One Water Framework

Winter Haven One Water Framework diagram showing: Healthy Lakes & Wetlands, Resilient Water Utilities, Thriving Green Smart Community, Strong & Growing Economy, Sustainable Agriculture, Partnerships — WINTER HAVEN ONE WATER FRAMEWORK
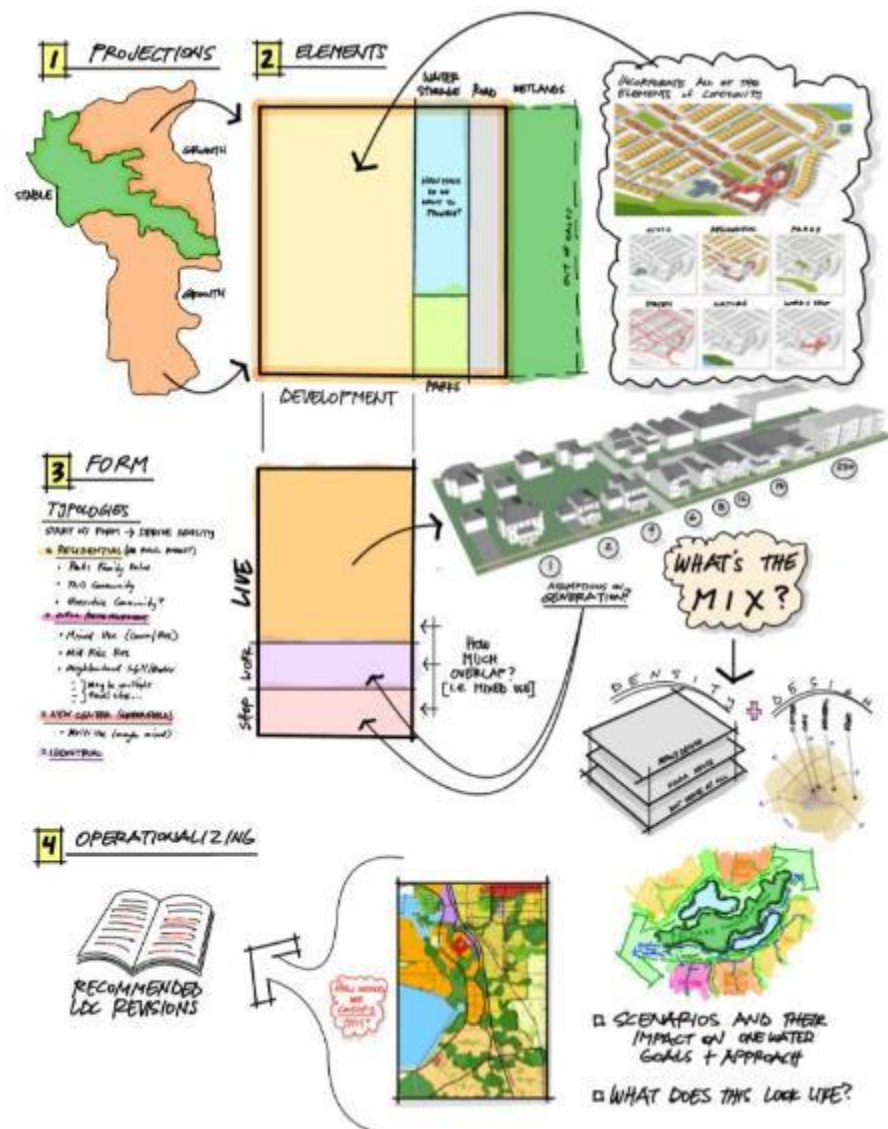
Land Use Planning
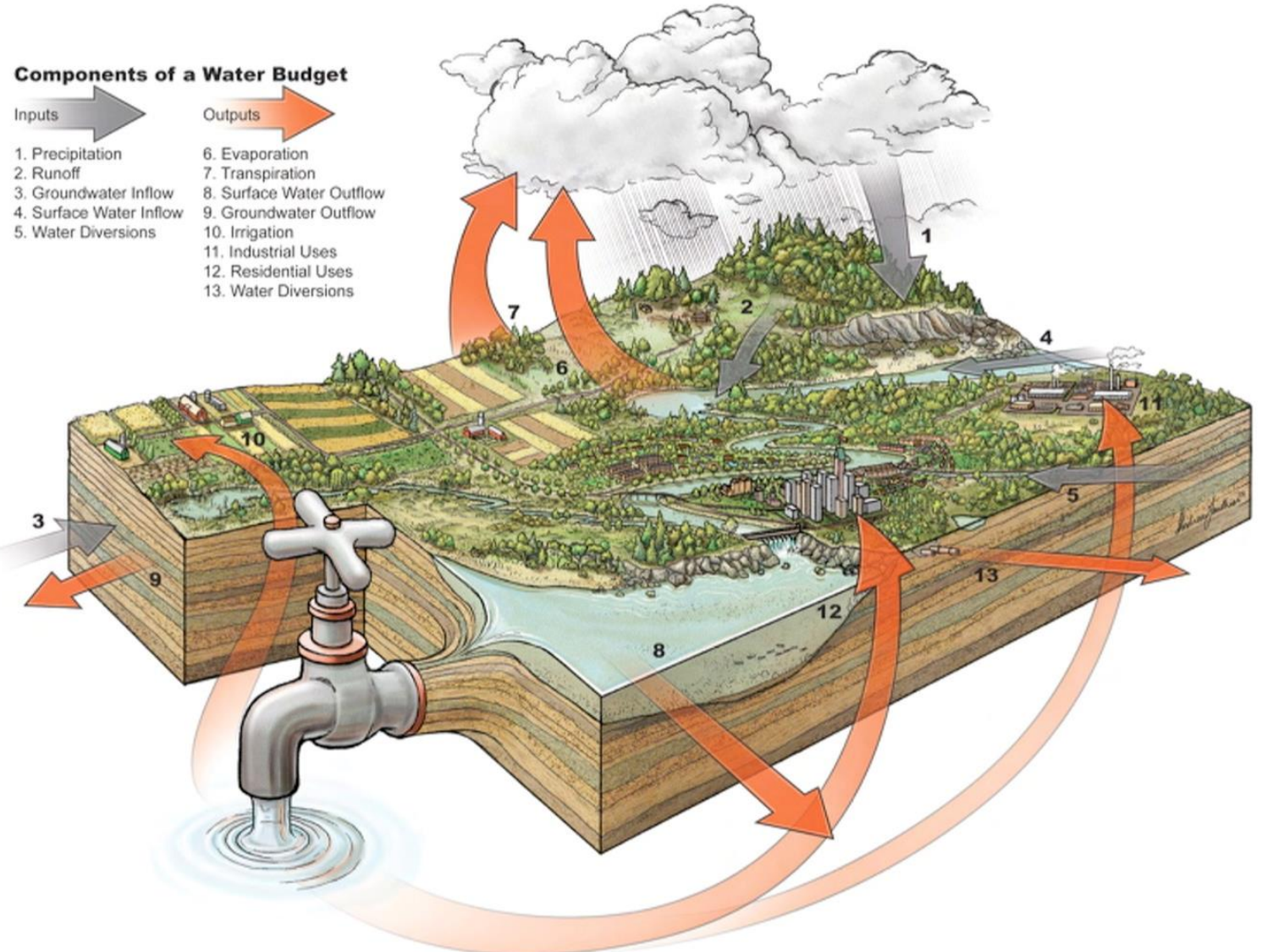
Watershed Optimization Model Tasks

