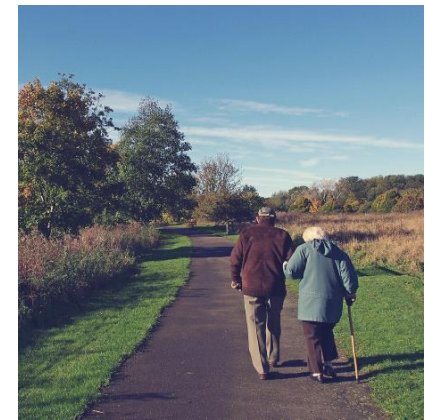
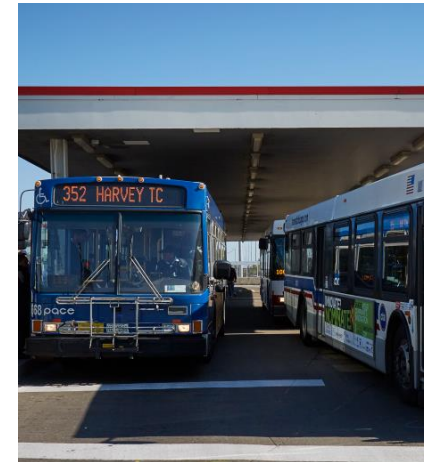


NWPA Water Supply Sustainability Plan: Landscape efficiency strategy

NWPA TAC Meeting
November 28, 2023



Agenda

Strategy overview

- Overview of measures (including potential water savings and current levels of implementation)

Baseline information

- Target audience
- Baseline water use

Water savings estimates

WSSP selected strategies

- Residential Sector
 - Residential retrofits - Single Family
 - Residential outdoor water use (landscape efficiency) - Single Family
 - Residential new construction
- System
 - Water loss control
 - Costing & Pricing
- Commercial, Industrial and Institutional (CII) Sector
- Information & Education

Landscape efficiency strategy

Strategy goal

NWPA communities will voluntarily adopt and promote landscaping and irrigation technologies, practices, and policies to help reduce residential outdoor water use.

Measures and targeted behaviors

Measures	Targeted behaviors
Water-efficient landscaping	Curb the use of water and waste from water-intensive landscapes and inefficient landscape maintenance and watering practices
Efficient irrigation system and maintenance	Reduce water loss and waste from inefficient and poorly managed irrigation systems and technologies
Watering restrictions (i.e., NWPA lawn watering ordinance)	Manage peak water demand and curb the use of water and waste from inefficient watering practices (esp. during summer months and times of drought)

Water-efficient landscaping

Water-efficient landscaping

Using site design, landscape materials, and maintenance practices – based on local climate and conditions – to lower water use:

- Site grading
- Using ground covers (e.g., mulch)
- Using native plants (including rain gardens and less water-intensive turf grass varieties)
- Using little to no turf grass
- Implementing natural lawn care (e.g., aeration, soil amendments, mowing grass high, natural pesticides, efficient irrigation, etc.)



Images source: US EPA WaterSense

Landscape transformations/conversions

Transforming/converting a traditional turf-dominated (water-intensive) landscape into a more water-efficient one.

Commons types of conversion/transformations

- Full removal of turf grass (xeriscaping)
- Replacing turf grass with less water-intensive turf grass varieties
- Replacing some or all turf grass with native plants and other less water-intensive ground covers

Water-efficient landscaping: Implementation approaches

Implementation approach	What does the approach entail?	Who can implement the approach?
Technical assistance	Landscape site consultations/assessments/audit	County, municipality, third-party partner/contractor
Financial incentives	Rebates, discounts, or credits to create and maintain a water-efficient landscape (e.g., remove turf, use water-efficient plants, install irrigation controllers)	County, municipality, public utility
Education and training	Plant selection, watering, and landscaping techniques	County, municipality, third-party (including non-profits, research/educational institutions)
Ordinances	Requirements on turf coverage, use of native plants	County or municipality

