	Illinois Beaver Association
Schmidt, Ben	USDA, Illinois NRCS
Stierwalt, Steve	Champaign County Soil & Water Association District
Webster, Maxwell	American Farmland Trust
Yeoman, Dan	Qualified Ventures

16 – Data Management

Lead – Laura Keefer, ISWS

Name	Representing
Brooks, Jessica	NOAA
Getahun, Elias	ISWS, Prairie Research Institute
Hanstad, Chris	ISWS, Prairie Research Institute
Johnson, Gary	USGS
Lageman, Jon	USGS
Lincoln, Scott	NOAA
Maloney, Tom	IDNR – OWR
Markus, Momcilo	ISWS, Prairie Research Institute
Murry, BJ	IDOT
Weckle, Amy	IWRC
Zhang, Jason	ISWS, Prairie Research Institute

17 – Recreation

Leads – Seth Love, Brennan Caputo, IDNR–ORC

Name	Representing
Irons, Kevin	IDNR – ORC
Prehn, Ryan	IDNR – OLM
Santucci, Vic	IDNR – ORC

Stakeholders and Partners

We really appreciate our many stakeholders and communities for getting involved with the State Water Plan update with members sitting on committees, forwarding our public meeting notices, providing written review comments to our drafts, promoting the State Water Plan with legislators and helping us to ensure that water issues are being addressed comprehensively for all citizens in Illinois. We hope you continue support while we enter the implementation phase.

Alphabetical Order:

- Alliance for the Great Lakes
- American Rivers
- Barrington Area Council of Governments (BACOG)
- Beaver Alliance
- Bird Conservation Network
- Chicago Metropolitan Agency for Planning (CMAP)
- Elevate Energy
- IL Chapter Sierra Club
- Illinois Environmental Council (IEC)
- Illinois Farm Bureau (IFB)
- Kane-DuPage Soil & Water Conservation District (KDSWCD)

- Mahomet Aquifer Consortium (MAC)
- Metropolitan Planning Council (MPC)
- Metropolitan Water Reclamation District of Greater Chicago (MWRD)
- Openlands
- Prairie Rivers Network
- The Nature Conservancy (TNC)
- Many other stakeholder organizations and communities

General Public

Thanks to all those that participated in the Public Outreach Meetings held between 2020 and 2022. Due to COVID-19, the first two outreach events were held virtually with the first being held from December 1-3, 2020 and the second from May 25-27, 2021. The third public outreach meetings were held both in-person and virtually on August 24, 25 and 29, 2022. We also want to thank those that took the time to respond to the initial survey request in 2020 (see **Appendix B** for additional survey information).

Outreach presentations, general meeting recordings and breakout meeting recordings can be found on the State Water Plan website. Written review comments about the draft report and responses from the Task Force are also posted on the project website. (State Water Plan).

Photographs

Thanks to all those that contributed photographs to be used in this report. Most were taken by agency staff through the course of their daily work so we appreciate them sharing the fruits of their labor (in alphabetical order):

Photographers:

Bayers, Ania	Beardsley, John	Brown, C. Eliana	Gray, Pam
Iordache, Vlad	Jagadeesh, Tara	Knocke, Layne	Love, Seth
Martin, Bob	Kelly, Walton	McKinney, Megan	Metzke, Brian
Miliszewski, Adam			

Agencies:

IDNR	IDOT	IEPA
Library of Congress	OWR	

gettyimages:

eyfoto
Gian Lorenzo Ferretti Photography

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APPENDIX B

PUBLIC OUTREACH SUMMARY

Outreach Events

Public Outreach 1 – December 2-3, 2020

The following links provide a brief overview about each of the 13 identified critical issues.

Recorded Summary Video Link:
https://www2.illinois.gov/dnr/WaterResources/Documents/SWP%20Phase%201%20Full%20Presentation%20720p.mp4

Public Outreach 2 – May 25-27, 2021

The following links provide a brief overview about each of the draft recommendations for the 13 identified critical issues.

Recorded Summary Video Link: https://youtu.be/AWdRrSkp6Gw

Three sessions were held at varying times to maximize public participation for each outreach event. Each day's meetings covered the same information and lasted around 1.5 hours. The Introduction and Wrap-up sessions were open to all attendees at once. Breakout rooms were provided to allow discussion of specific topics. Links to the recordings of the Introduction, Breakout and Wrap-up sessions can be found on the SWP website:
https://www2.illinois.gov/dnr/WaterResources/Pages/StateWaterPlanTaskForce.aspx

Public Outreach 3 – August 24, 25, 29, 2022

The outreach meetings were held both in-person and virtually in three locations throughout the state: Yorkville, Carterville, and Springfield. A presentation was provided during the outreach sessions that outlines how the update was completed, the protocol for providing public comments and provides a brief overview of the report (PDF). A combined set of minutes was

prepared that also includes questions and responses (Minutes). The following links are recordings of each meeting.

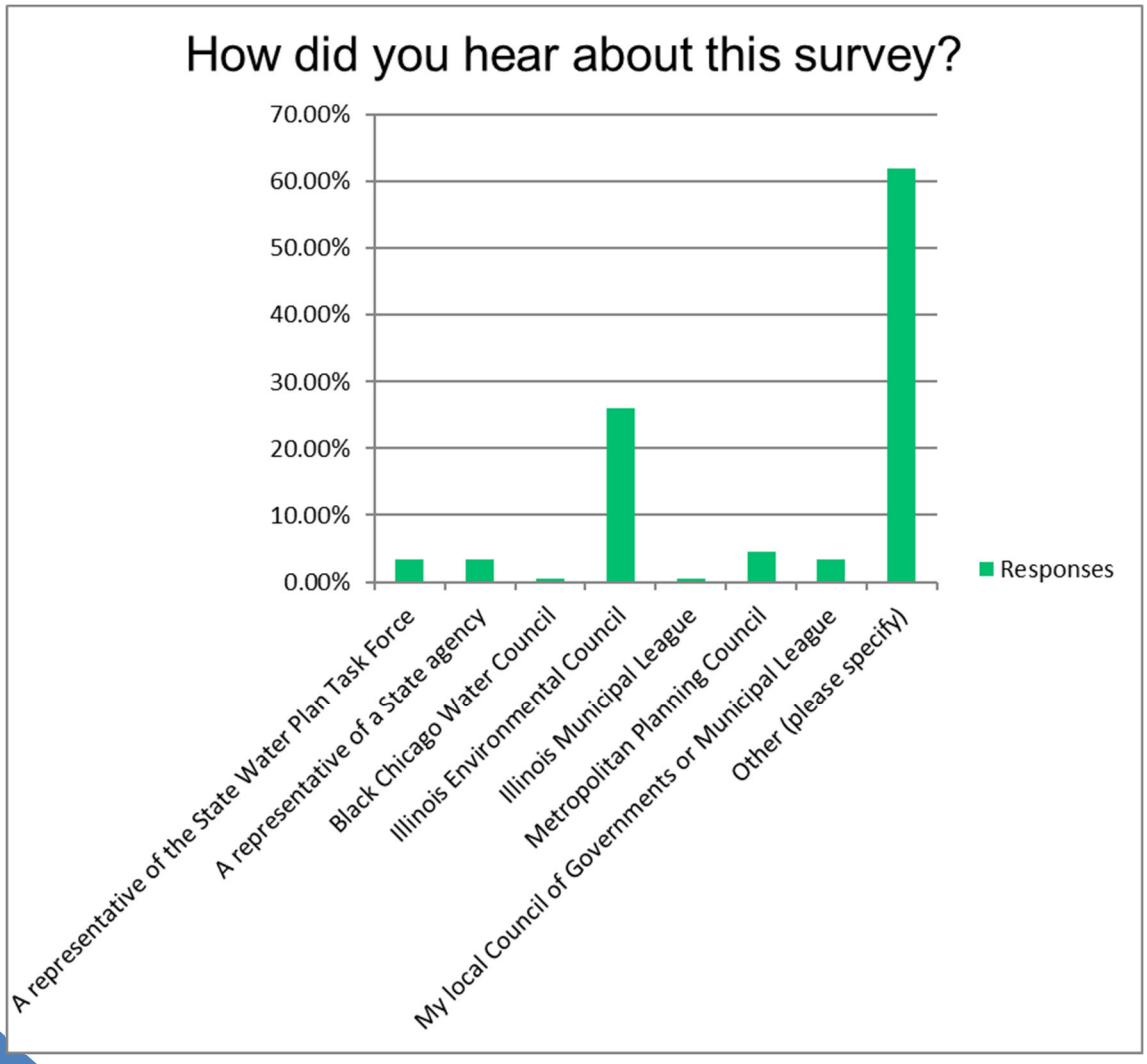
Yorkville Recorded Summary Video Link: link

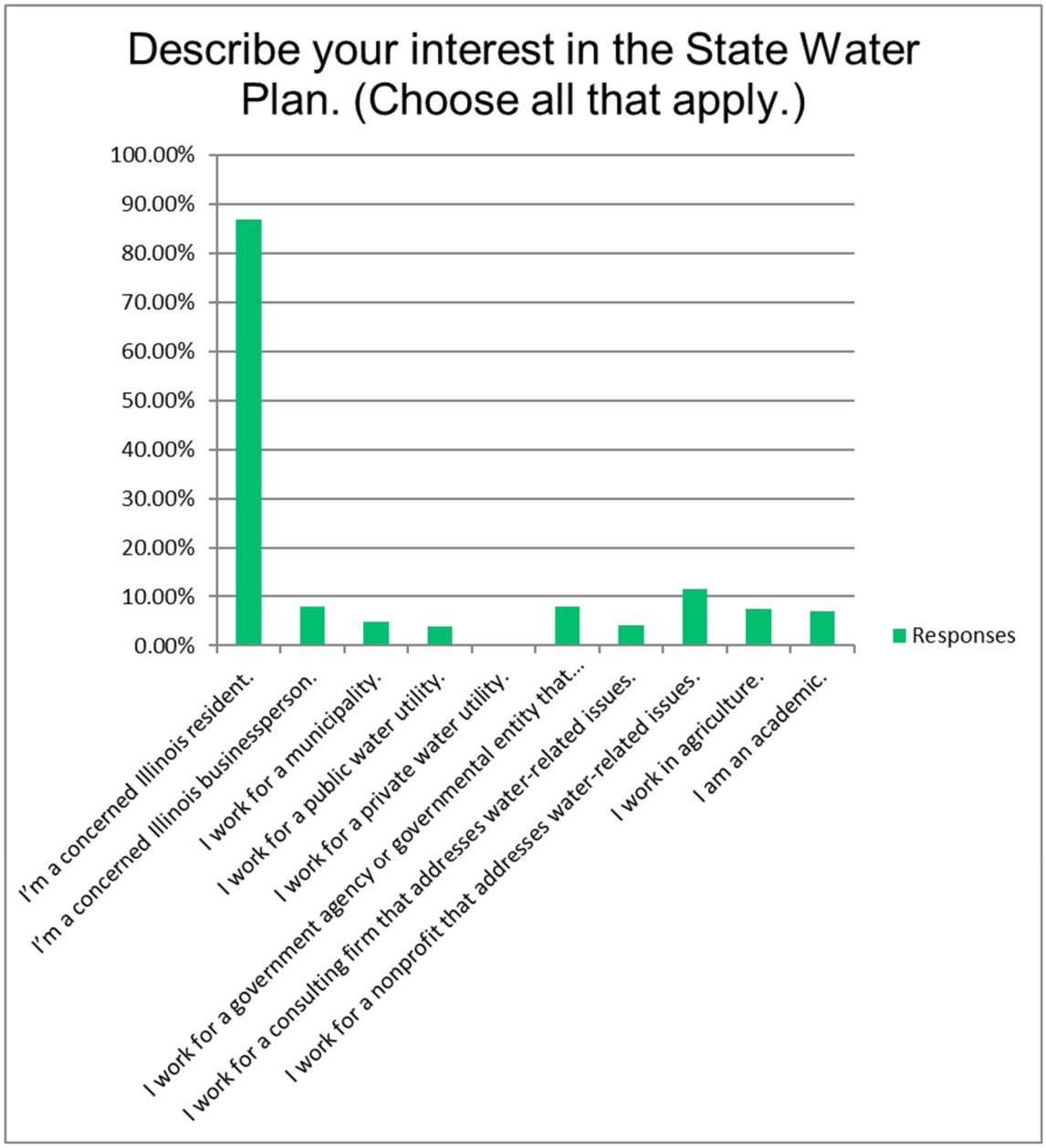
Carterville Recorded Summary Video Link: Link