1. **Development of Water Budget**

2. **Development of Hydrologic Simulation Planning Model**
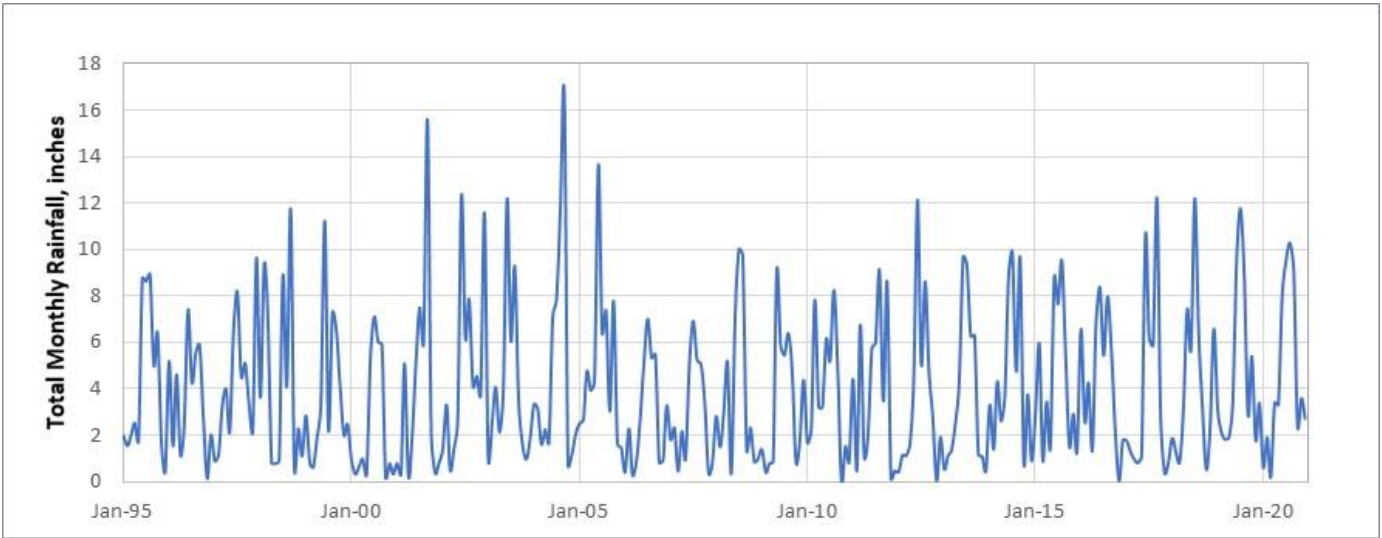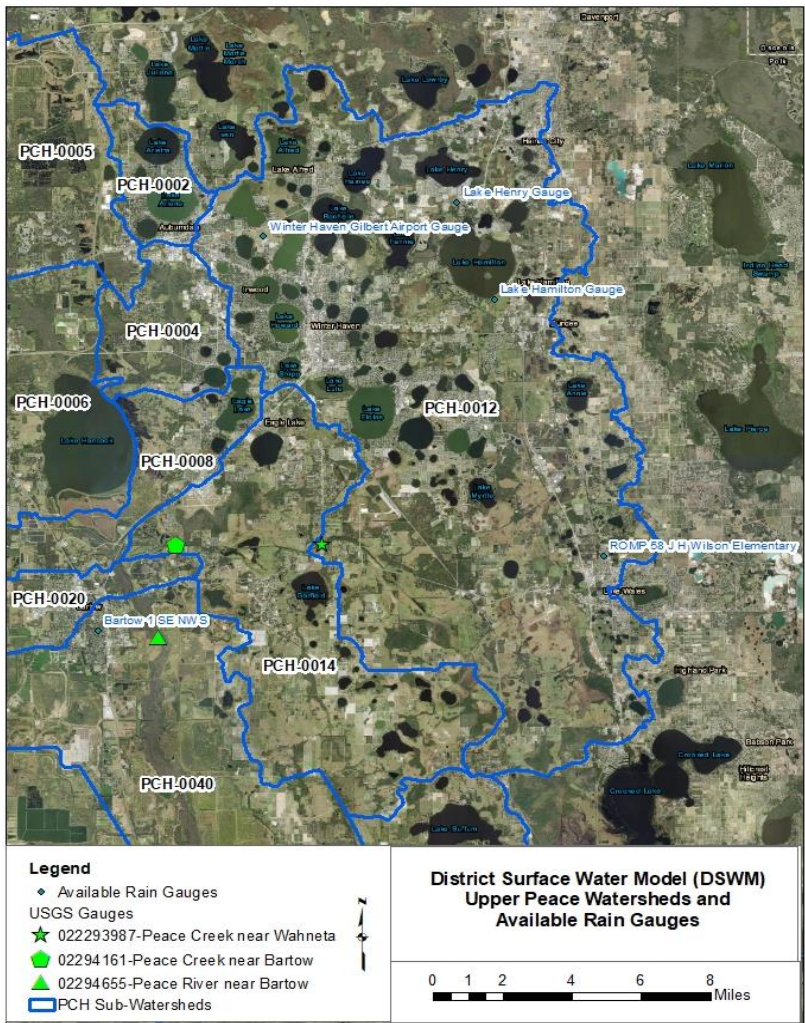
3. **Optimization Evaluations**

1 - Water Budget Development

Water Budget = The relationship between the inflow and outflow of water through a specified region.

- *How much do you have?*
- *How much does it cost?*
- *What is the quality of the Resource?*
- *What choices does Winter Haven have to meet current and future needs?*