Water-efficient landscaping: Potential water savings

Measures	Estimated outdoor water use savings
<p>Use of water-efficient landscaping practices</p> <ul style="list-style-type: none">• Grading landscape outdoor areas• Using native plants (including rain gardens and less water-intensive turf grass varieties), ground covers (e.g., mulch)• Using little to no turf grass• Implementing natural lawn care (e.g., aeration, soil amendments, mowing grass high, natural pesticides, efficient irrigation, etc.)	20-50% of outdoor water use for residential properties (Vickers, 2001)
<p>Participation in landscape transformation programs</p> <ul style="list-style-type: none">• Turf removal• Site consultations• Irrigation equipment incentives• Free mulching materials	26.5% of residential outdoor water use, on average (AWE, 2015)

Water-efficient landscaping: Case studies

Landscape transformation programs	Implementation approaches used	Estimated outdoor water use savings
<p>Healthy Landscape Assessment – Guelph, Canada</p> <ul style="list-style-type: none">Assist residents in establishing low water and natural pesticide-free outdoor areas	<ul style="list-style-type: none">Technical assistance (site consultation)Education (e.g., attract pollinators, build a rain garden, garden, mulch)	6.9% savings in residential outdoor water use (10.3 gpd/meter)
<p>Sustainable Landscapes – San Diego County, CA</p> <ul style="list-style-type: none">Requires conversion of turf areas into water-smart landscapes using rainwater capture/detention, soil enhancements, climate-appropriate plants, and water-efficient irrigation methods	<ul style="list-style-type: none">Financial incentives (per sq. ft. transformed)Education/training (e.g., transformation classes, workshops, online videos)	34.8% savings in residential outdoor water use (114.8 gpd/meter)

Water-efficient landscaping: Current levels of implementation

The Conservation Foundation's Conservation @Home Program

- Membership program that encourages residents to replace some turf grass with native plants
- Participation rate: 3,200 sites across the Chicago region

Lawn to Lake Midwest Program

- Educational program that promotes healthy lawn and landscape practices in the Great Lakes region
- Participation rate: Unknown

Efficient irrigation systems and management

Efficient irrigation systems and management

Use and management of efficient irrigation technologies/systems to avoid overwatering and reduce water waste:

- Use of smart irrigation devices/controllers that respond to weather and soil conditions
- Checking/monitoring for breaks and leaks
- System/device adjustments for direct water application/coverage
- System winterization



Images source: US EPA WaterSense

Efficient irrigation systems/management: Implementation approaches

Implementation approach	What does the approach entail?	Who can implement the approach?
Technical assistance	Home or irrigation system water audits to identify breaks/leaks and other irrigation system improvements	Certified/registered irrigation professional (county, municipality, third-party partner/contractor)
Financial incentives	Rebates, discounts, or credits to offset the purchase/installation of water-efficient irrigation systems/controllers	County, municipality, water utility
Ordinances	Require the installation/use of water-efficient irrigation systems/devices	Municipality

Efficient irrigation systems/management: Potential water savings

Measures	Estimated outdoor water use savings
<p>Performing landscape irrigation water audits Audit landscape and irrigation systems to address leaks, correct malfunctioning irrigation controllers, adjust watering schedules, and install hardware such as automatic shut-off valves.</p>	<p>10-15% of outdoor water use (Vickers, 2001) 1,918 gallons annually (AWWA, 1992)*</p>
<p>Irrigation system weatherization and other management practices</p>	<p>Potential savings unknown</p>
<p>Installation/use of irrigation devices</p> <ul style="list-style-type: none"> • Irrigation controllers on conventional sprinkler systems • Soil-moisture sensors/probes • Drip irrigation (non-turf only) compared to conventional systems • WaterSense-labeled weather-based smart irrigation controllers • WaterSense-labeled soil moisture-based smart irrigation controllers 	<p>Water use savings vary by device:</p> <ul style="list-style-type: none"> • 10-15% of residential outdoor water use • 5-10% of residential outdoor water use • 25-75% of water used on non-turf areas • 7,600 gallons annually per household • 15,000 gallons annually per household

*Estimated water savings attributed to outdoor landscape/irrigation auditing from a comprehensive home water audit (indoor and outdoor).