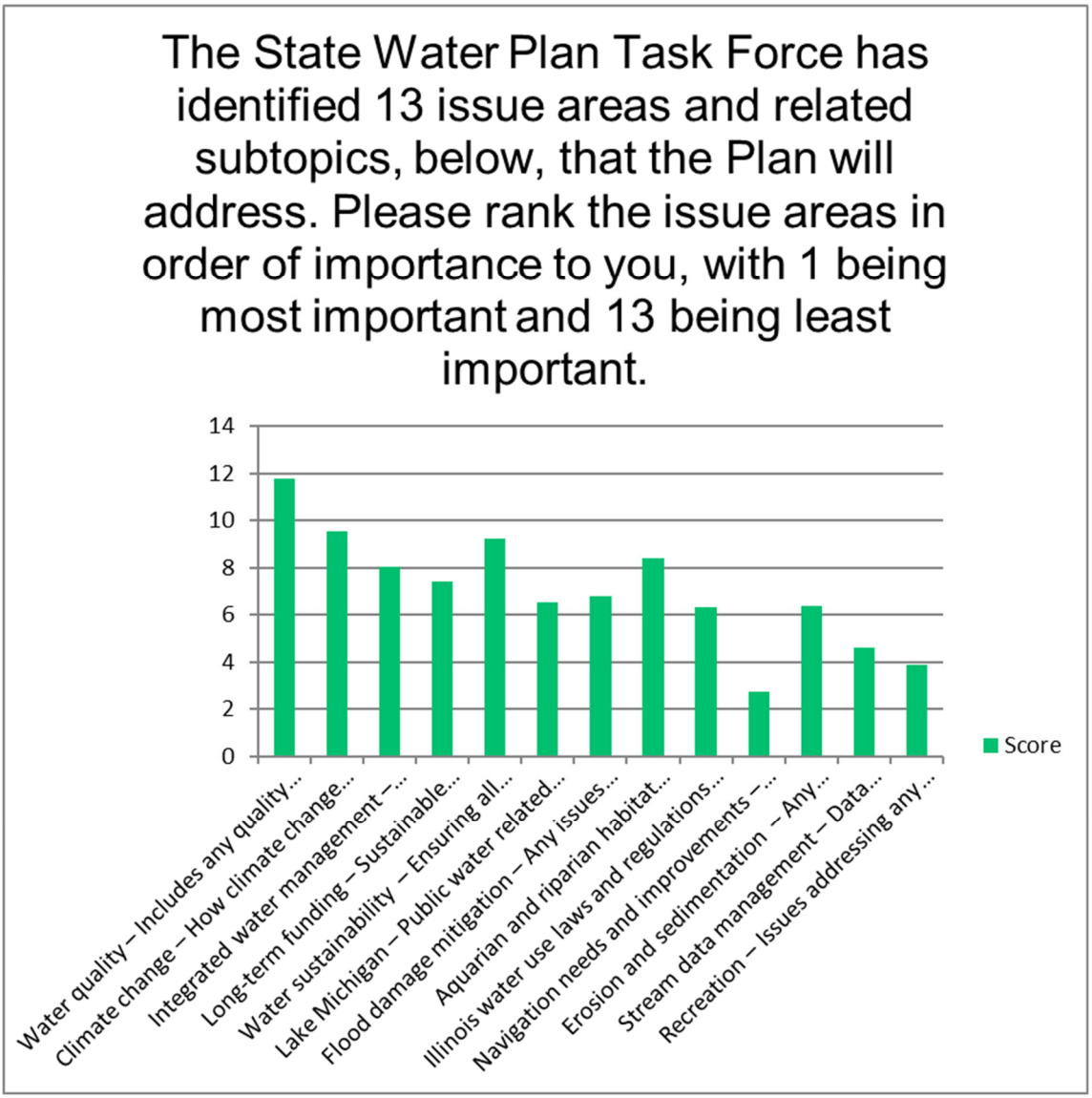
Springfield Recorded Summary Video Link: Link

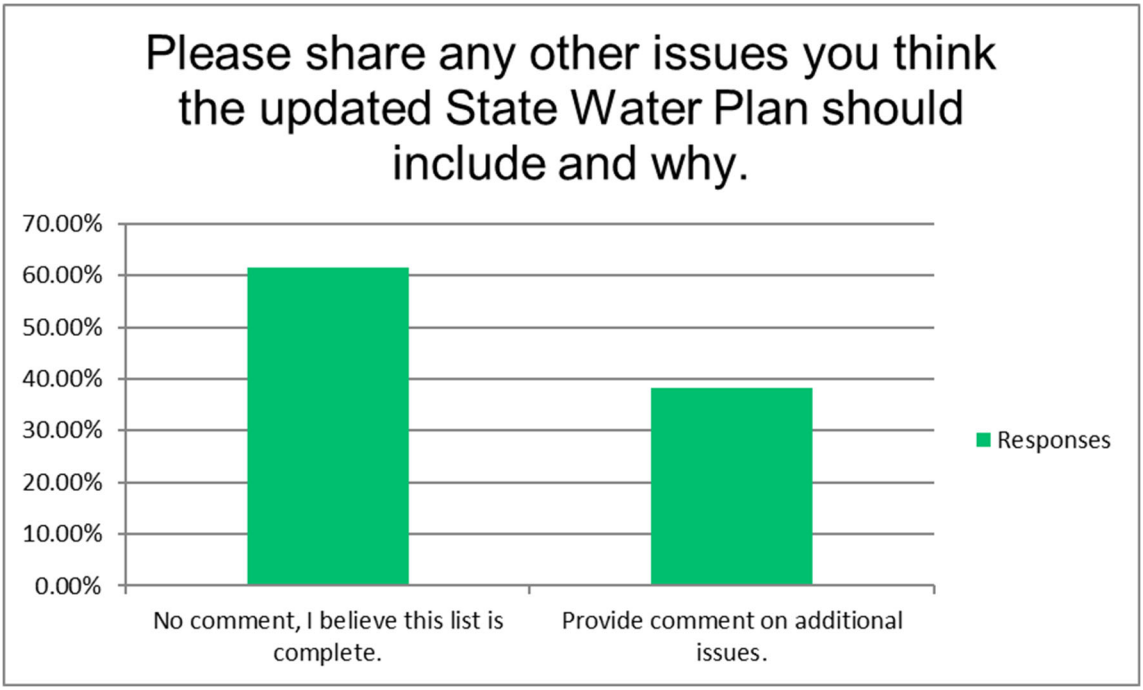
Public Survey

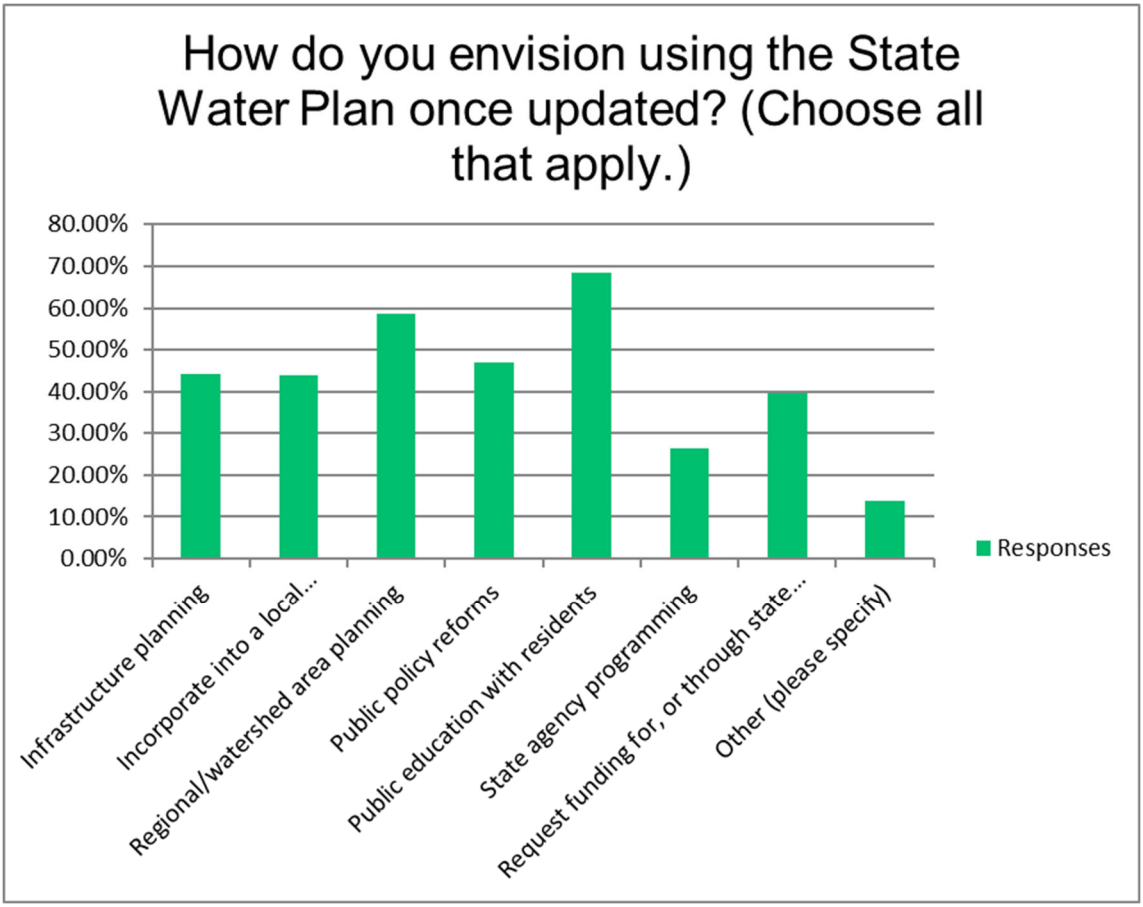
In conjunction with the first public outreach event, a survey (in English and Spanish) was provided on the State Water Plan's website with a link to the online survey being sent to many stakeholders and to communities in the state. The Metropolitan Planning Commission (MPC) compiled the results and shared them with the SWPTF. The survey was comprised of several questions and the results are summarized below. The survey had 703 responses and 503 people requested to stay informed about the Plan development process.




Describe your interest in the State Water Plan. (Choose all that apply.)
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
I'm a concerned Illinois resident.
I'm a concerned Illinois businessperson.
I work for a municipality.
I work for a public water utility.
I work for a private water utility.
I work for a government agency or governmental entity that...
I work for a consulting firm that addresses water-related issues.
I work for a nonprofit that addresses water-related issues.
I work in agriculture.
I am an academic.
Responses


The State Water Plan Task Force has identified 13 issue areas and related subtopics, below, that the Plan will address. Please rank the issue areas in order of importance to you, with 1 being most important and 13 being least important.
14
12
10
8
6
4
2
0
Water quality – Includes any quality...
Climate change – How climate change...
Integrated water management –...
Long-term funding – Sustainable...
Water sustainability – Ensuring all...
Lake Michigan – Public water related...
Flood damage mitigation – Any issues...
Aquarian and riparian habitat...
Illinois water use laws and regulations...
Navigation needs and improvements –...
Erosion and sedimentation – Any...
Stream data management – Data...
Recreation – Issues addressing any...
Score


Please share any other issues you think the updated State Water Plan should include and why.
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
No comment, I believe this list is complete.
Provide comment on additional issues.
Responses


How do you envision using the State Water Plan once updated? (Choose all that apply.)
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Infrastructure planning
Incorporate into a local...
Regional/watershed area planning
Public policy reforms
Public education with residents
State agency programming
Request funding for, or through state...
Other (please specify)
Responses

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APPENDIX C

REFERENCES AND LINKS

Section 3 - Introduction

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Section 4 – Social and Environmental Justice

Links

Natural Hazards Center (2021): https://hazards.colorado.edu/

Environmental Justice Policy: https://www2.illinois.gov/epa/topics/environmental-justice/Pages/ej-policy.aspx

Section 5 – Water Quality

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Section 6 – Climate Change

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Section 7 – Integrated Water Management

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Section 9 – Water Sustainability

Links

The Illinois State Water Survey hosts two sites of particular interest to water operators and owners of private well systems.