- *How shall Winter Haven invest its economic resources for the next 50 yrs?*
- *What will be the Value Proposition?*

Components of a Water Budget

Inputs
1. Precipitation
2. Runoff
3. Groundwater Inflow
4. Surface Water Inflow
5. Water Diversions

Outputs
6. Evaporation
7. Transpiration
8. Surface Water Outflow
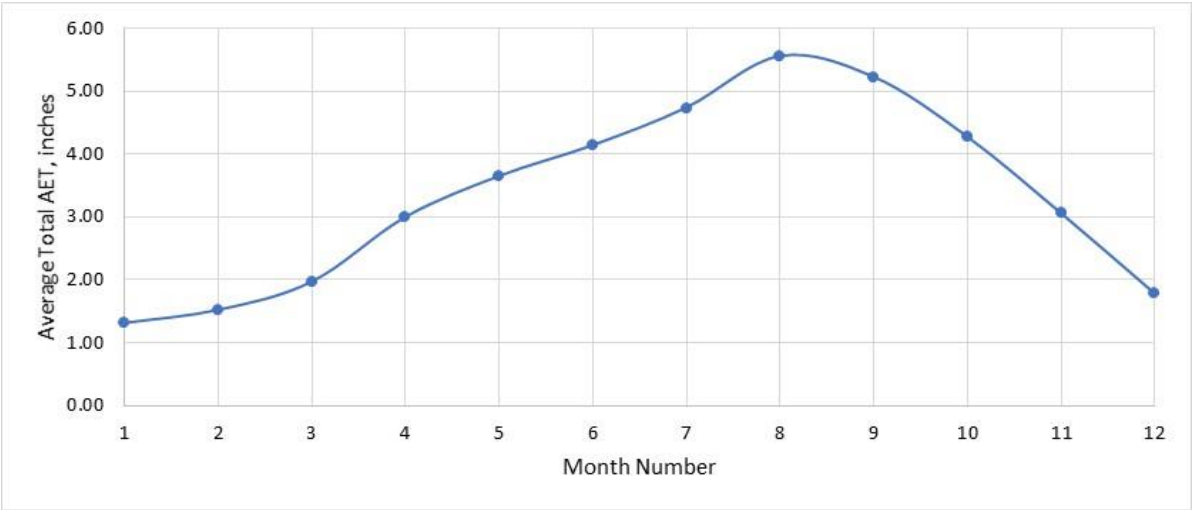9. Groundwater Outflow
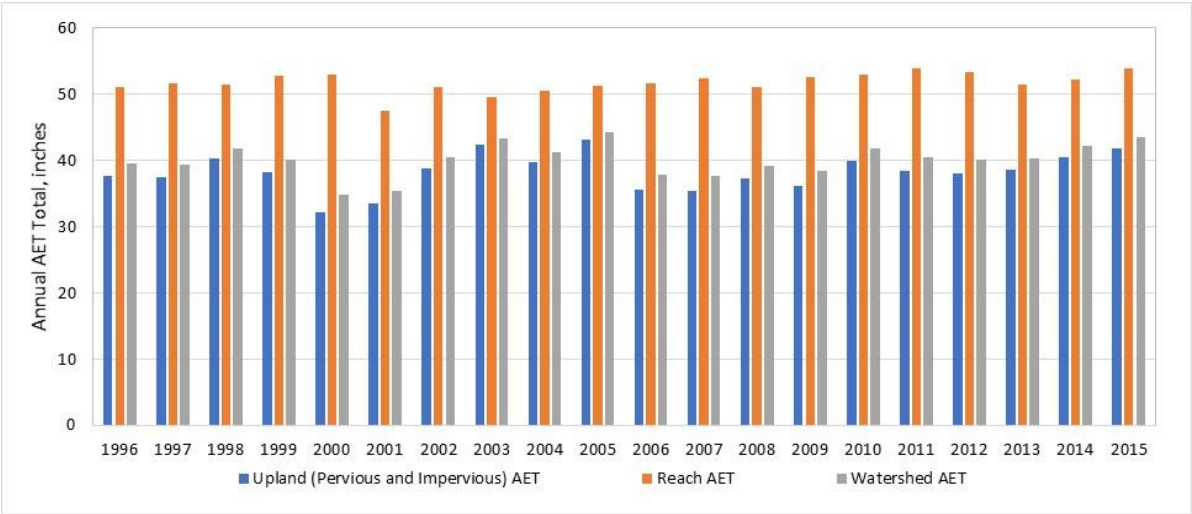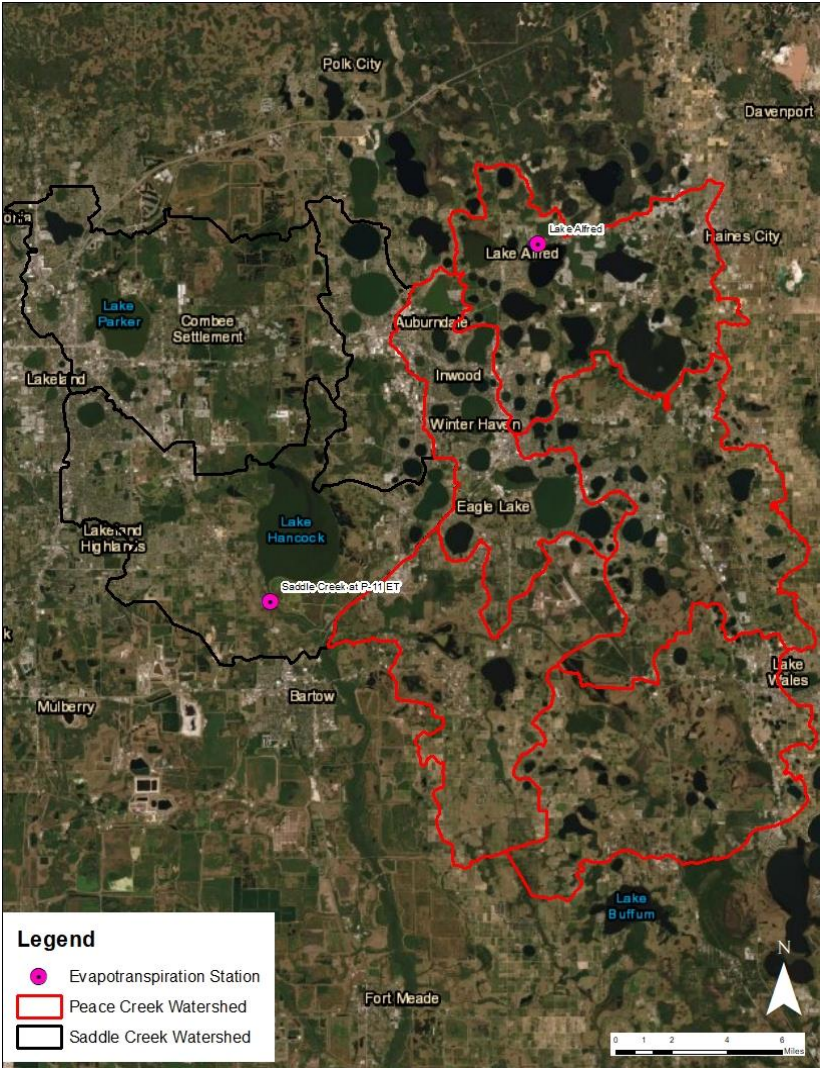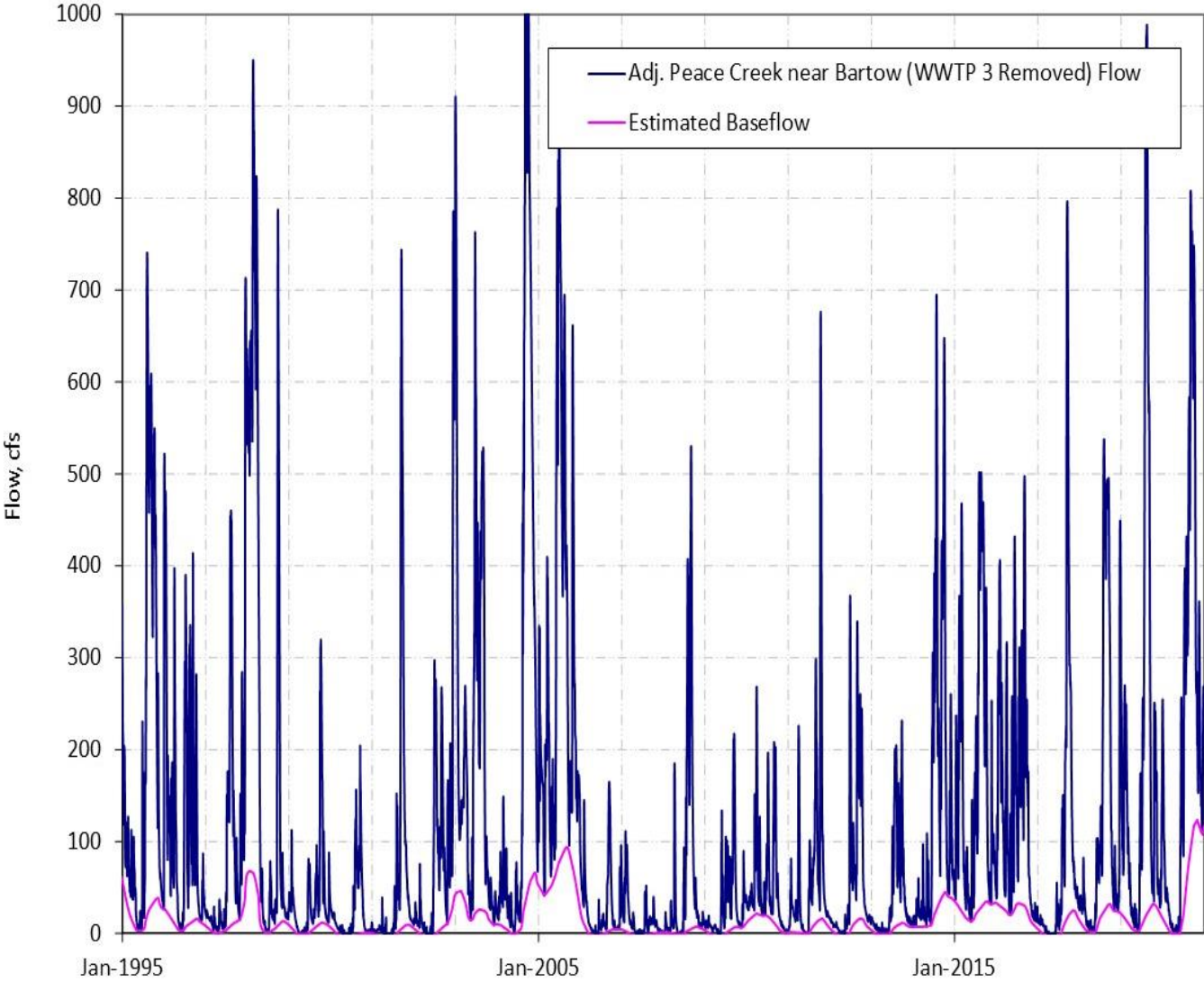10. Irrigation
11. Industrial Uses
12. Residential Uses
13. Water Diversions