Efficient irrigation systems/management: Current levels of implementation

Local policies promoting the use/installation of irrigation controllers:

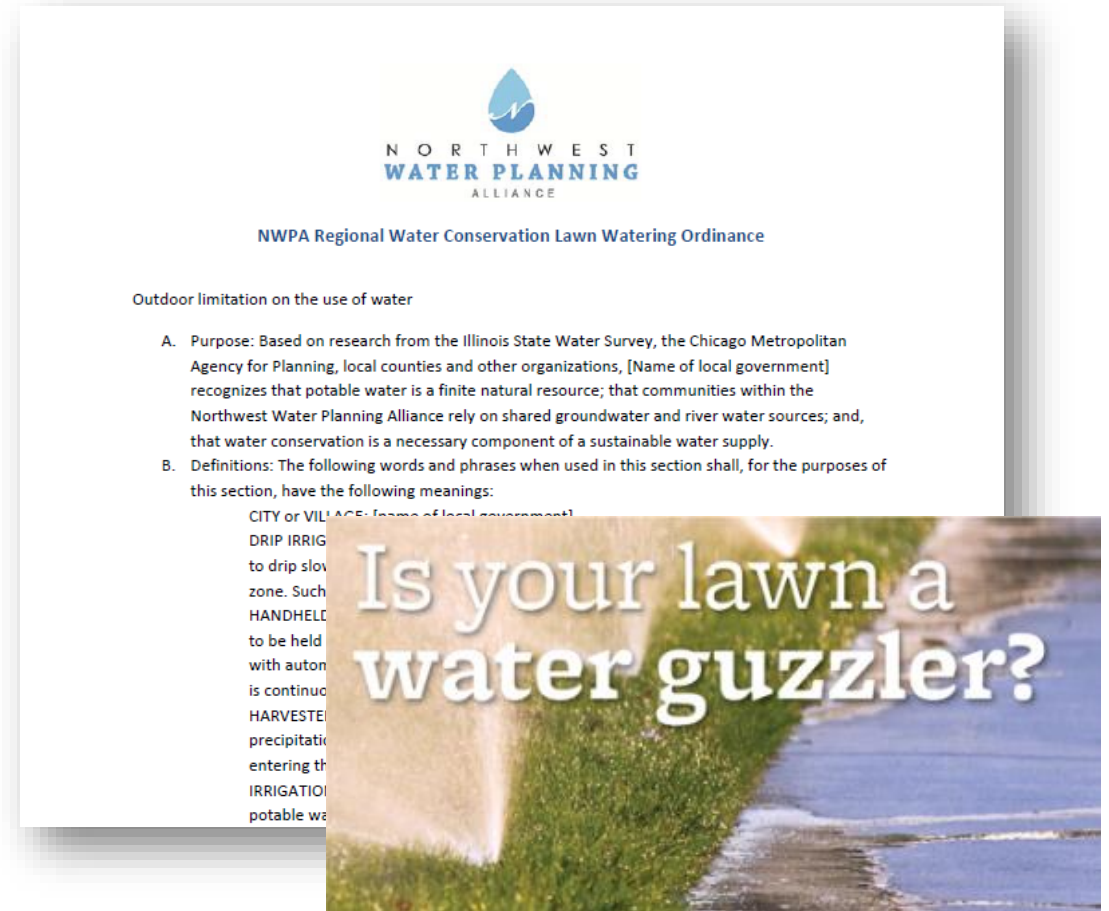
- 10 communities adopted policies between 2015 and 2021 requiring irrigation controllers to be WaterSense-certified
- 21 communities have the NWPA ordinance's water restriction exemptions (includes water-efficient devices like shut-off nozzles, drip irrigation, etc.)
- 3 communities have both

Watering restrictions

Watering restrictions

Local ordinance provisions that regulate water scheduling (timing and frequency) to lower water use and minimize water waste:

- Enforcement periods
- Time restrictions
- Seed and sod restrictions
- Emergency proclamations
- Prohibition of water waste



Watering restrictions: Implementation approaches

Implementation approach	What does the approach entail?
Education and outreach	Information campaigns, paper notifications/flyers, social media posts, etc.
Enforcement	Alerts, non-compliance warnings; inspections or metering use for compliance; tickets, fees/fines if not in compliance