WaterOperator.org

https://wateroperator.org/

The Private Well Class - Free Training for Private Well Owners

http://www.privatewellclass.org/

Capacity links:

https://www.epa.gov/dwcapacity

https://www.epa.gov/dwcapacity/learn-about-capacity-development

https://www2.illinois.gov/epa/topics/drinking-water/field-operations/Pages/capacity-development.aspx

Section 11 – Flood Damage Mitigation

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Section 14 - Navigation

Links

The Illinois Marine Transportation System Plan and Economic Impact Analysis Study (IMTS Plan) is complete and can be accessed here:

Web Friendly Version-Final 2020 Final IMTS Plan Document;

Print Friendly Version-Final 2020 Final IMTS Plan Document

A video summarizing the Marine Transportation System and its economic impact and forecasted commodity flows is available here

The Illinois Port Facilities Capital Investment Grant Program provides grants to public agencies for the planning and development of facilities within public port districts that are included in the Illinois Marine Transportation System (IMTS). The IMTS is comprised of ports located on these navigable waterways: the Mississippi River, Illinois River, Chicago Area Waterway System, Kaskaskia River, Ohio River, Lake Michigan, and the landside infrastructure that allows transportation to, from, and on water. The Website can be accessed here: Illinois Port Facilities Capital Investment Grant Program.

Section 16 – Data Management

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Section 17 - Recreation

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APPENDIX D

RECOMMENDATIONS SORTED BY AGENCY

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#	Topic	Recommendation	Lead Agency
6	Long-Term Funding	Adopt technology to streamline state agency operations to save costs	All
3	Recreation	Maintain and improve state waterbody access and focus on underserved locations	IDNR-OLM
8	Long-Term Funding	Enact stamps or license fees to generate targeted funds	IDNR-ORC
1	Aquatic & Riparian Habitat	Develop and implement watershed BMPs that benefit habitat	IDNR-ORC
2	Aquatic & Riparian Habitat	Enhance incentives for the implementation of watershed BMPs on private lands and provide outreach	IDNR-ORC
7	Aquatic & Riparian Habitat	Establish and maintain stream and groundwater base flows criteria	IDNR-ORC
9	Aquatic & Riparian Habitat	Install more biological monitoring programs	IDNR-ORC
10	Aquatic & Riparian Habitat	Expand CTAP wetland monitoring	IDNR-ORC
11	Aquatic & Riparian Habitat	Expand CTAP stream monitoring	IDNR-ORC
12	Aquatic & Riparian Habitat	Monitor and control invasive species	IDNR-ORC
14	Aquatic & Riparian Habitat	Develop flow standards for all public waters including climate change impacts	IDNR-ORC
16	Aquatic & Riparian Habitat	Develop policy guidelines to obtain adequate compensation for injured aquatic resources	IDNR-ORC
17	Aquatic & Riparian Habitat	Develop assessment approach and collect data to compensate for injured aquatic resources	IDNR-ORC
19	Aquatic & Riparian Habitat	Enact Aquatic Habitat Stamp on licenses to fund habitat protection	IDNR-ORC
1	Recreation	Enact Aquatic Conservation Stamp on licenses to fund ANS management	IDNR-ORC
2	Recreation	Create invasive species education center as part of the Brandon Road Interbasin Project	IDNR-ORC
4	Recreation	Expand funding for BADD program to create boat access to public waterbodies with underserved focus	IDNR-ORC
5	Recreation	Increase angling opportunities on private property with focus on underserved locations	IDNR-ORC
6	Recreation	Develop mobile app with multitude of angling information	IDNR-ORC
9	Recreation	Develop a new program to allow access for non-motorized boating on private property	IDNR-ORC
2	Long-Term Funding	Establish new Water Resources State Revolving Fund (WRSRF)	IDNR-OWR
8	Water Quality	Protect and Restore Upper MS River	IDNR-OWR
10	Water Quality	Support underserved small public water system infrastructure improvements	IDNR-OWR
5	Climate Change	Research and provide climate impact information to urban and fringe areas	IDNR-OWR
7	Climate Change	Update existing rainfall data	IDNR-OWR
8	Climate Change	Model future climate change related rainfall data	IDNR-OWR
9	Climate Change	Research effects of changing seasonal rainfall impacts on river systems	IDNR-OWR
11	Climate Change	Research and outreach about rapid melt events	IDNR-OWR
1	Integrated Water Mgmt.	Establish the Integrated Water Information Center (IWIC)	IDNR-OWR
2	Integrated Water Mgmt.	Fund and support State Water Plan Task Force	IDNR-OWR
3	Integrated Water Mgmt.	Prioritize funding for water system improvements to underserved communities	IDNR-OWR
5	Integrated Water Mgmt.	Develop consistent funding criteria for all agencies	IDNR-OWR
4	Integrated Water Mgmt.	Reestablish Local Assistance Program to guide underserved communities	IDNR-OWR
7	Integrated Water Mgmt.	Develop methodology for identifying and prioritizing underserved communities	IDNR-OWR
1	Long-Term Funding	Dedicated funding for water resource management planning	IDNR-OWR
3	Long-Term Funding	Establish strategic fund for critical long-term issues	IDNR-OWR
5	Long-Term Funding	Technical and financial support for underserved communities using the Local Assistance Program	IDNR-OWR
7	Long-Term Funding	Support Public-Private Partnerships	IDNR-OWR
1	Water Sustainability	Prioritize services to underserved communities	IDNR-OWR
2	Water Sustainability	Determine sustainable water yield for all water supply sources and share online	IDNR-OWR
3	Water Sustainability	Establish and support regional water supply committees	IDNR-OWR
5	Water Sustainability	Develop minimum stream flow protection for during emergencies	IDNR-OWR
6	Water Sustainability	Update IL Drought Preparedness and Response Plan	IDNR-OWR
1	Lake Michigan	Outreach about Lake MI programs using the Local Assistance Program	IDNR-OWR
2	Lake Michigan	Improve water allocation reporting	IDNR-OWR
3	Lake Michigan	Update Rules regarding water loss and conservation	IDNR-OWR
4	Lake Michigan	Expand Lake MI programs and prioritize services to underserved communities	IDNR-OWR
5	Lake Michigan	Implement water allocation review fees to fund Lake MI Water Allocation Programs	IDNR-OWR
6	Lake Michigan	Establish workgroup for Lake MI water diversion	IDNR-OWR
7	Lake Michigan	Strengthen coastal resiliency with regional management	IDNR-OWR
8	Lake Michigan	Promote coastal tourism and recreation	IDNR-OWR
10	Lake Michigan	Protect and restore coastal habitats	IDNR-OWR
11	Lake Michigan	Evaluate feasibility of alternative energy in Lake MI and define acceptable locations	IDNR-OWR
1	Flood Damage Mitigation	Update rainfall data by modeling future/seasonal data changes	IDNR-OWR
2	Flood Damage Mitigation	Develop a hydraulic model database	IDNR-OWR
4	Flood Damage Mitigation	Develop dynamic inundation mapping for targeted areas in the state	IDNR-OWR
5	Flood Damage Mitigation	Perform structural damage assessments for targeted areas in the state	IDNR-OWR
6	Flood Damage Mitigation	Identify 2 underserved communities per year that require flood planning assistance	IDNR-OWR
7	Flood Damage Mitigation	Develop a pilot urban flood warning system	IDNR-OWR
11	Flood Damage Mitigation	Develop project design for underserved community's flood mitigation plan as a pilot program	IDNR-OWR
12	Flood Damage Mitigation	Provide funding for construction of the flood protection project for underserved communities as a pilot	IDNR-OWR
13	Flood Damage Mitigation	Encourage watershed level planning efforts	IDNR-OWR
14	Flood Damage Mitigation	Adopt statewide building codes	IDNR-OWR
15	Flood Damage Mitigation	Encourage natural and nature-based flood prevention measures	IDNR-OWR
3	Aquatic & Riparian Habitat	Create multi-beneficial floodplains in underserved communities	IDNR-OWR
5	Aquatic & Riparian Habitat	Enhance hydrologic and hydraulic connectivity	IDNR-OWR
6	Aquatic & Riparian Habitat	Enhance landscape connectivity	IDNR-OWR
18	Aquatic & Riparian Habitat	Incorporate climate change flow standards into private water use regulations	IDNR-OWR
20	Aquatic & Riparian Habitat	Establish authority to regulate isolated wetlands	IDNR-OWR

#	Topic	Recommendation	Lead Agency
2	Water Use Laws & Regs.	Propose legislation to regulate water reuse	IDNR-OWR
3	Water Use Laws & Regs.	Propose legislation for water diversions outside of IL	IDNR-OWR
4	Water Use Laws & Regs.	Authorize groundwater management districts	IDNR-OWR
5	Water Use Laws & Regs.	Resolve water use conflicts caused by prolonged drought	IDNR-OWR
7	Water Use Laws & Regs.	Establish authority to regulate isolated wetlands	IDNR-OWR
3	Navigation	Maintain and upgrade locks and dams	IDNR-OWR
6	Navigation	Support USACE channel maintenance dredging programs	IDNR-OWR
8	Navigation	Protect the IMTS environment	IDNR-OWR
17	Erosion & Sedimentation	Enroll more land into the CREP program	IDNR-OWR
2	Data Management	Create working group to explore feasibility of Streamgaging Data Collaborative	IDNR-OWR
7	Recreation	Outreach about waterway access laws & regulations	IDNR-OWR
8	Recreation	Develop a webpage and mobile app focused on low-head dam safety and navigation	IDNR-OWR
1	Water Quality	Support Nutrient Loss Reduction Strategy implementation	IDOA
3	Water Quality	Support voluntary nutrient reduction programs and focus on underserved communities	IDOA
4	Aquatic & Riparian Habitat	Support Nutrient Loss Reduction Strategy	IDOA
1	Water Use Laws & Regs.	Review Water Use Act for success and modify as needed	IDOA
1	Erosion & Sedimentation	Reinvigorate the Soil Erosion and Water Quality Advisory Committee (SEWQAC)	IDOA
2	Erosion & Sedimentation	Expand soil and water conservation program coordination	IDOA
3	Erosion & Sedimentation	Educate industry leaders, invest in STAR program	IDOA
5	Erosion & Sedimentation	Target elementary and higher education with programs about soil erosion & sedimentation	IDOA
6	Erosion & Sedimentation	Establish credentialing and apprenticeship program to train workers for this field	IDOA
7	Erosion & Sedimentation	Statewide erosion/sedimentation survey and BMP recommendations	IDOA
8	Erosion & Sedimentation	Expand staffing to assist local planning and implementation	IDOA
9	Erosion & Sedimentation	Prioritize resources by targeting underserved areas and those with greatest need	IDOA
10	Erosion & Sedimentation	Expand funding to install conservation practices in areas where valid complaint has been filed	IDOA
11	Erosion & Sedimentation	Identify and monitor marginal land use	IDOA
12	Erosion & Sedimentation	Expand outreach efforts about success of infield and edge-of-field practices	IDOA
13	Erosion & Sedimentation	Establish Watershed Councils to reduce nutrient levels	IDOA
14	Erosion & Sedimentation	Establish Watershed Protection grant program	IDOA
15	Erosion & Sedimentation	Identify and secure federal funding for soil erosion and sedimentation reduction efforts	IDOA
16	Erosion & Sedimentation	Expand funding of SESC inspection program to allow more participation	IDOA
18	Erosion & Sedimentation	Develop new and expand existing incentives to encourage participation in soil conservation practices	IDOA
19	Erosion & Sedimentation	Expand research to outline conservation economics and BMPs	IDOA
20	Erosion & Sedimentation	Update IUM to include new technology and maintain accuracy	IDOA
21	Erosion & Sedimentation	Expand funding to support the NLRS programs	IDOA
22	Erosion & Sedimentation	Expand groundwater monitoring of nutrient loss strategies	IDOA
23	Erosion & Sedimentation	Initiate conservation management program	IDOA
24	Erosion & Sedimentation	Expand IDOA staffing to assist in conservation efforts	IDOA
25	Erosion & Sedimentation	Establish IDOA outreach/educational position	IDOA
9	Lake Michigan	Increase transportation of commercial goods and upgrade ports	IDOT
1	Navigation	Maintain and upgrade IMTS infrastructure	IDOT
2	Navigation	Maintain and upgrade port infrastructure	IDOT
4	Navigation	Upgrade bridge alignment and clearance issues	IDOT
5	Navigation	Adopt technology to streamline operations to save costs	IDOT
7	Navigation	Utilize dredged material in infrastructure projects	IDOT
10	Navigation	Establish IDOT Marine Transportation Section	IDOT
6	Water Quality	PFAS and contaminant monitoring in fish	IDPH
9	Water Quality	Outreach for proper well abandonment and water supply protection	IDPH
6	Integrated Water Mgmt.	Expand IMAG collaboration for increased efficiency and consistent funding	IEMA
3	Flood Damage Mitigation	Generate 2-D hydraulic modeling for targeted areas in the state	IEMA
8	Flood Damage Mitigation	Develop GIS-based database of existing flood protective infrastructure and future needs	IEMA
9	Flood Damage Mitigation	Develop outreach tool to help find flood impact funding opportunities	IEMA
10	Flood Damage Mitigation	Assess infrastructure and identify future needs for underserved communities as a pilot program	IEMA
2	Water Quality	Support green infrastructure and water quality programs, and focus on underserved communities	IEPA
4	Water Quality	Support continued operation of USGS "Super Gages"	IEPA
5	Water Quality	Harmful Algal Bloom Monitoring and Nutrient Monitoring in IL River Basin	IEPA
7	Water Quality	Expand groundwater monitoring network to include chronic and emerging health conditions	IEPA
11	Water Quality	Support regionalization efforts of underserved small public water systems	IEPA
12	Water Quality	Support efforts of underserved small public water systems to meet long-term resiliancy	IEPA
4	Long-Term Funding	Mandate that water, wastewater and stormwater providers utilize asset management	IEPA
8	Aquatic & Riparian Habitat	Install more stream gauges to measure flow and water quality	IEPA
15	Aquatic & Riparian Habitat	Develop biological indices in underrepresented habitats and biota	IEPA
4	Erosion & Sedimentation	Update and expand the Illinois Urban Manual program	IEPA