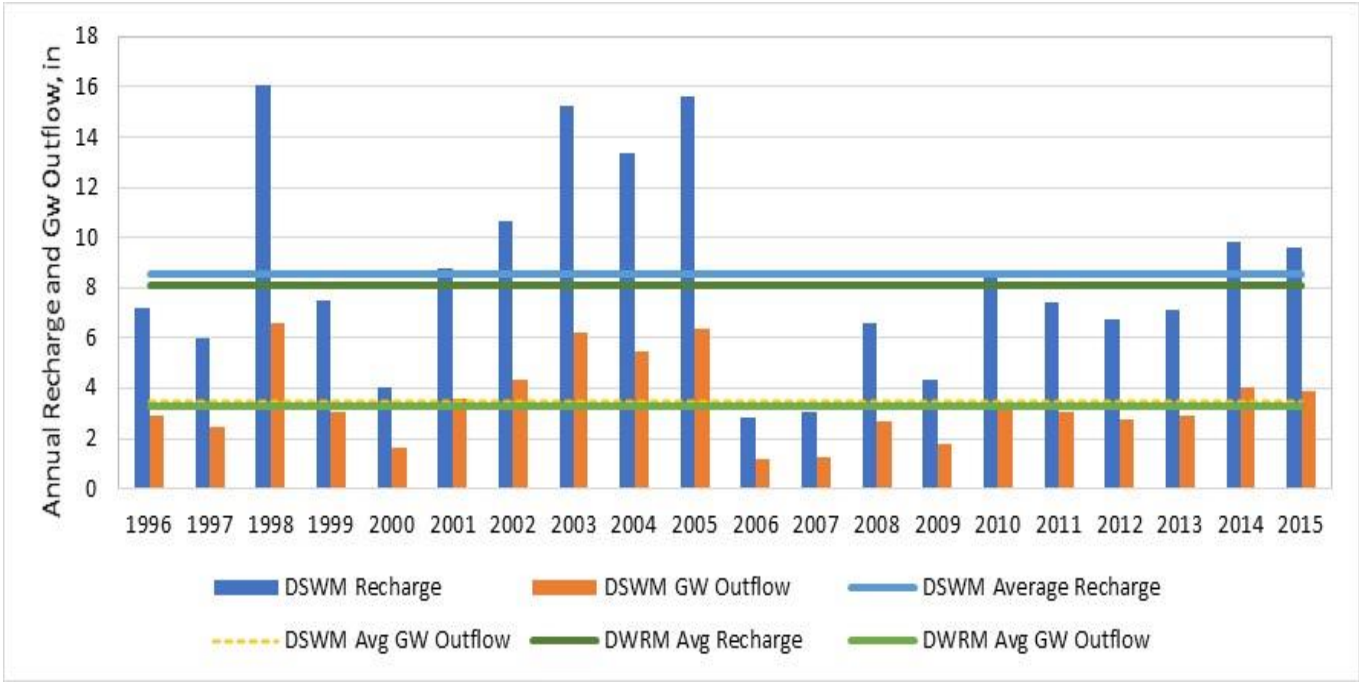# Data Gathering

Data Gathering

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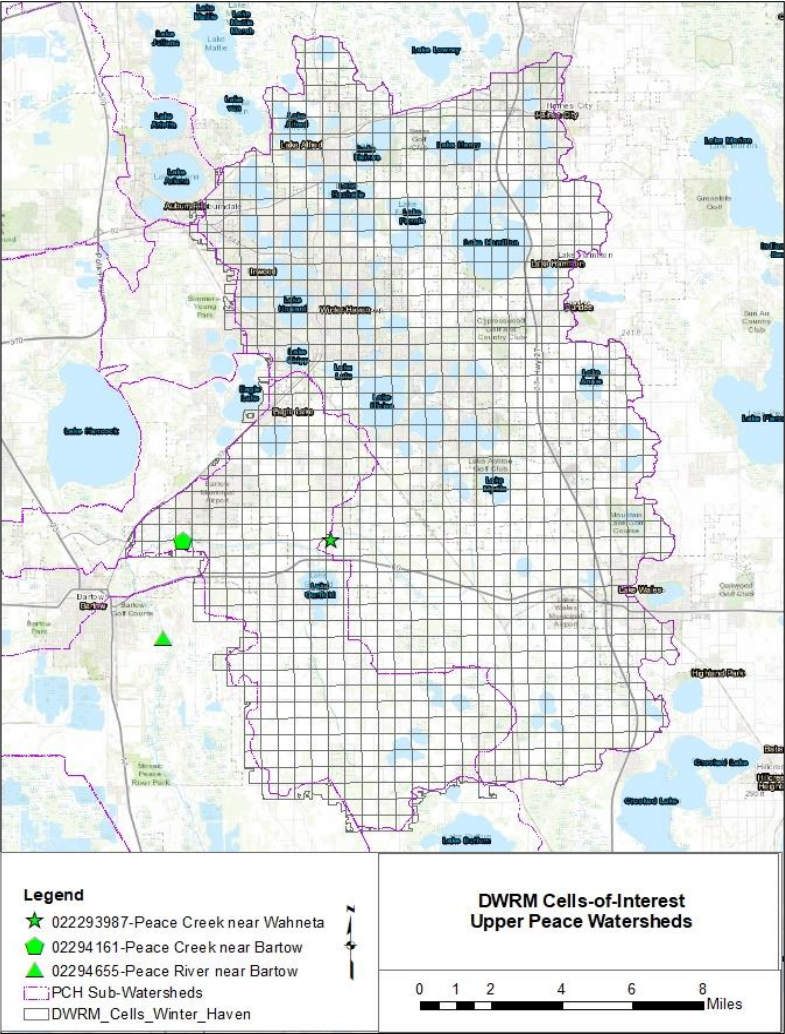
Water Budget Summary
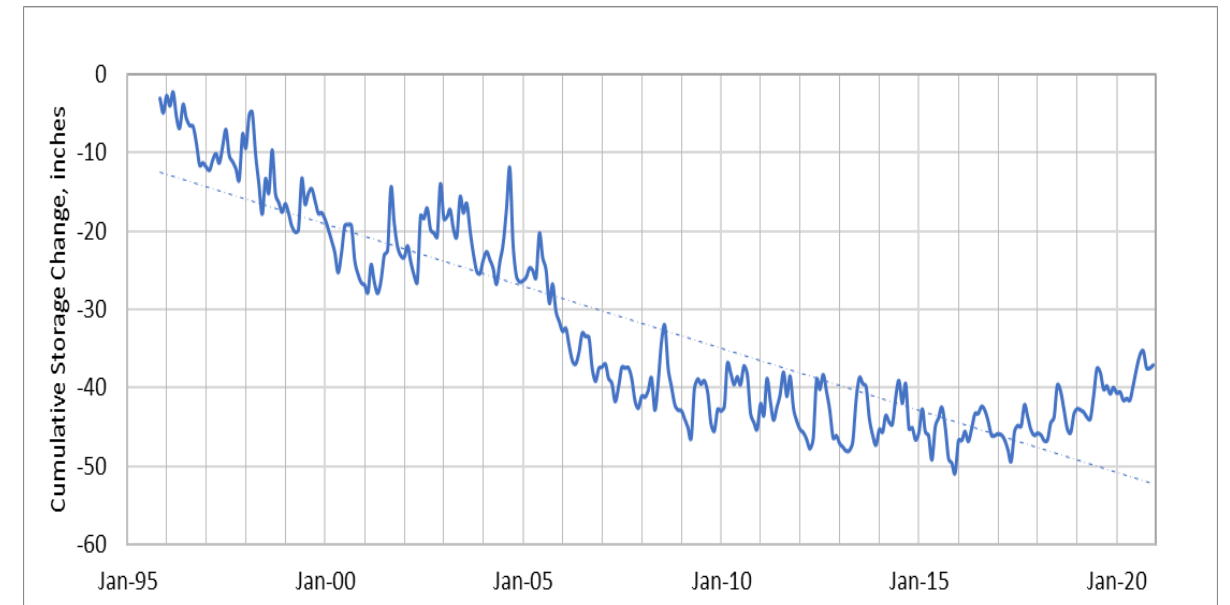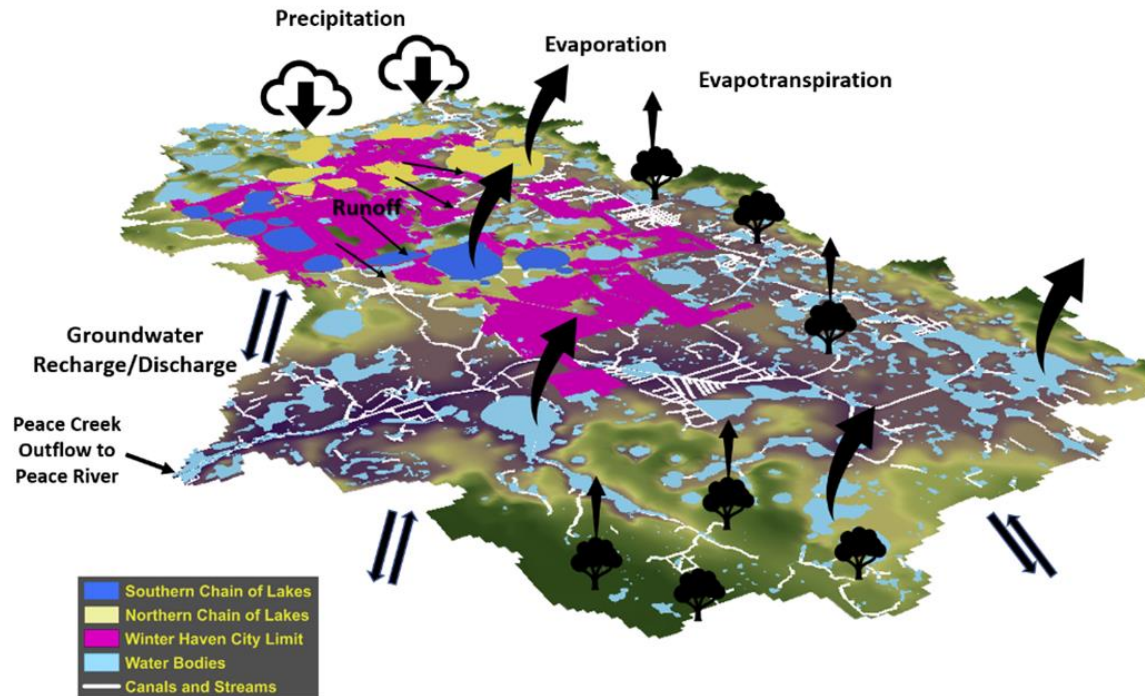
Decline has flattened out. Working toward recovery.

Hydrologic Simulation Planning Model

2 - Development of Hydrologic Simulation Planning Model

1. **Understand the City's objectives**

2. **Leveraged XLRM Framework to develop the decision thought process**

   - **Uncertainties or Scenarios ("X")**

   - **Policy Levers or Key Decision Variables ("L")**

   - **System Relationships ("R")**

   - **Performance Metrics or Water Resource Management Objectives ("M")**

2 - Development of Hydrologic Simulation Planning Model

Uncertainties or Scenarios ("X")

The key unknowns could affect the Peace Creek Watershed (City of Winter Haven). This category represents factors over which the decision-makers do not have influence or control.

2 - Development of Hydrologic Simulation Planning Model

Policy Levers or Key Decision Variables ("L")

The projects and policies available will be compared. This category describes the options to be explored.

2 - Development of Hydrologic Simulation Planning Model

Performance Metrics or Water Resource Management Objectives ("M")

Maximize

1. Flows and Levels
2. Water Storage (groundwater and surface water)
3. Connectivity (includes recreation)
4. Quality of Life

Minimize

5. Cost of Water Supply
6. Watershed Nutrient Loading
7. Flooding

2 - Development of Hydrologic Simulation Planning Model

1. **System Relationships ("R"): This section describes the links, which can be qualitative or quantitative data**

2. **Simulate the hydrologic response of the Peace Creek Optimization Model (PCOM) domain → HSPF**