Watering restrictions: Potential water savings

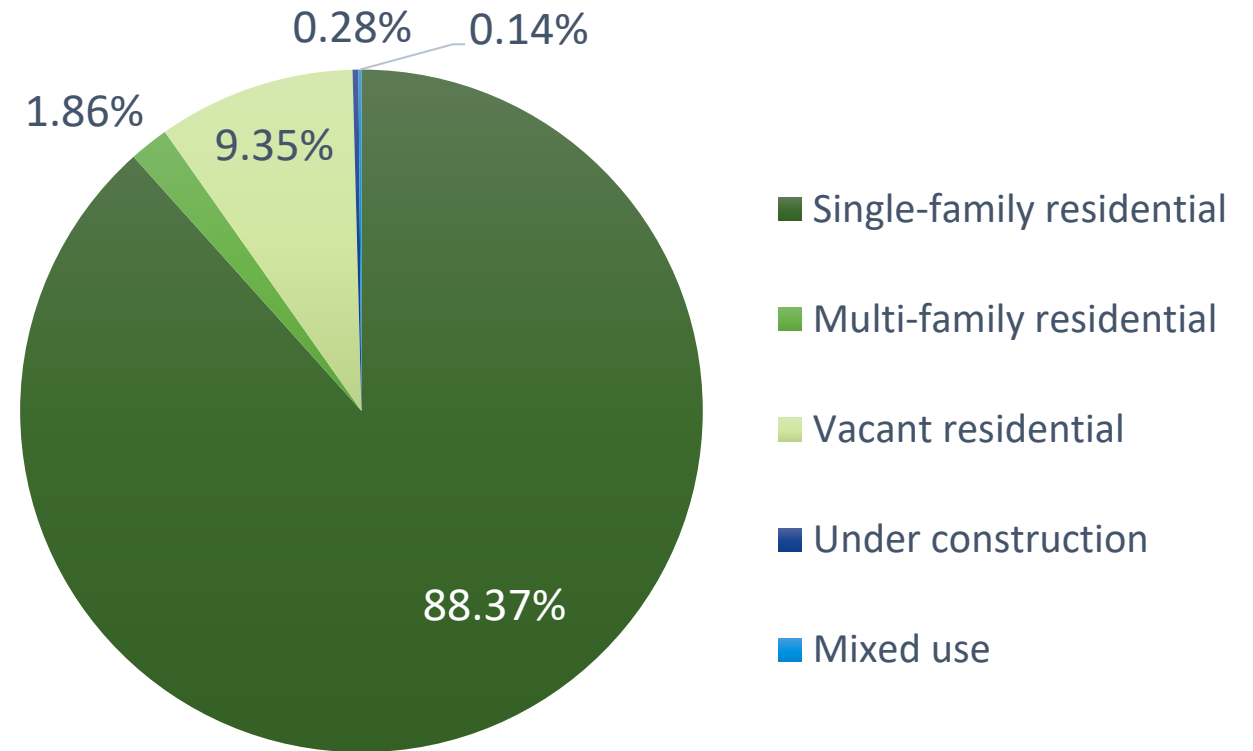
Measures	Implementation approaches used	Estimated outdoor water use savings
NWPA Ordinance – Aurora	Enforcement	20 GPCD water demand
NWPA Ordinance – color-coded restrictions (only)	Enforcement	2-3 MGD in water use during summer months
Texas water ordinance – consecutive day restrictions (2x a week)	Education and enforcement	Total residential water demand savings varies with education and enforcement levels: <ul style="list-style-type: none"> • Low = 7.5% • High = 16.6%
Mandatory drought restrictions	Enforcement	18-56% savings in outdoor water use
Voluntary drought conditions	Enforcement	4-12% savings in outdoor water use

Baseline information

Target audience and geography

NWPA single-family homes served by community water supply (CWS) and domestic self-supply (DSS) systems

Residential land uses in NWPA region (by acre)



Target audience and geography

	2018 Population	2018 Households ^a
NWPA Communities	1,142,229	407,939
NWPA Unincorporated Areas	236,033	84,298
NWPA Region	1,378,262	492,236

a. The 2018 household estimates are based on the 2020 average household size.