#	Topic	Recommendation	Lead Agency
13	Water Quality	Expand stream and groundwater monitoring to test for emerging WQ issues	ISWS
14	Water Quality	Water Quality Outreach and Education through IWIC	ISWS
1	Climate Change	Expand climate monitoring sites in sensitive areas - suburban, urban and agricultural areas	ISWS
2	Climate Change	Develop web-based climate toolkits	ISWS
3	Climate Change	Develop detailed local climate models	ISWS
4	Climate Change	Research and develop online tools to illustrate concurrent climate events	ISWS
6	Climate Change	Research and develop online tools to illustrate how agricultural practices affect crops and climate	ISWS
10	Climate Change	Evaluate impacts and provide information about flash droughts	ISWS
4	Water Sustainability	Study evaporation impacts from climate change	ISWS
7	Water Sustainability	Improve water use accuracy with outreach and metering	ISWS
9	Navigation	Navigation Outreach and Education using IWIC	ISWS
1	Data Management	Assess streamgage network ability to meet current and future water data needs for everyone	ISWS
6	Water Use Laws & Regs.	Meter high capacity well water use	ISWS
13	Aquatic & Riparian Habitat	Interagency monitoring data database	TBD
3	Data Management	Develop central location to view data using IWIC	TBD

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APPENDIX E

CROSS-CUTTING GRAPHICS

The following charts illustrate how recommendations from one topic impact the other critical topics. Since they are so common, recommendations that had one or two connection impacts were not illustrated. These graphics illustrate the recommendations with larger cross-cutting impacts.

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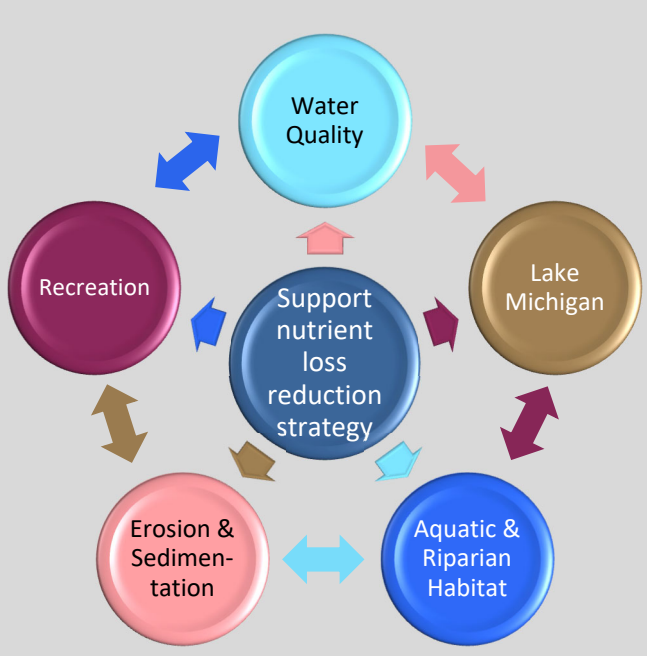
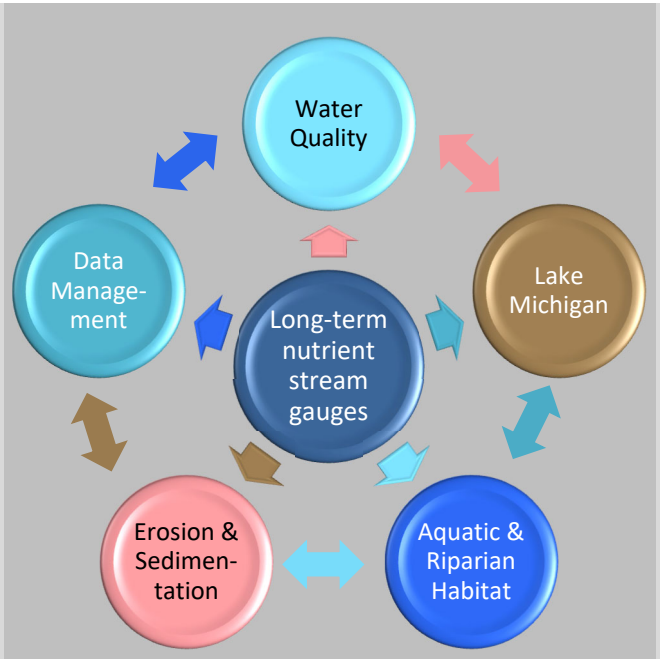
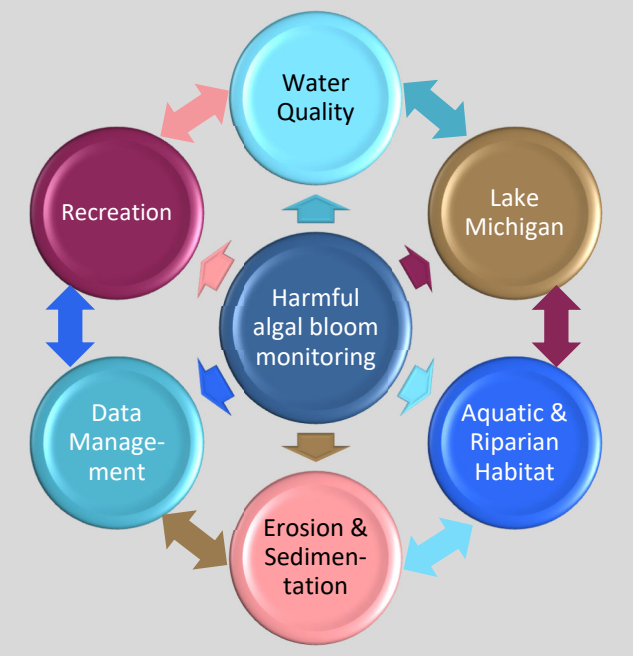
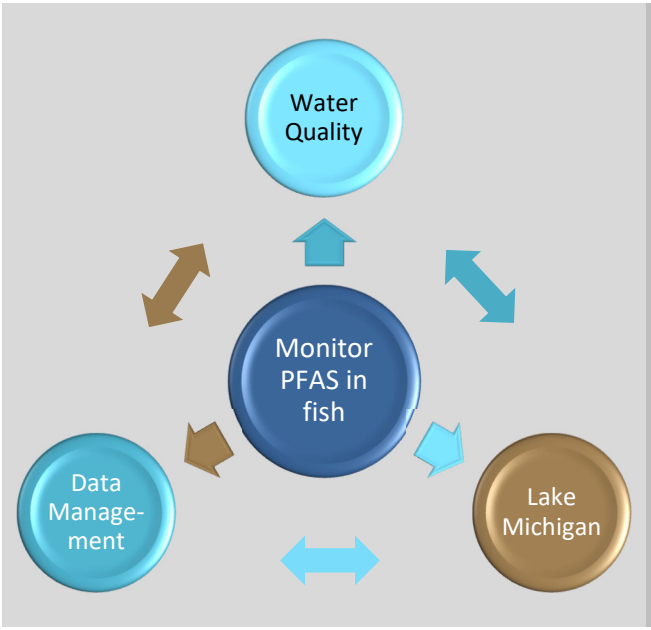
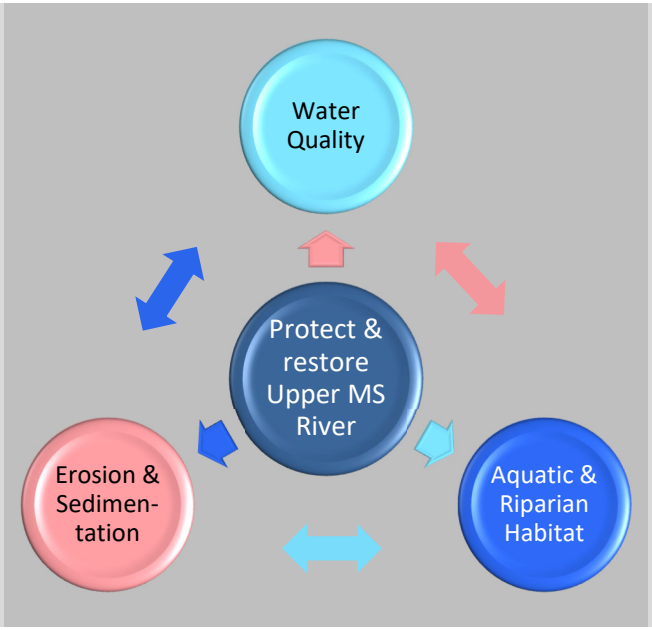
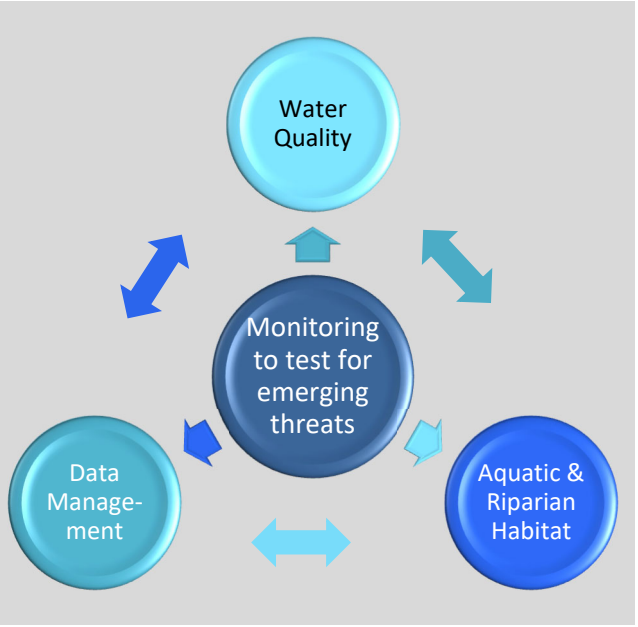

Water Quality
Recreation
Support nutrient loss reduction strategy
Lake Michigan
Erosion & Sedimen-tation
Aquatic & Riparian Habitat

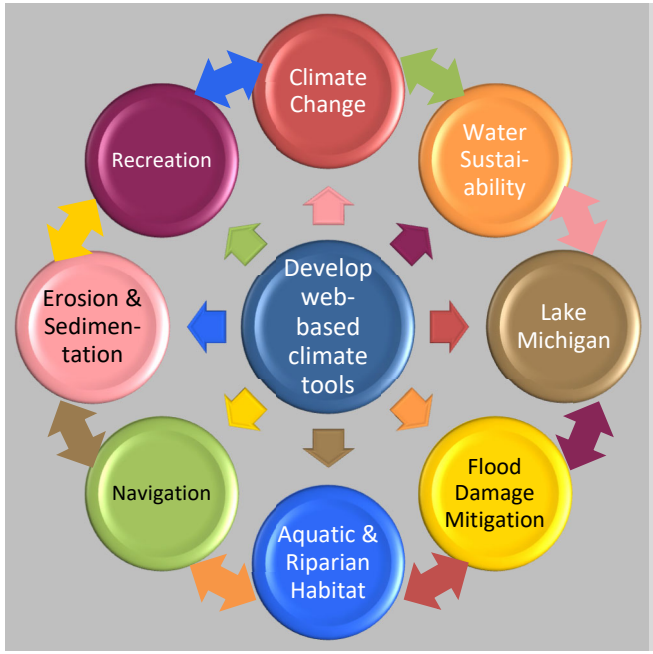

Water Quality
Data Manage-ment
Long-term nutrient stream gauges
Lake Michigan
Erosion & Sedimen-tation
Aquatic & Riparian Habitat