3. **Evaluate surface water storage and management options, flood risk assessment → ICPR**
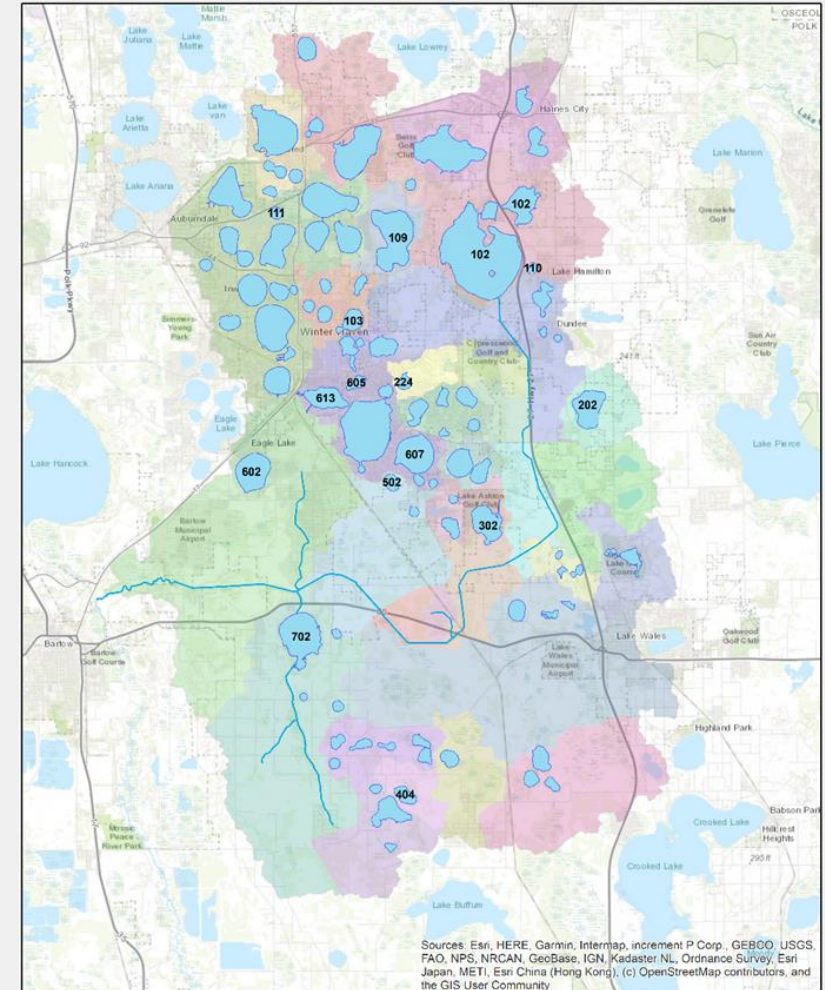
HSPF Model
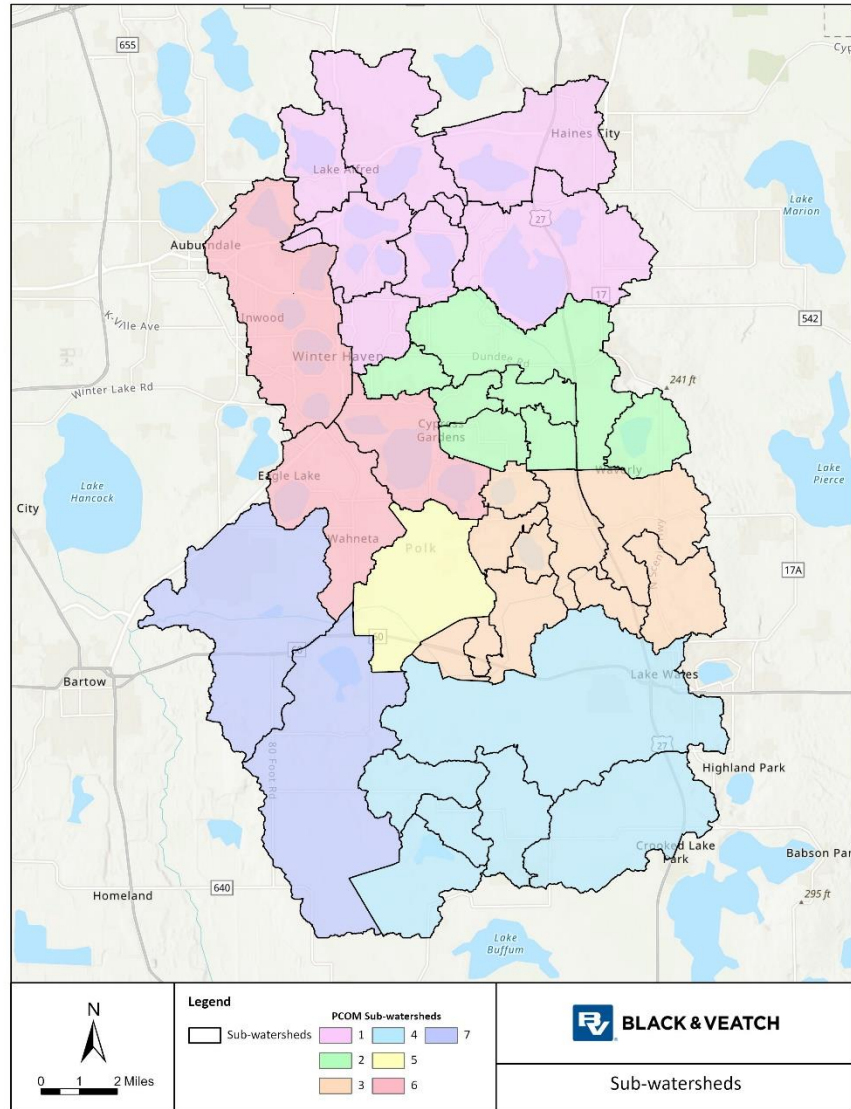
City sub-watersheds combined with PCSWMM-delineated sub-watersheds outside of the City

37 sub-watersheds that comprise 7 PCOM areas

Each sub-watershed is an areas of similar hydrologic response

HSPF -> Optimization Tool

- **PCOM monthly total runoff and recharge is extracted from each HSPF simulation and used as input to the optimization tool.**

- **The amount of impervious area in each PCOM is modulated by +10%, +5%, -5%, and -10%. This resulted in 28 additional model simulations**
(4 changes in % impervious x 7 PCOMs)

ICPR Model
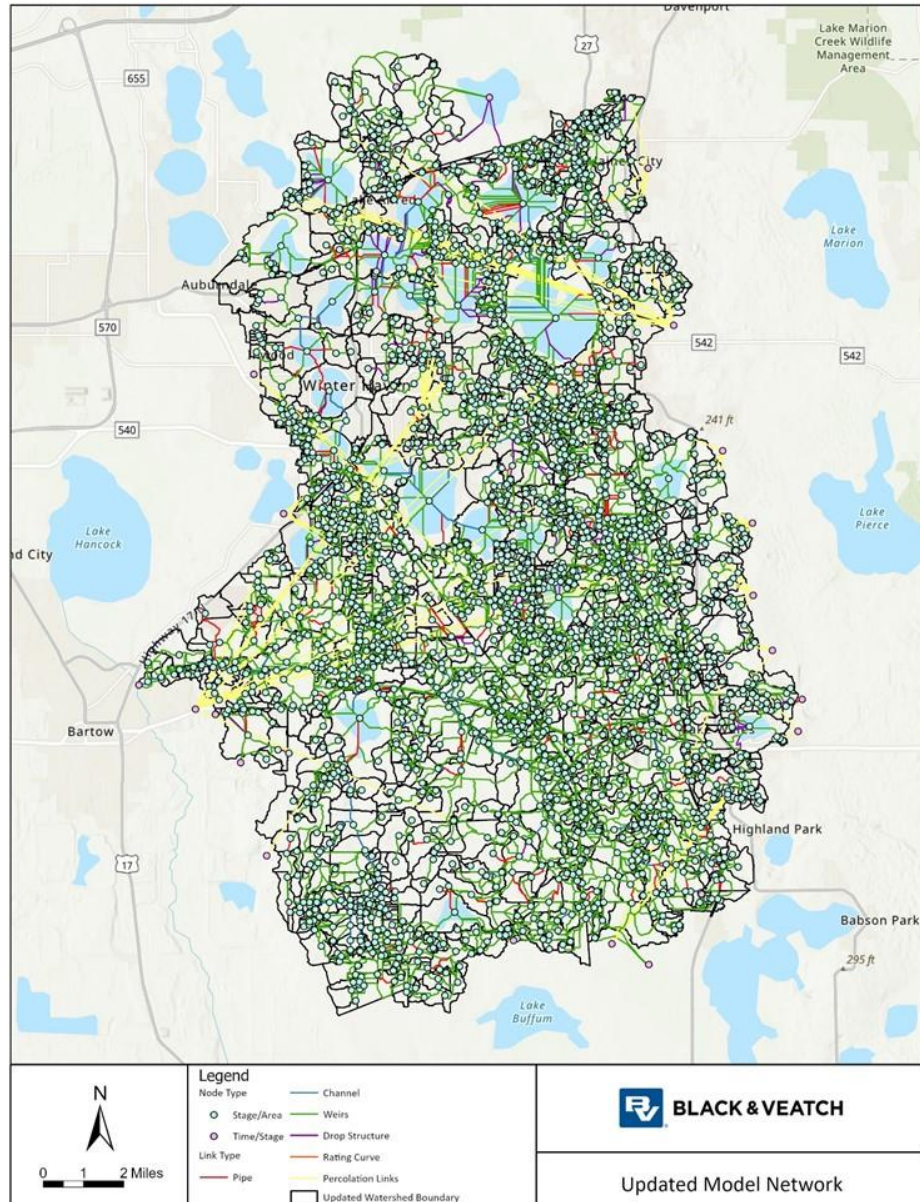
Focus on the Sapphire Necklace and Restoration Areas/Wetlands

Update of

    Stormwater inventory / model network

    Overland Flow Weirs

    Stage/Area and Initial Stages

    Time of Concentration

    LULC and impervious area lookup

Winter Haven Spreadsheet Optimization Tool

Spreadsheet Optimization Tool Objectives

1. **Test various management actions and objectives**

2. **Optimize decision-making processes within the One Water Master Plan framework**