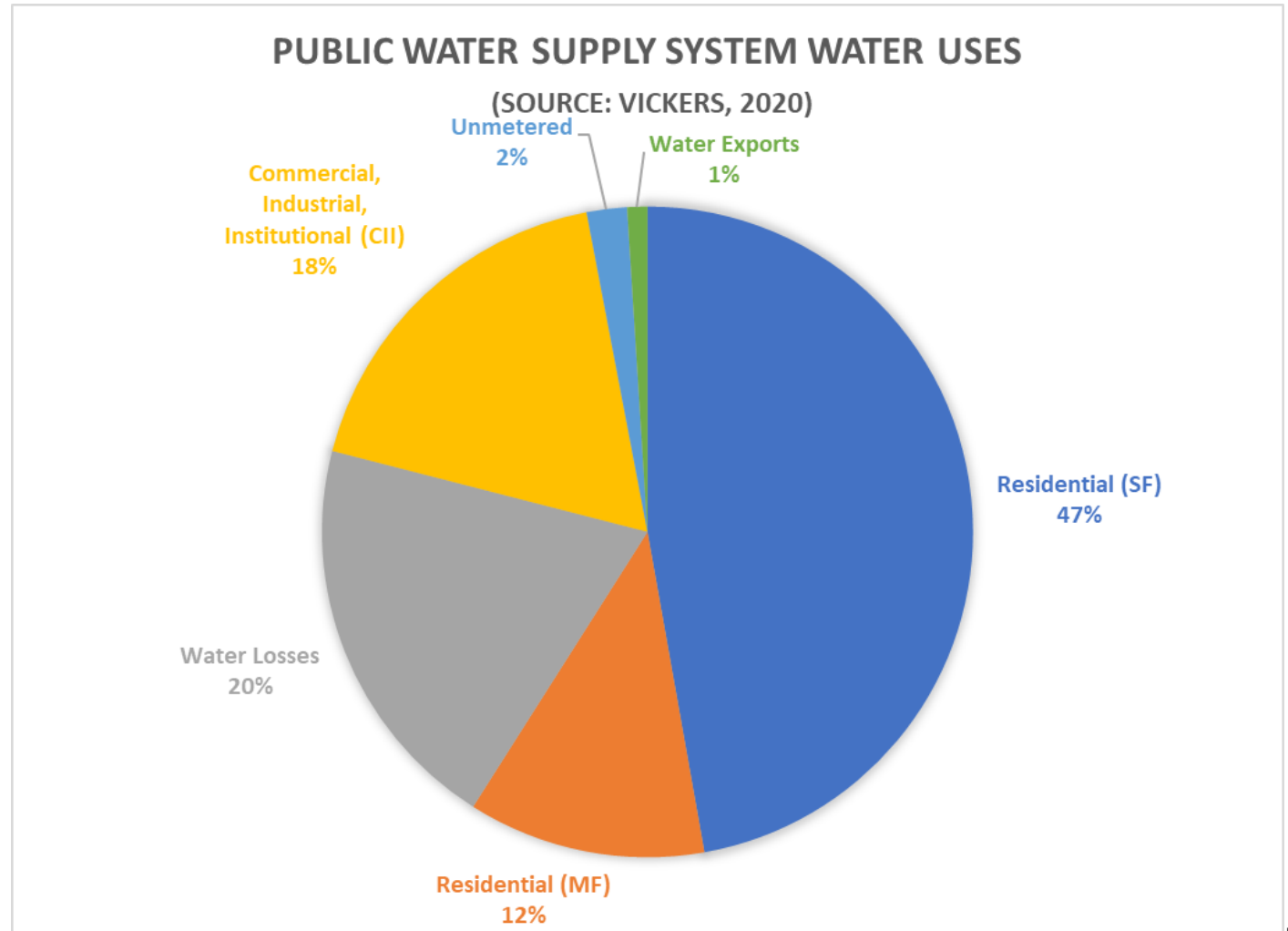
Data sources:

- CMAP's analysis of U.S. census data from 2000-2020 (input in the most recent water demand forecast.)
- U.S. census data from 2020

Baseline water use

How do community water suppliers use water?