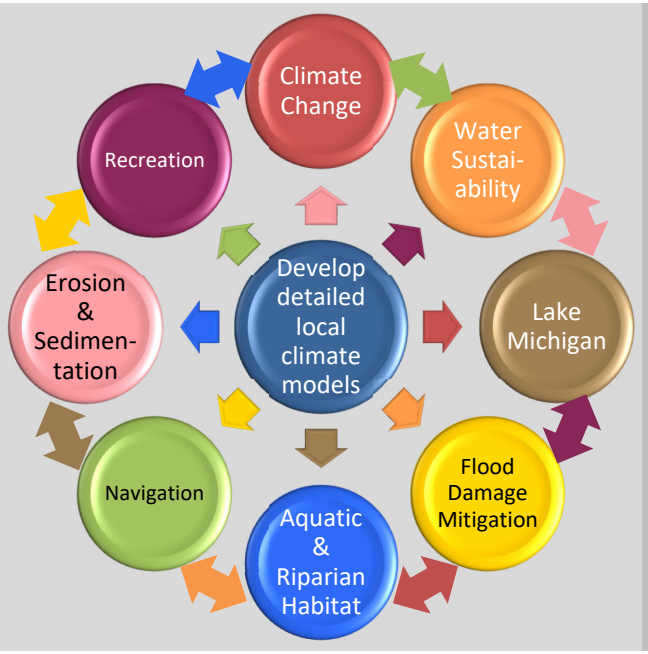

Water Quality
Recreation
Lake Michigan
Harmful algal bloom monitoring
Data Manage-ment
Aquatic & Riparian Habitat
Erosion & Sedimen-tation

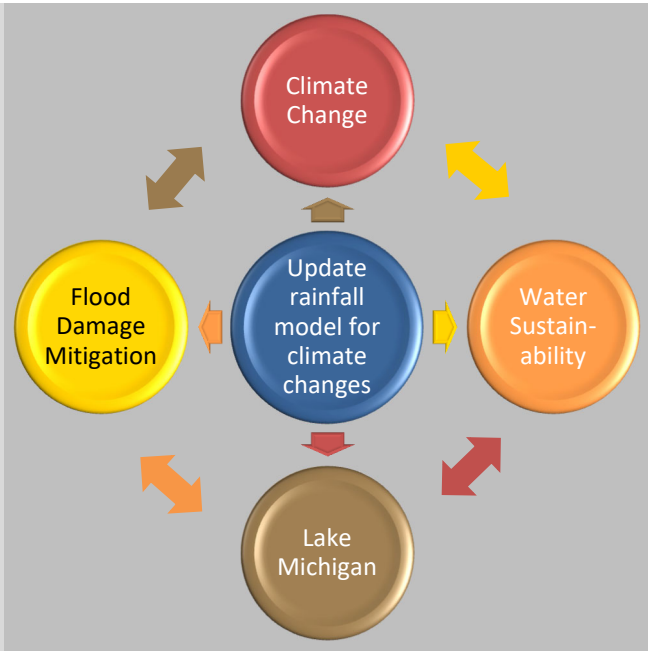

Water Quality
Monitor PFAS in fish
Data Manage-ment
Lake Michigan

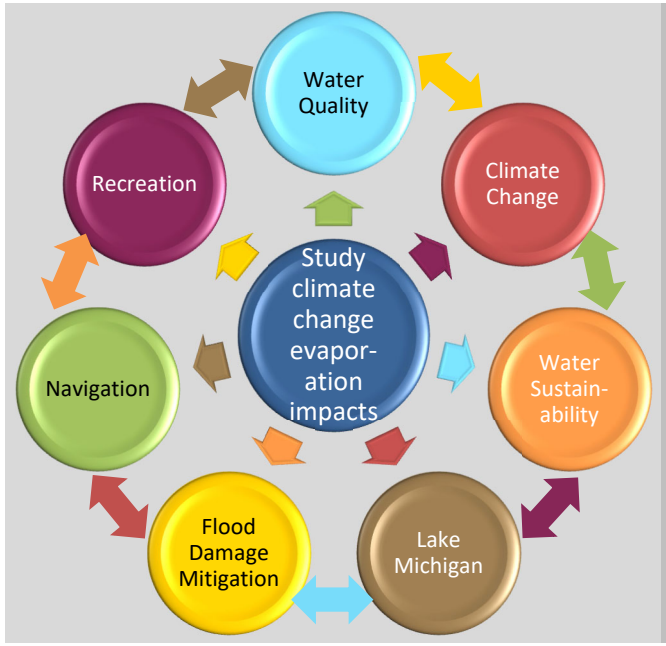

Water Quality
Protect & restore Upper MS River
Erosion & Sedimen-tation
Aquatic & Riparian Habitat

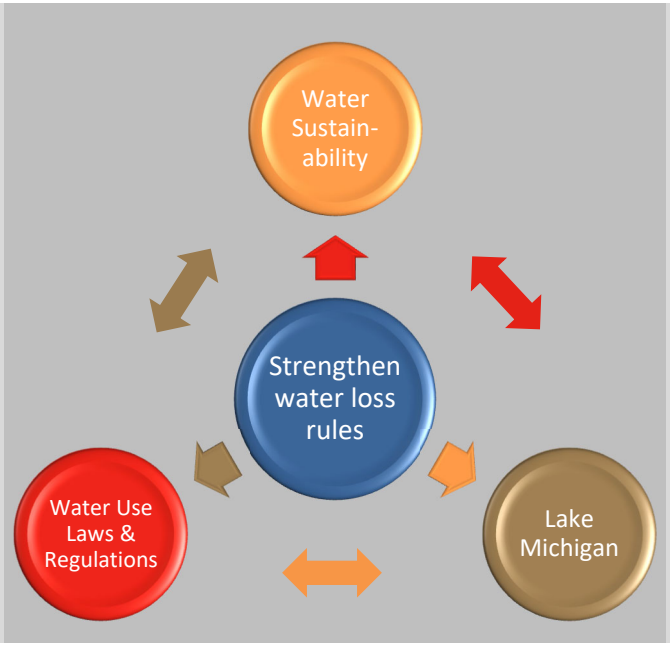

Water Quality
Monitoring to test for emerging threats
Data Manage-ment
Aquatic & Riparian Habitat

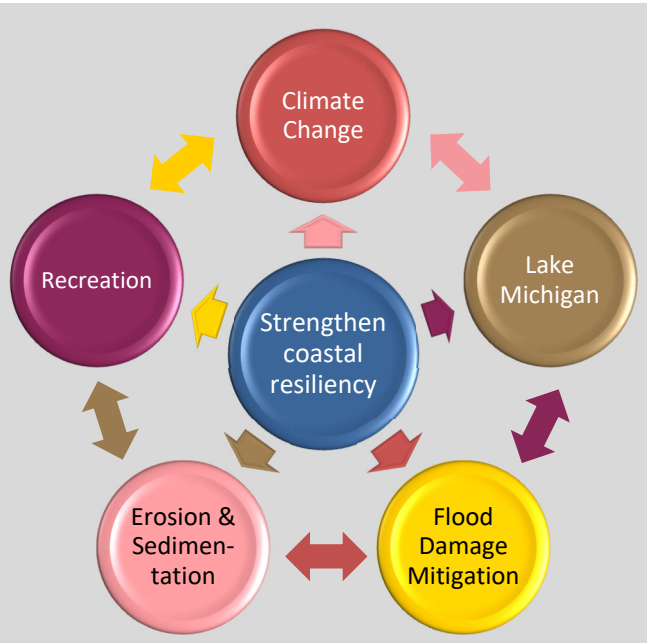

Climate Change
Water Sustai-ability
Lake Michigan
Flood Damage Mitigation
Aquatic & Riparian Habitat
Navigation
Erosion & Sedimen-tation
Recreation
Develop web-based climate tools


Climate Change
Water Sustai-ability
Lake Michigan
Flood Damage Mitigation
Aquatic & Riparian Habitat
Navigation
Erosion & Sedimen-tation
Recreation
Develop detailed local climate models

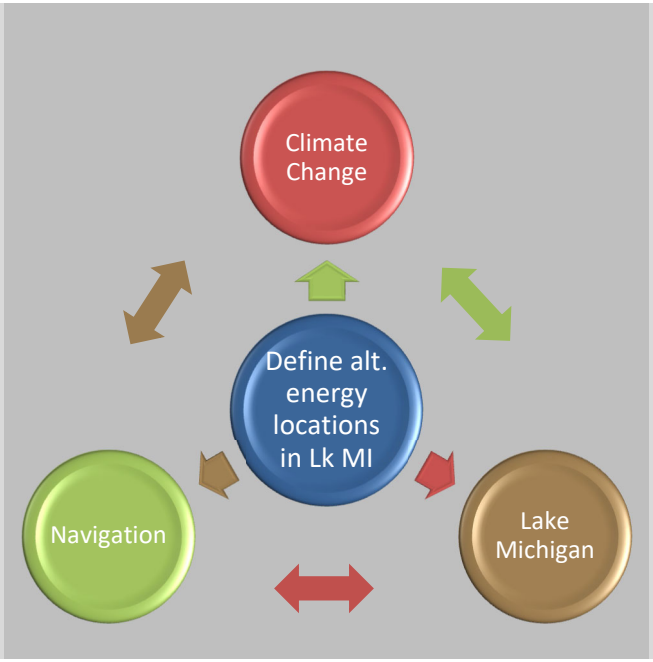

Climate Change
Water Sustain-ability
Lake Michigan
Flood Damage Mitigation
Update rainfall model for climate changes


Water Quality
Climate Change
Water Sustain-ability
Lake Michigan
Flood Damage Mitigation
Navigation
Recreation
Study climate change evapor-ation impacts


Water Sustain-ability
Lake Michigan
Water Use Laws & Regulations
Strengthen water loss rules

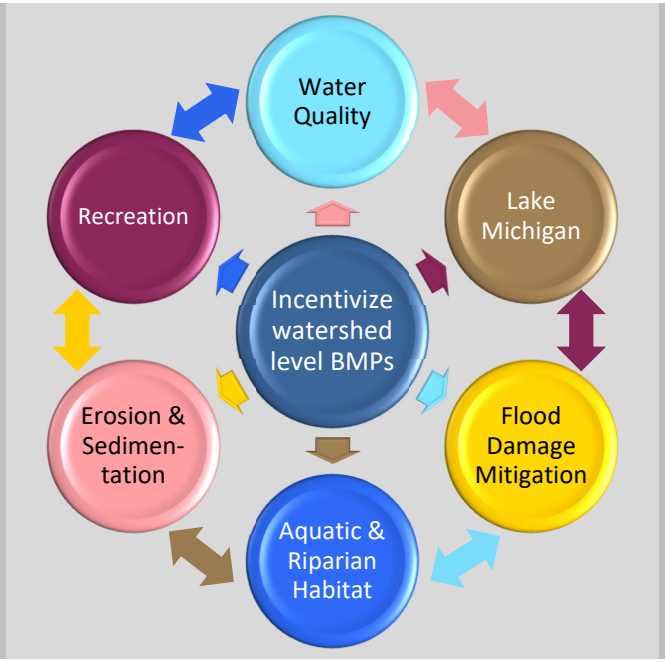

Climate Change
Lake Michigan
Flood Damage Mitigation
Erosion & Sedimen-tation
Recreation
Strengthen coastal resiliency


Water Quality
Lake Michigan
Flood Damage Mitigation
Aquatic & Riparian Habitat
Erosion & Sedimen-tation
Recreation
Protect and restore coastal habitats