Highlights

Sub-watersheds
1, 2, 3, 4, 5, 6, 7

BLACK & VEATCH

PCOM Sub-watersheds
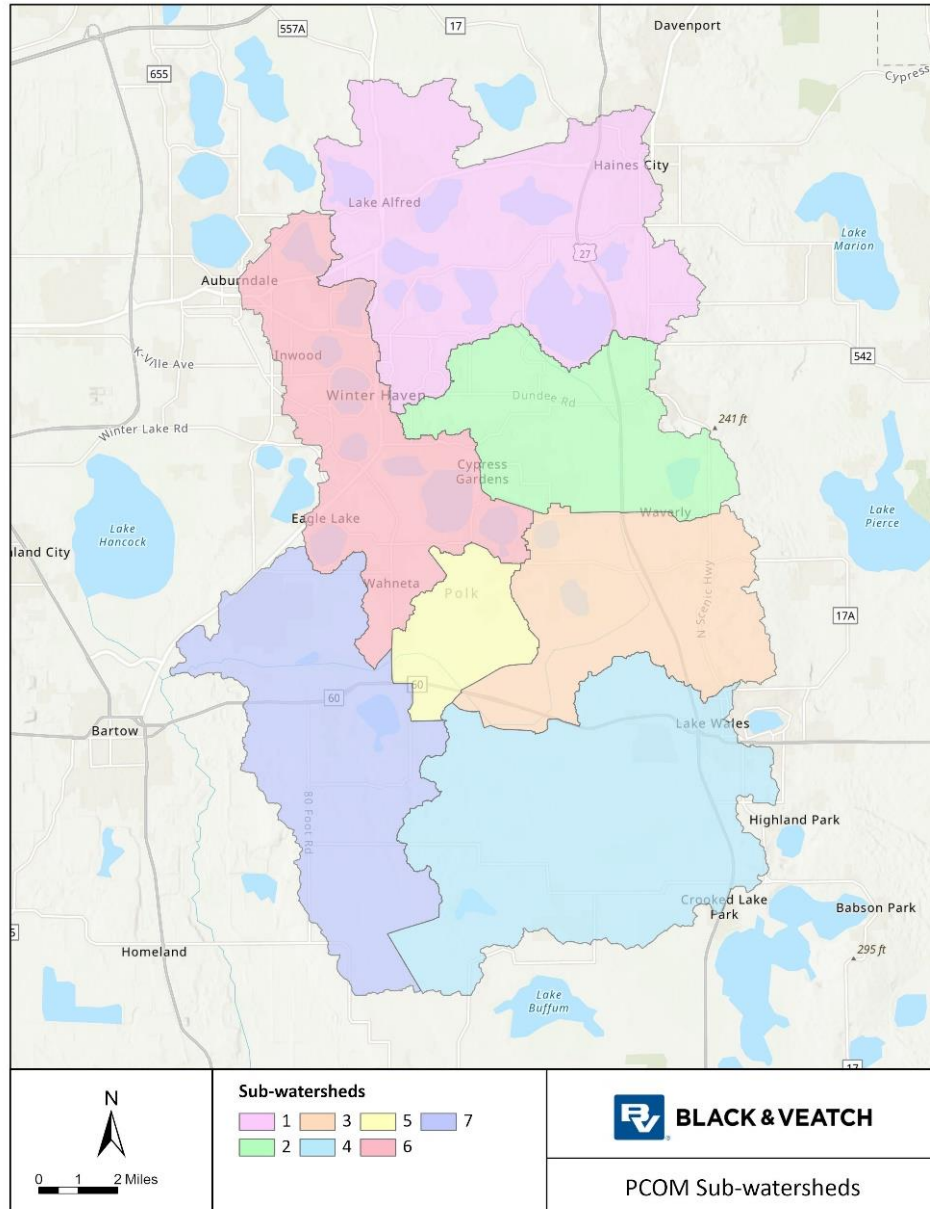
Based on the U.S. Environmental Protection Agency's Watershed Management Optimization Support Tool (EPA WMOST)

Standalone set-up independent from additional models, tools and data sources

Global and PCOM watershed specific scenarios

HSPF and ICPR model results provide input for model

Compilation of current utility and watershed data

Tool Overview

Source Water	Treated Water	Water Use	Wastewater	Water Reuse

External SW

Land Use Areas, Runoff & Recharge Rates (Ru/Re)

Baseline / Managed PCOMs

Surface Water (Sw)

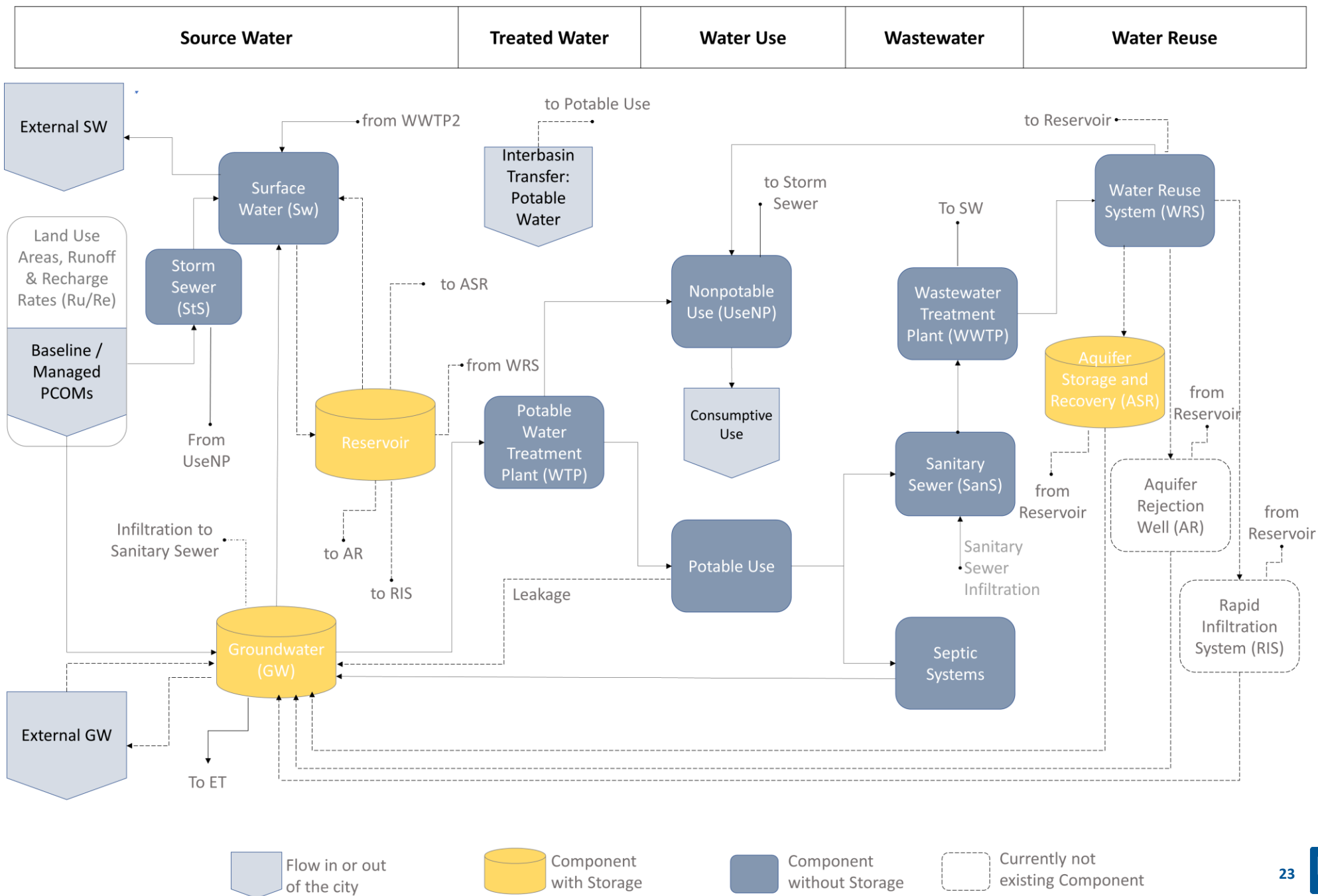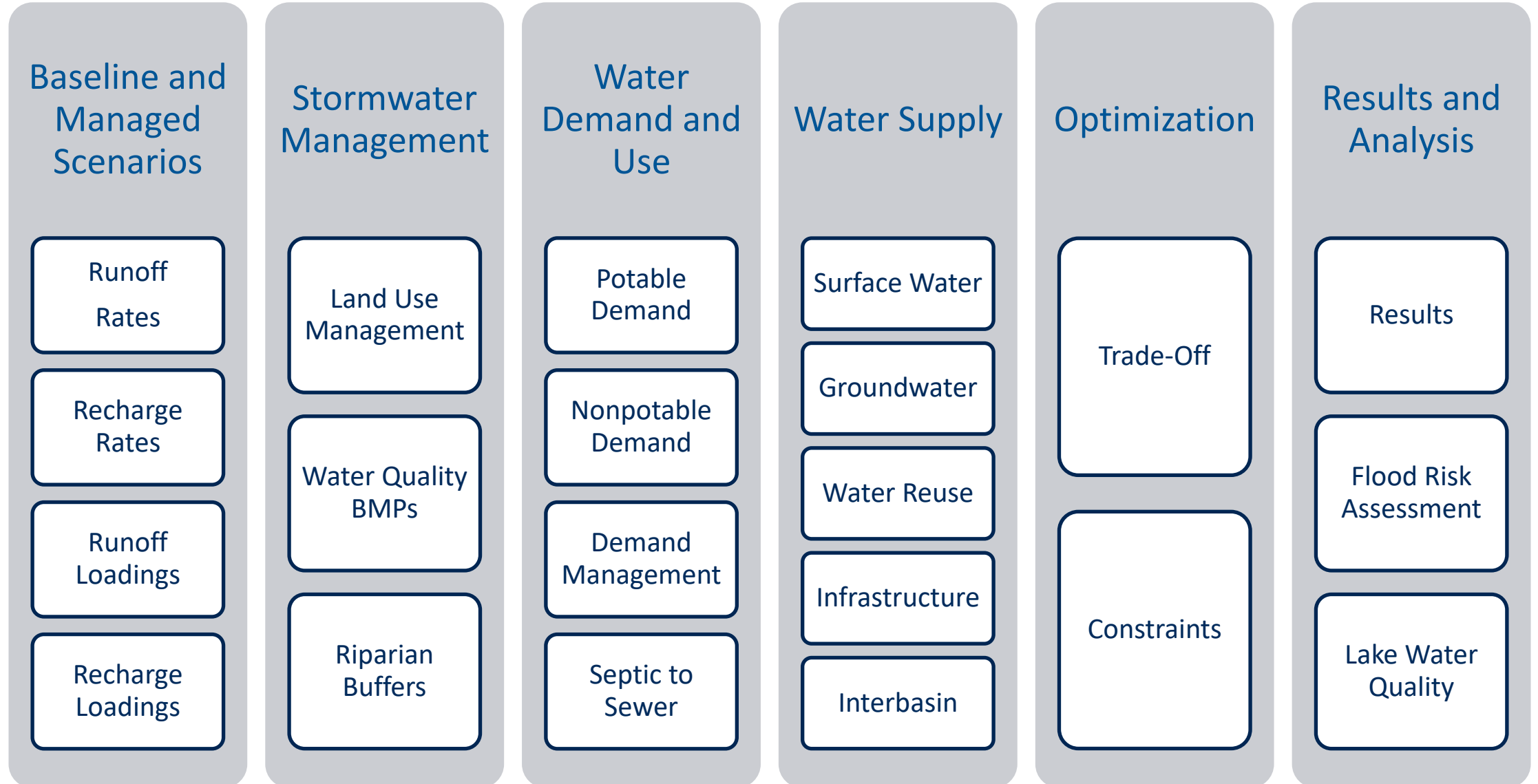Storm Sewer (StS)