- Residential sector 59% nationwide
- Residential SF ~47% average nationwide
- MF is 20% of all residential (12% of 59%)

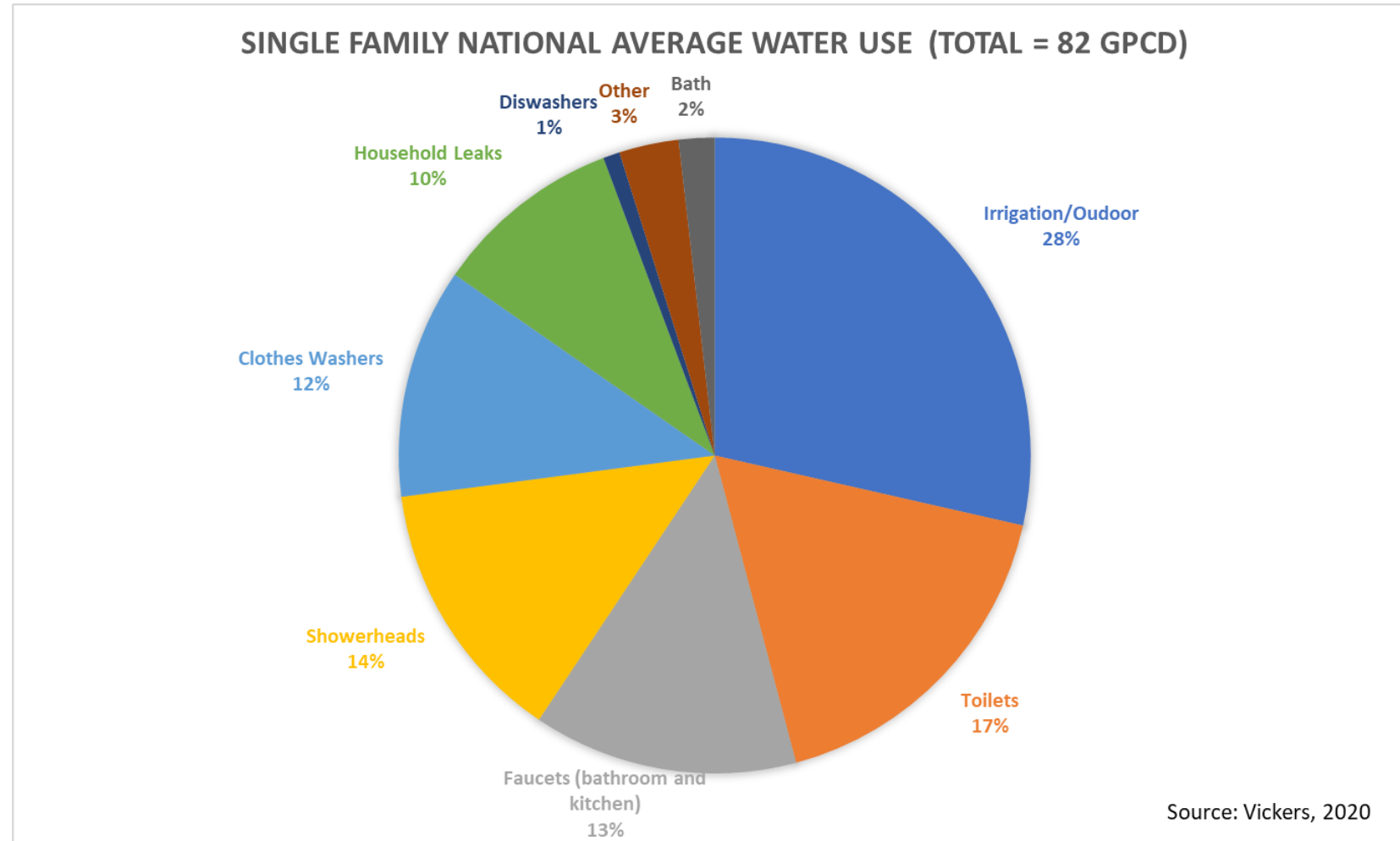


Target audience and geography

	Number of Housing Units by Housing Type				% Single-Family Units
	Single-Family	Multi-Family	Other	Total	
DeKalb	TBD	TBD	TBD	TBD	81%
Kane	152,306	34,005	1,541	187,852	92%
Kendall	40,778	3,574	91	44,443	77%
Lake	206,447	57,472	4,589	268,508	88%
McHenry	104,565	14,037	863	119,465	81%
Total	504,096	109,088	7,084	620,268	81%

How do single family households use water?