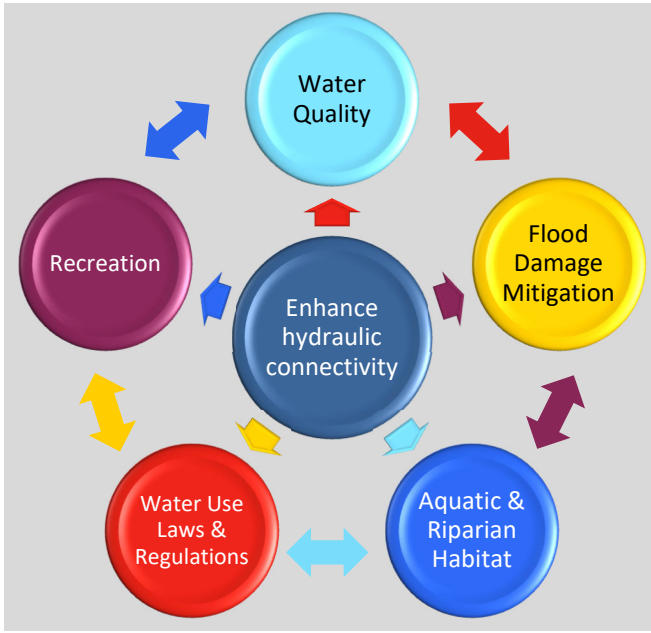

Climate Change
Lake Michigan
Navigation
Define alt. energy locations in Lk MI

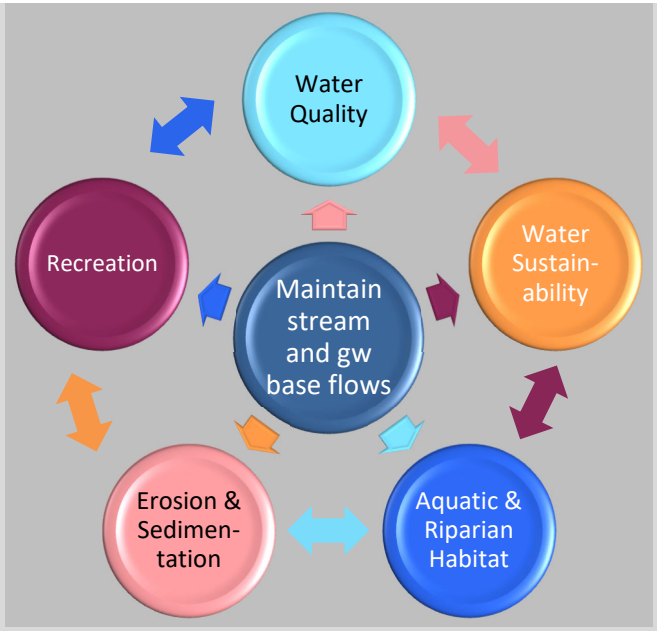

Water Quality
Flood Damage Mitigation
Aquatic & Riparian Habitat
Erosion & Sedimen-tation
Encourage watershed-level planning

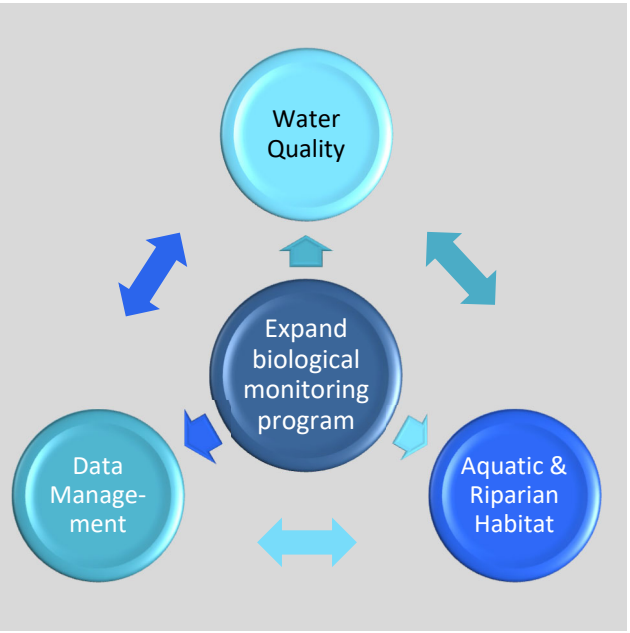

Water Quality
Lake Michigan
Flood Damage Mitigation
Aquatic & Riparian Habitat
Water Use Laws & Regulations
Erosion & Sedimen-tation
Recreation
Encourage nature-based flood protection

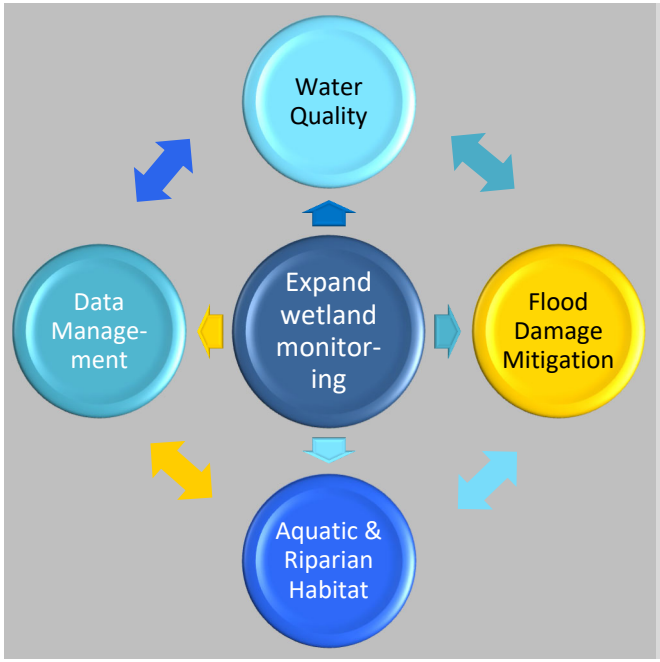

Water Quality
Lake Michigan
Flood Damage Mitigation
Aquatic & Riparian Habitat
Erosion & Sedimen-tation
Recreation
Incentivize watershed level BMPs

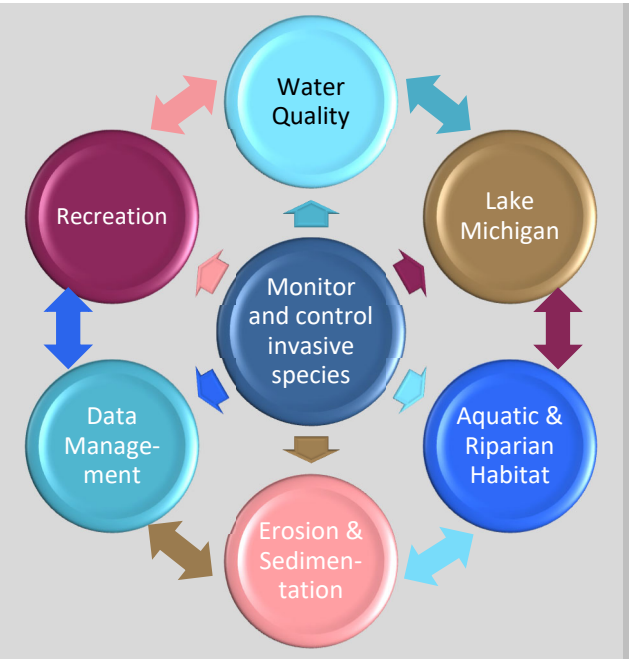

Water Quality
Flood Damage Mitigation
Aquatic & Riparian Habitat
Erosion & Sedimen-tation
Recreation
Create multi-beneficial floodplains

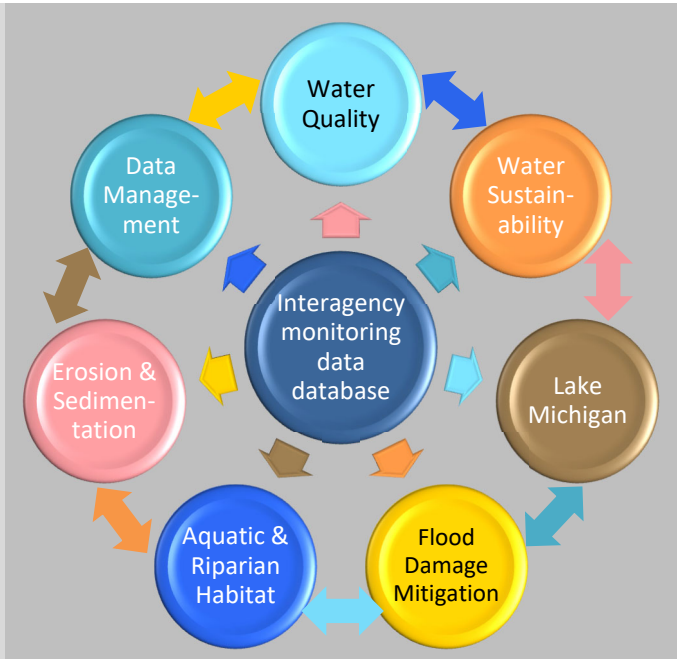

Water Quality
Recreation
Enhance hydraulic connectivity
Flood Damage Mitigation
Water Use Laws & Regulations
Aquatic & Riparian Habitat

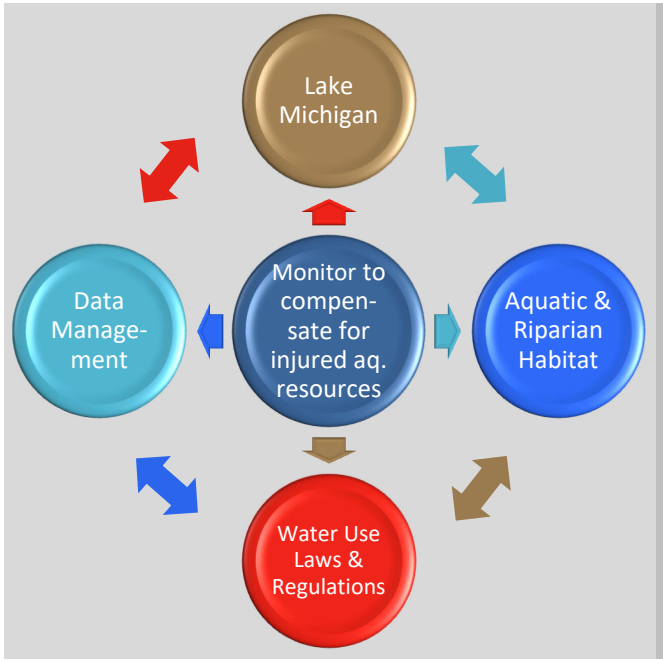

Water Quality
Recreation
Maintain stream and gw base flows
Water Sustain-ability
Erosion & Sedimen-tation
Aquatic & Riparian Habitat

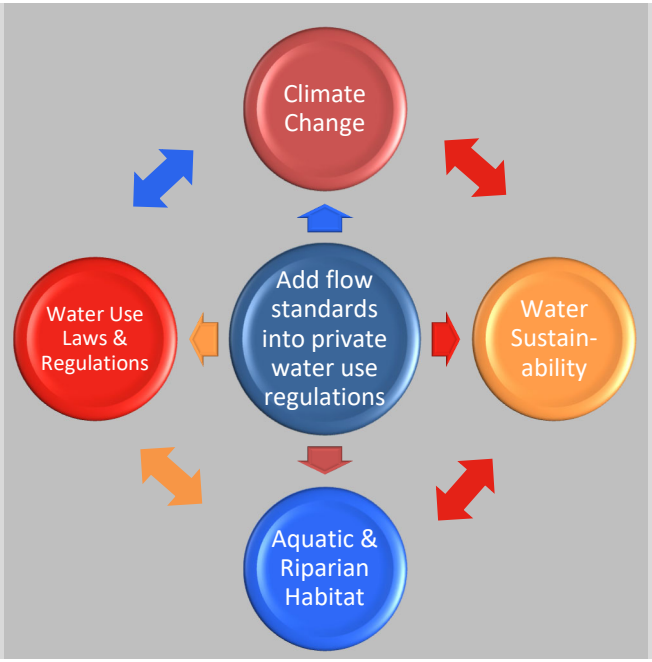

Water Quality
Expand biological monitoring program
Data Manage-ment
Aquatic & Riparian Habitat