From UseNP

Reservoir

from WWTP2

to Potable Use

Interbasin Transfer: Potable Water

to ASR

from WRS

Potable Water Treatment Plant (WTP)

Nonpotable Use (UseNP)

to Storm Sewer

Consumptive Use

To SW

Wastewater Treatment Plant (WWTP)

Water Reuse System (WRS)

to Reservoir

Aquifer Storage and Recovery (ASR)

from Reservoir

Infiltration to Sanitary Sewer

to AR

to RIS

Leakage

Potable Use

Sanitary Sewer (SanS)

Sanitary Sewer Infiltration

from Reservoir

Aquifer Rejection Well (AR)

from Reservoir

Groundwater (GW)

Septic Systems

Rapid Infiltration System (RIS)

External GW

To ET

Flow in or out of the city

Component with Storage

Component without Storage

Currently not existing Component

23

Components

Baseline and Managed Scenarios	Stormwater Management	Water Demand and Use	Water Supply	Optimization	Results and Analysis
Runoff Rates	Land Use Management	Potable Demand	Surface Water	Trade-Off	Results
Recharge Rates	Water Quality BMPs	Nonpotable Demand	Groundwater		Flood Risk Assessment
Runoff Loadings	Riparian Buffers	Demand Management	Water Reuse	Constraints	Lake Water Quality
Recharge Loadings		Septic to Sewer	Infrastructure		
			Interbasin		

Baseline and Managed Scenarios
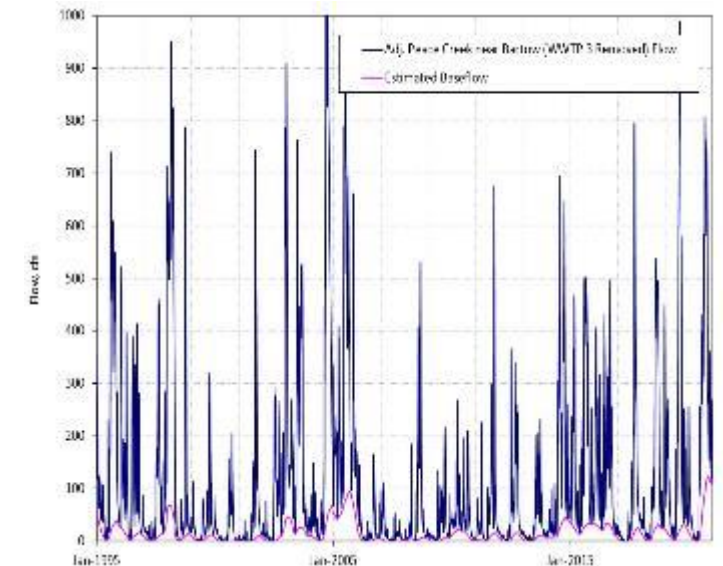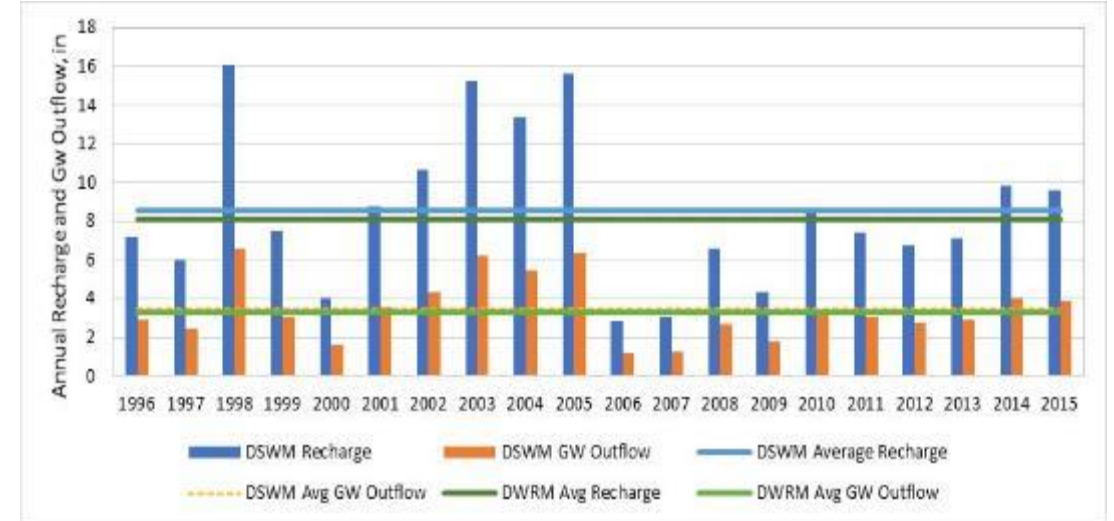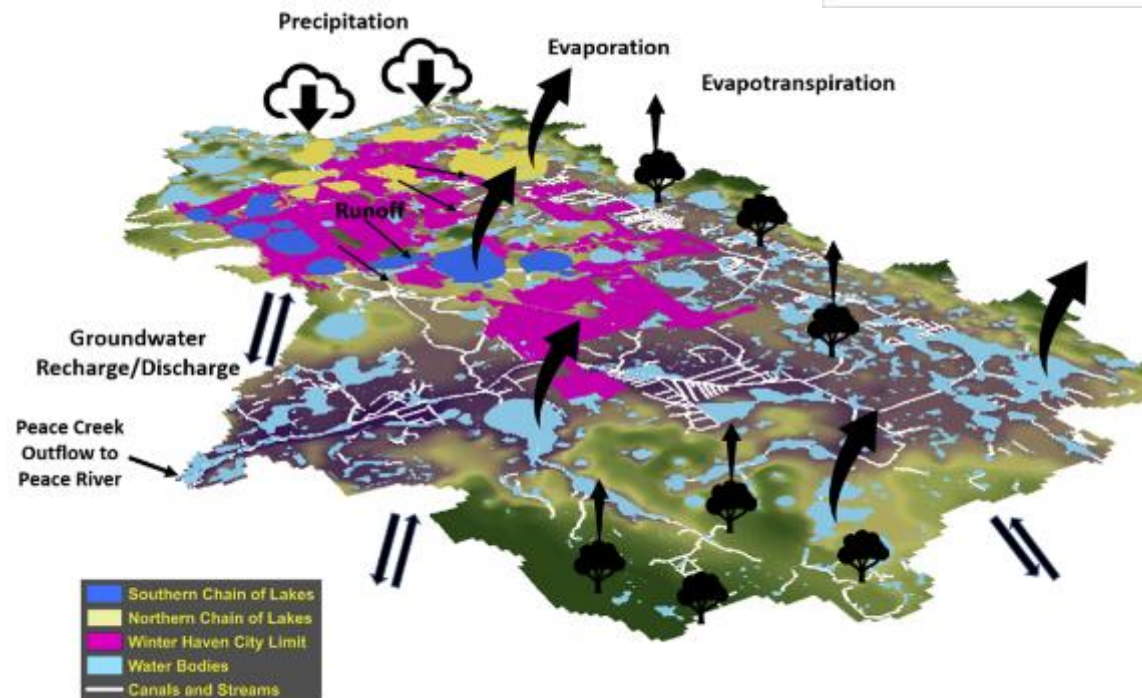
Baseline and Managed Scenarios