- NWPA Region 77 gpcd
(Average 2003 – 2013, 2018 CMAP Water Demand Forecast)
- 28% outdoor nationwide
- ~20% NWPA region *
- ~15.4 gpcd



Baseline water use

Data sources

- **CWS sector:** The Illinois Water Inventory Program (IWIP) 2018 water use data
- **DSS sector:** U.S. Geological Survey National Water Information System: Water Use Data for Illinois
- **Assumptions**
- **CWS Sector:**
 - 20% Water Loss
 - 75% residential (20% multifamily)/ 25% non-residential water use split
 - 80% indoor / 20% outdoor water use split
- **DSS sector:**
 - 80% indoor / 20% outdoor water use split

Estimated NWPA residential outdoor water use

County	CWS SF Residential Use (MGD) *	DSS** Residential Use (MGD)	Total Residential Use (MGD) (CWS & DSS res. Totals)	Total Residential Outdoor Use (MGD) (20% of total res. use)
DeKalb	TBD	TBD	TBD	TBD
Kane	24	5	29	5.7
Kendall	2	2	4	0.9
Lake	24	6	30	6.0
McHenry	9	6	15	3.1
NWPA region total	59	19	78	15.7

** Calculated as 47% of CWS Total water withdrawals in accordance with national averages.

*Currently includes unincorporated DSS users – will exclude unincorporated DSS water use in final plan.

Water savings estimates

Estimating Outdoor Water Savings

$$WS_{mitj} = WR_{mitj} * N_{mt} \text{ (or WB)} * UA$$

where:

WS = Estimated water savings

WR = Estimated water reduction

N = Number of targeted group members implementing the conservation measure
(alternately, the amount of water use of the targeted group member(s) for the targeted water end use(s) WB)

UA = unit adjustments

conservation measure (m) occurring over time period of interest (t) for the targeted group (i) in units (j)

What is the achievable water reduction (WR)?

- U.S. EPA estimates that 50% of water use is wasted due to overwatering, evaporation, improper irrigation/watering.
- The Village of Algonquin was able to reduce water consumption during July by 30% through an aggressive outdoor water conservation program.
- Landscape Transformation Studies 26.5% of residential outdoor water use, on average (AWE, 2015)
- -> Based on this, 25% - 50% range
- Bottom up water use estimate: 1,378,262 population times 15.4 gpcd = 21.23 MGD
- Top-down water use estimate: 15.7 MGD
- > 3.9-10.6 MGD
- -> 7.25 MGD

Estimating Outdoor Water Savings

program participants equation

$$N = MP_{mit}(TG_{mit})$$

where:

- MP = Market penetration of the conservation measure (m) occurring over time period of interest (t) for targeted group (i)
- TG = Estimated size of the group (i) targeted for implementing conservation measure (m) over time (t) (*alternately, the amount of water use of the targeted group member(s) for the targeted water end use(s) WB*)
- Equation reflects that water savings depend on the level of coverage, or market penetration/installation rate that the program can achieve.

Potential water savings from residential single-family outdoor water conservation program

What is the achievable outdoor water conservation program participation rate?

- 18/76 of NWPA communities adopted NWPA ordinance ~24%
- Water2050 assumed low participation rate 10% and high participation rate of 50%

Range of estimated water savings:

- 0.4 - 5.3 MGD
- 2.2 MGD

Discussion

Is a shift to 20% outdoor water use reasonable?

Discussion

Should the WSSP estimate water savings using Water 2050's participation rates?

2024 TAC Meetings

2024 TAC Meeting Calendar

January 23

February 2

March 28

Spring Break – No Meeting

April 23

In-person meeting

May 28

June 25

July 23

August 27

Summer Break – No Meeting

September 24

October 24

In-person meeting

November 28

December 24

Winter Break – No Meeting