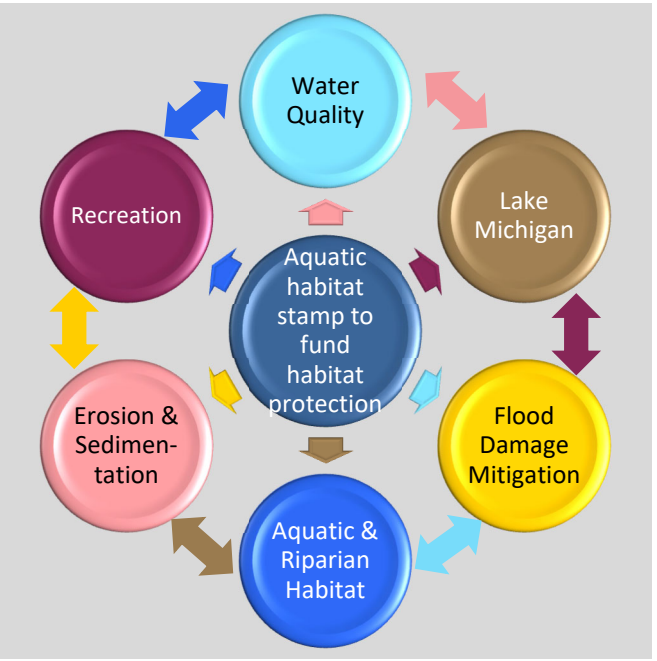

Water Quality
Data Manage-ment
Expand wetland monitor-ing
Flood Damage Mitigation
Aquatic & Riparian Habitat

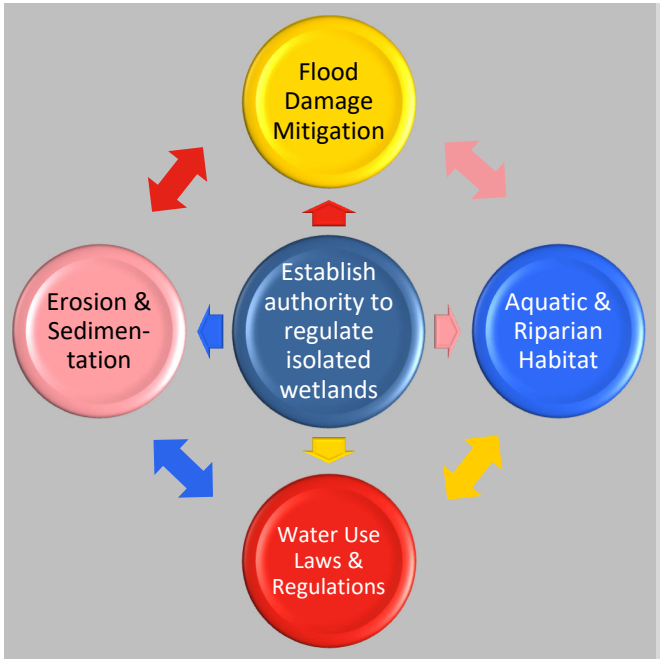

Water Quality
Recreation
Lake Michigan
Monitor and control invasive species
Data Manage-ment
Aquatic & Riparian Habitat
Erosion & Sedimen-tation

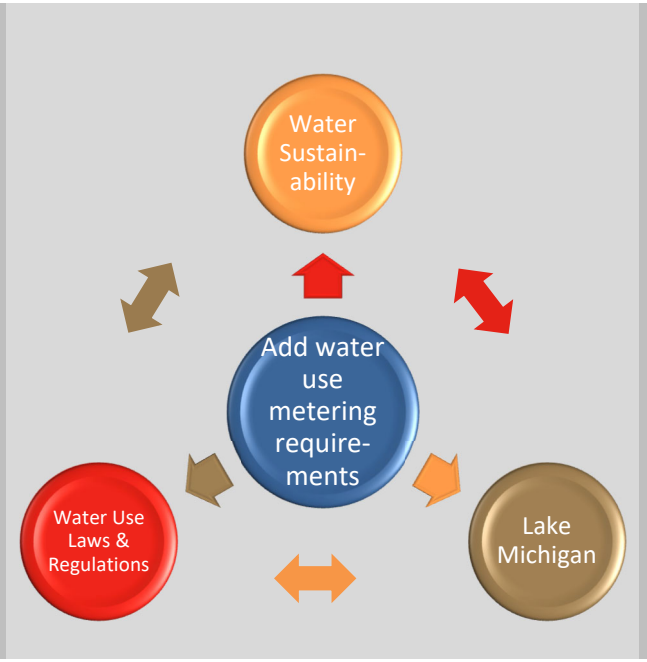

Water Quality
Data Manage-ment
Water Sustain-ability
Interagency monitoring data database
Erosion & Sedimen-tation
Lake Michigan
Aquatic & Riparian Habitat
Flood Damage Mitigation

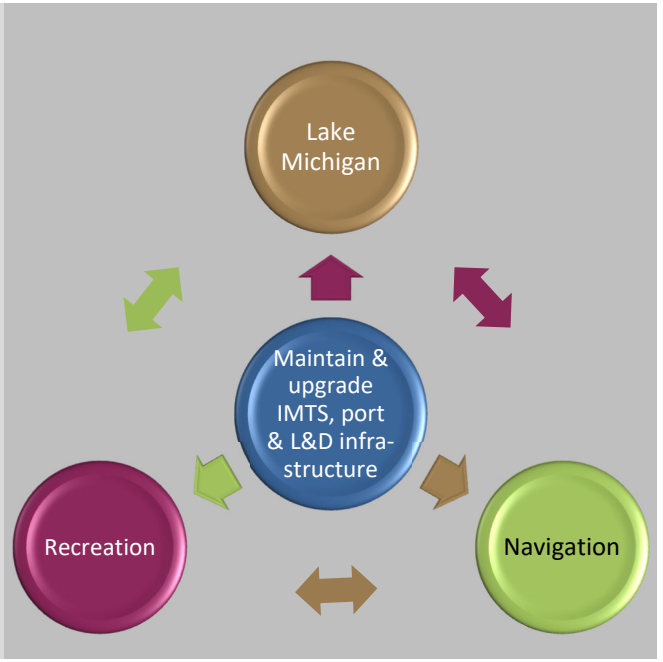

Lake Michigan
Data Manage-ment
Monitor to compen-sate for injured aq. resources
Aquatic & Riparian Habitat
Water Use Laws & Regulations

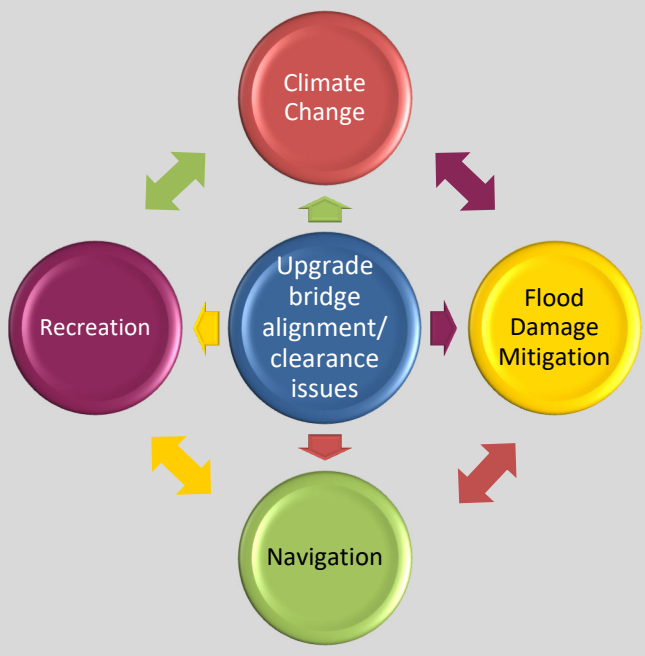

Climate Change
Water Use Laws & Regulations
Add flow standards into private water use regulations
Water Sustain-ability
Aquatic & Riparian Habitat

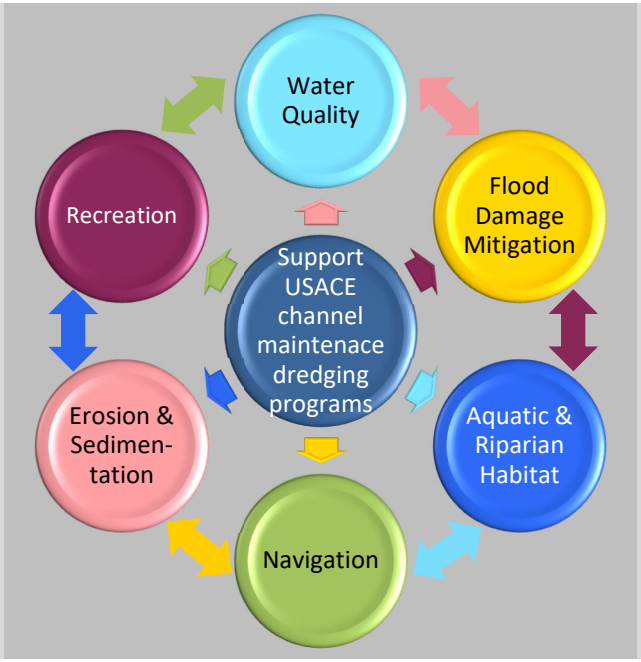

Water Quality
Recreation
Lake Michigan
Aquatic habitat stamp to fund habitat protection
Erosion & Sedimen-tation
Flood Damage Mitigation
Aquatic & Riparian Habitat

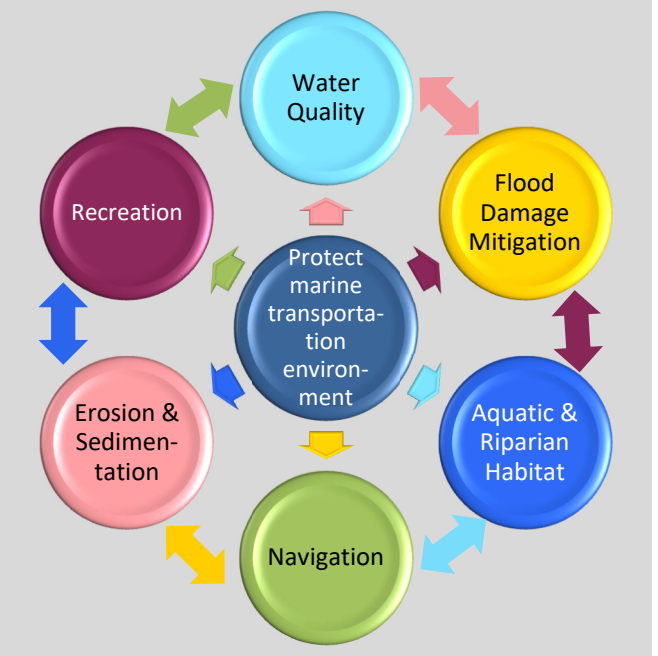

Flood Damage Mitigation
Erosion & Sedimen-tation
Establish authority to regulate isolated wetlands
Aquatic & Riparian Habitat
Water Use Laws & Regulations

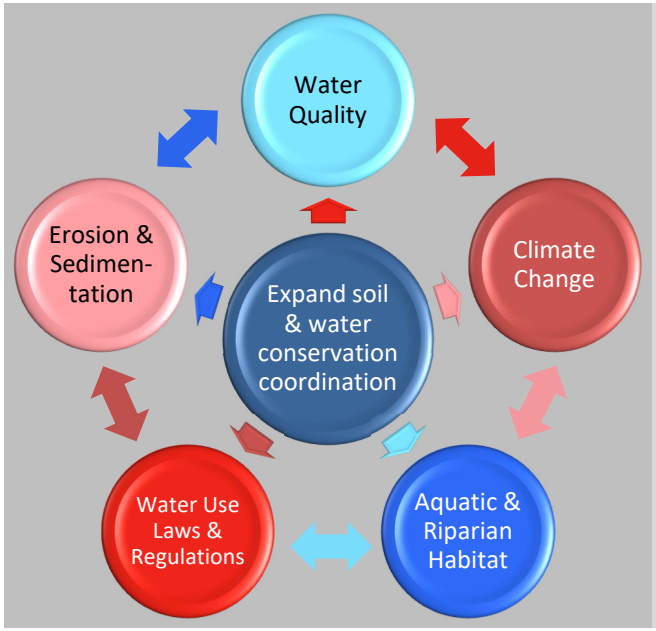

Water Sustain-ability
Add water use metering require-ments
Water Use Laws & Regulations
Lake Michigan