- Runoff Rates
- Recharge Rates
- Runoff Loadings
- Recharge Loadings

Stormwater Management

Stormwater Management

Land Use Management

Water Quality BMPs

Riparian Buffers
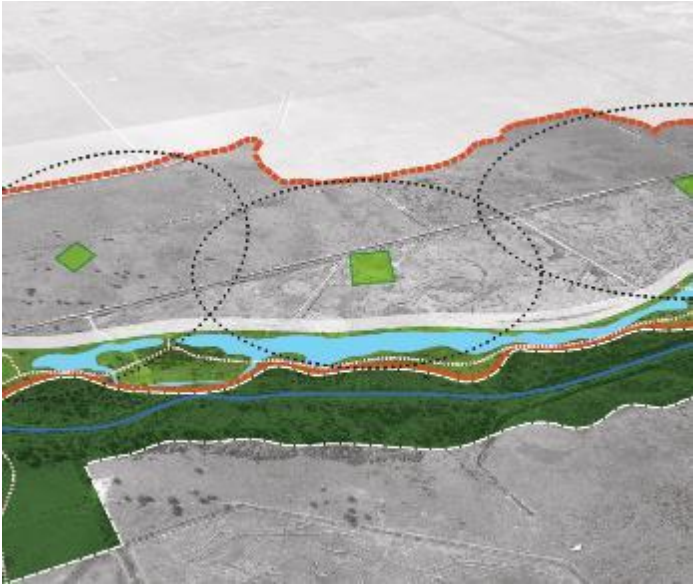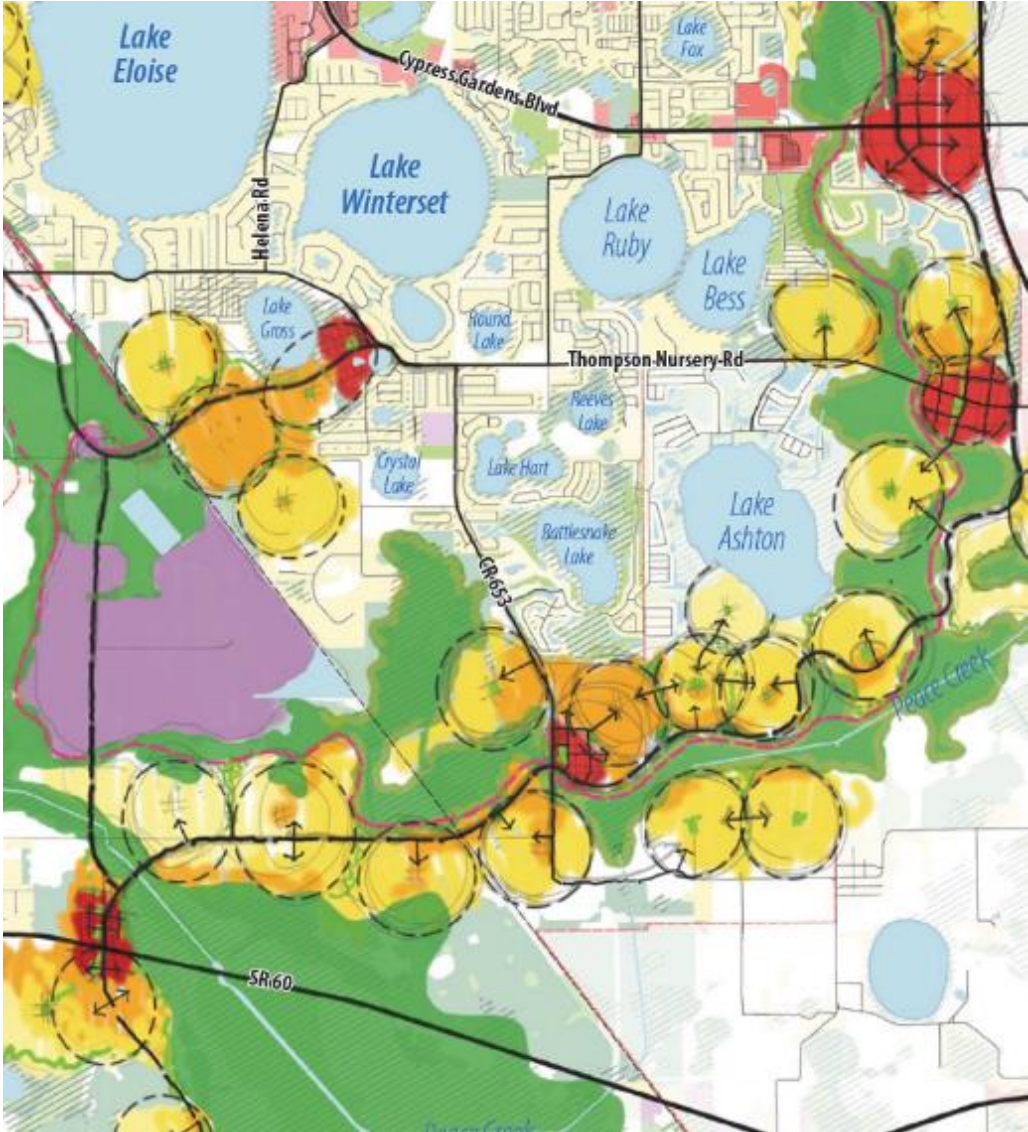
Water Demand and Use

Water Demand and Use

Potable Demand
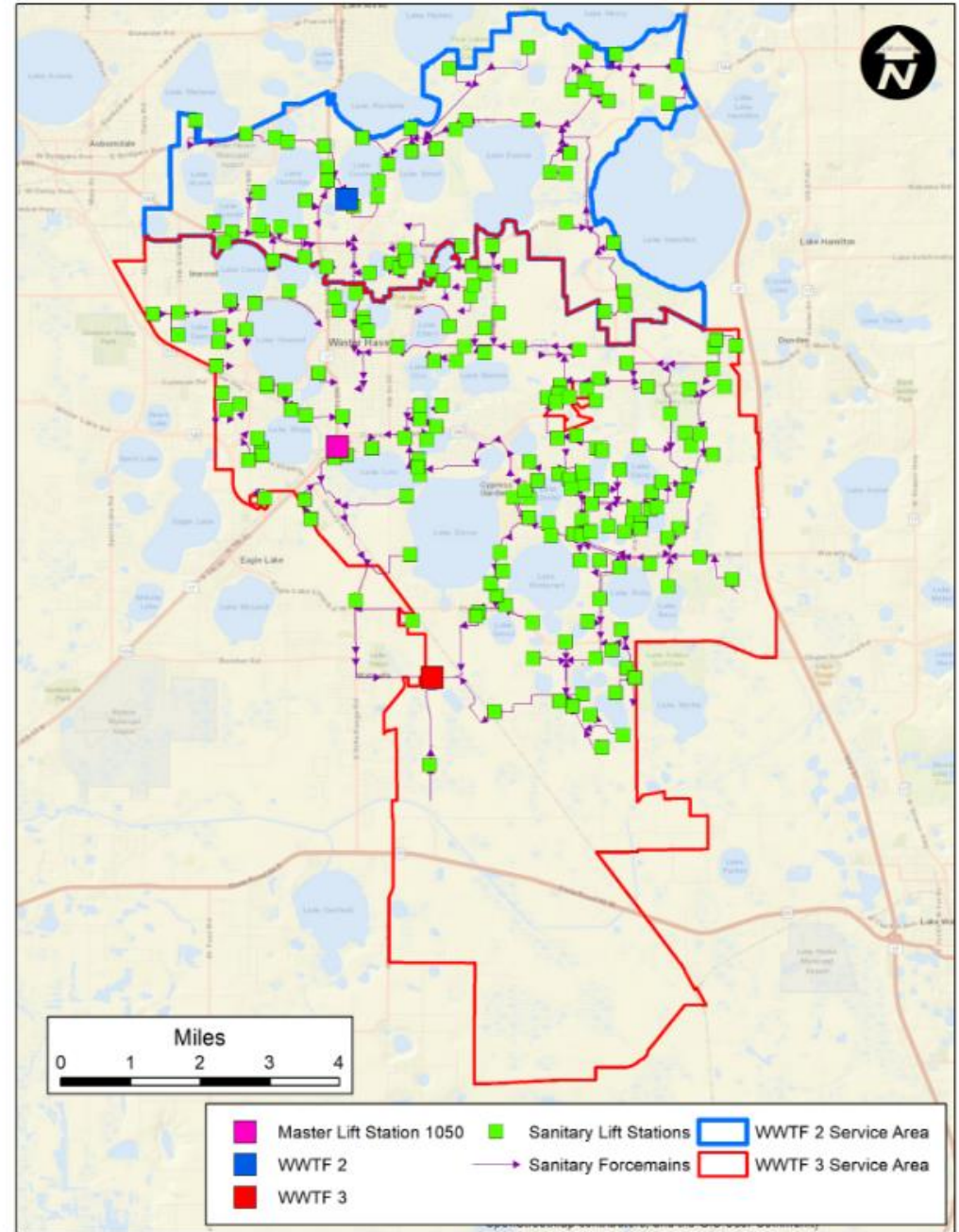
Nonpotable Demand

Demand Management

Septic to Sewer

Water Supply

Water Supply

- Surface Water
- Groundwater
- Water Reuse
- Infrastructure
- Interbasin

WINTER HAVEN'S SAPPHIRE NECKLACE
"Restoring Water Resources ... Adding Community Value"

Legend
- Trails
- Water Flow
- Aquifer Recharge
- Development Areas
- Water Storage
- Potential Nature Center

Miles
0   1   2   3   4

- Master Lift Station 1050
- WWTF 2
- WWTF 3
- Sanitary Lift Stations
- Sanitary Forcemains
- WWTF 2 Service Area
- WWTF 3 Service Area

Flood Risk Assessment

Likelihood of Impact
Flood Frequency

Flood Depth

Consequence of Impact
Critical Facility Impact

Structural Damage

Risk Assessment
Risk Score by Parcel, Storm or Criteria

Optimization