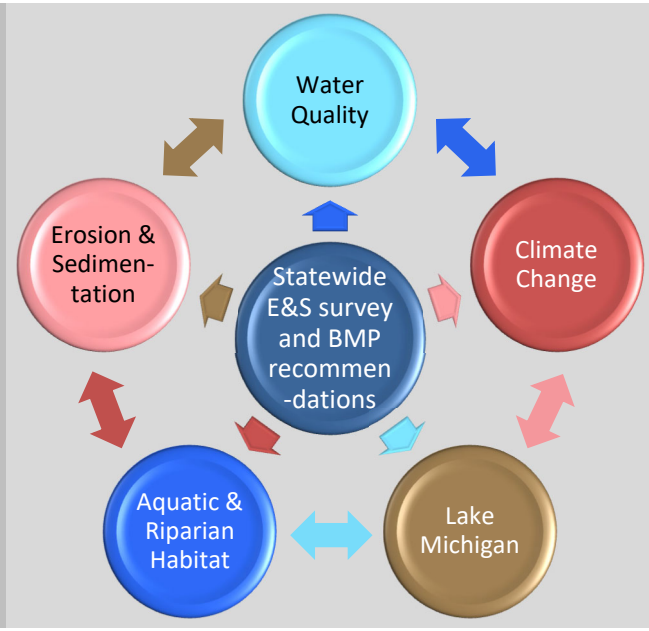

Lake Michigan
Maintain & upgrade IMTS, port & L&D infra-structure
Recreation
Navigation

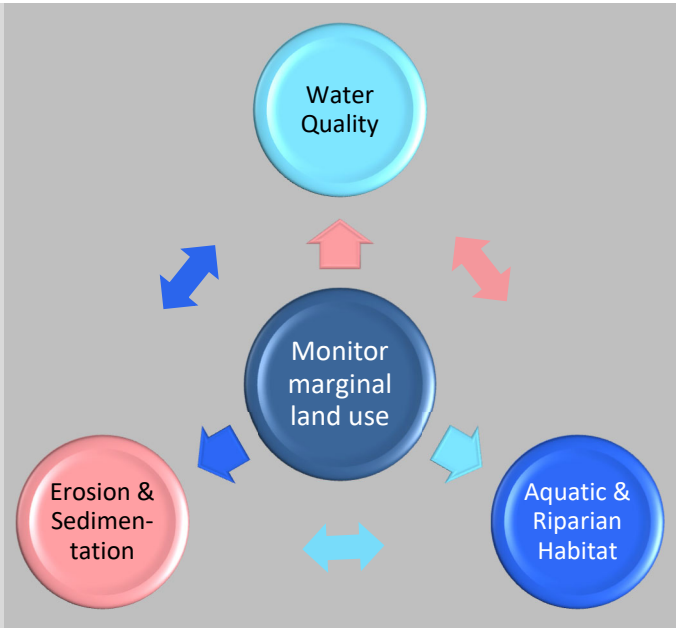

Climate Change
Recreation
Upgrade bridge alignment/ clearance issues
Flood Damage Mitigation
Navigation

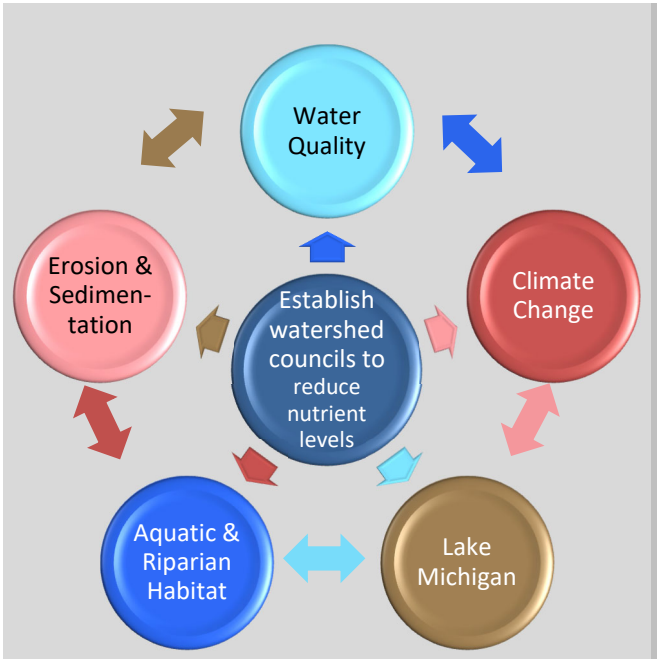

Water Quality
Recreation
Flood Damage Mitigation
Support USACE channel maintenace dredging programs
Erosion & Sedimen-tation
Aquatic & Riparian Habitat
Navigation

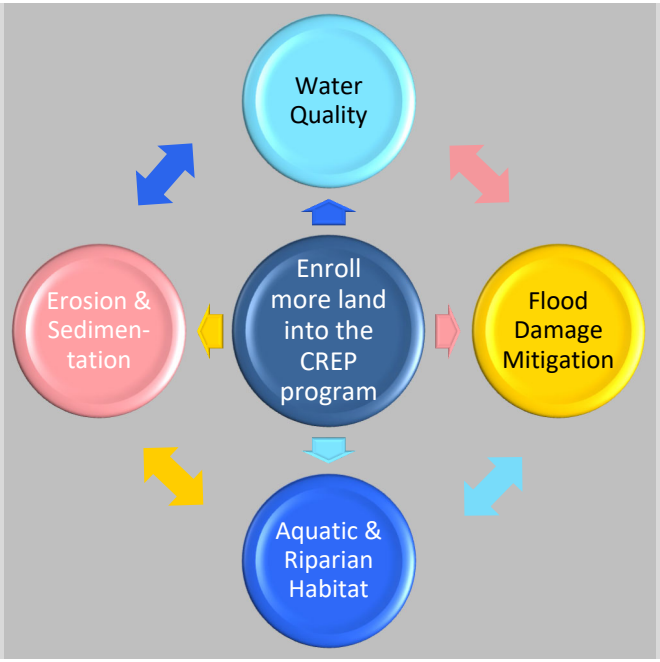

Water Quality
Recreation
Flood Damage Mitigation
Protect marine transporta-tion environ-ment
Erosion & Sedimen-tation
Aquatic & Riparian Habitat
Navigation

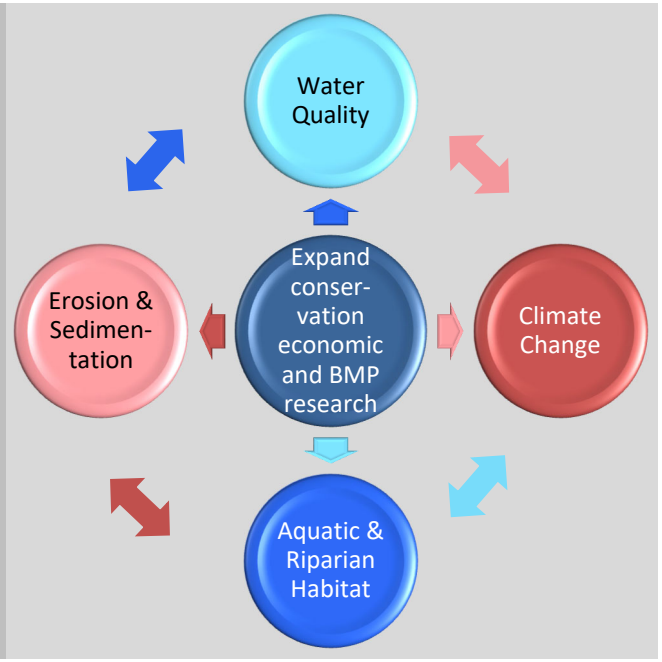

Water Quality
Erosion & Sedimen-tation
Climate Change
Expand soil & water conservation coordination
Water Use Laws & Regulations
Aquatic & Riparian Habitat


Water Quality
Erosion & Sedimen-tation
Climate Change
Statewide E&S survey and BMP recommen-dations
Aquatic & Riparian Habitat
Lake Michigan

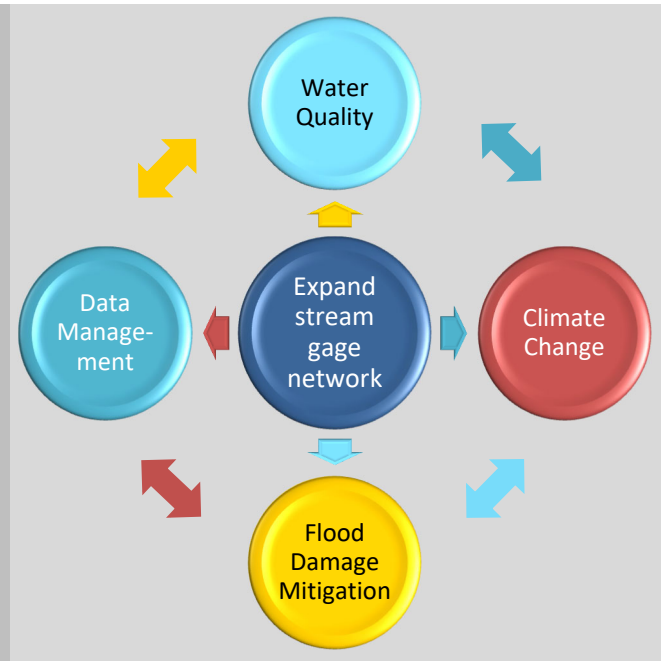

Water Quality
Monitor marginal land use
Erosion & Sedimen-tation
Aquatic & Riparian Habitat

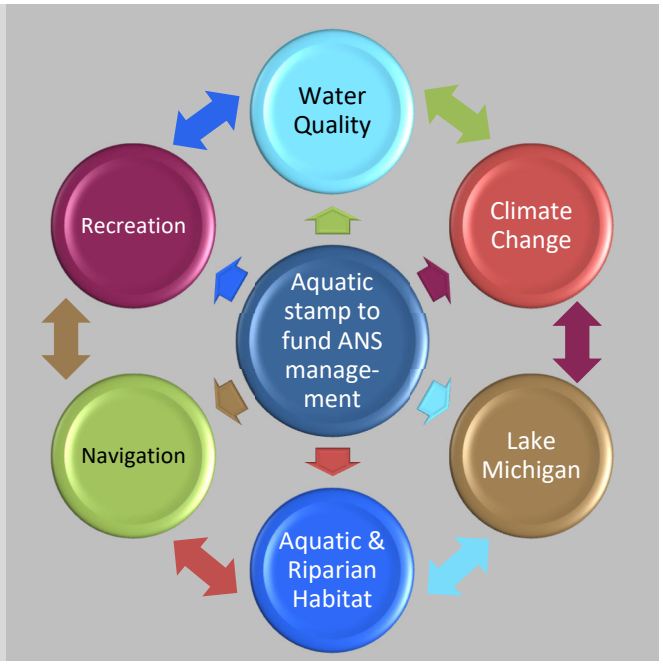

Water Quality
Erosion & Sedimen-tation
Establish watershed councils to reduce nutrient levels
Climate Change
Aquatic & Riparian Habitat
Lake Michigan

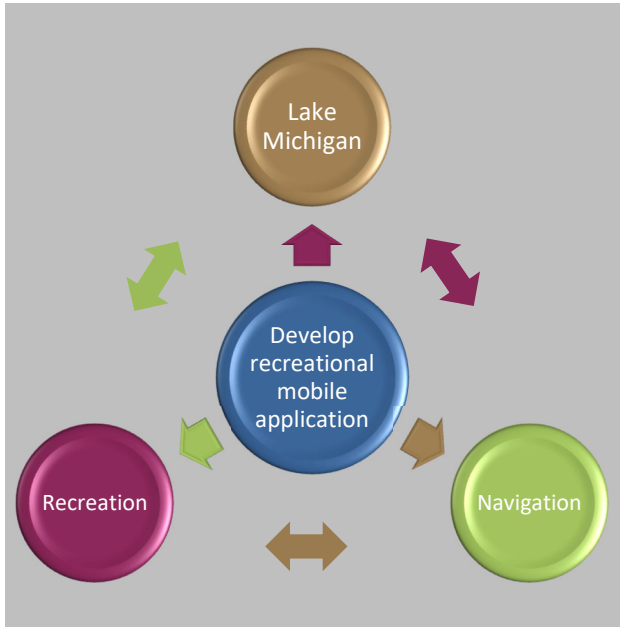

Water Quality
Erosion & Sedimen-tation
Enroll more land into the CREP program
Flood Damage Mitigation
Aquatic & Riparian Habitat


Water Quality
Erosion & Sedimen-tation
Expand conser-vation economic and BMP research
Climate Change
Aquatic & Riparian Habitat


Water Quality
Erosion & Sedimen-tation
Initiate IDOA conservation management program
Lake Michigan
Aquatic & Riparian Habitat


Water Quality
Data Manage-ment
Expand stream gage network
Climate Change
Flood Damage Mitigation


Water Quality
Recreation
Climate Change
Aquatic stamp to fund ANS manage-ment
Navigation
Lake Michigan
Aquatic & Riparian Habitat


Lake Michigan
Develop recreational mobile application
Recreation
Navigation