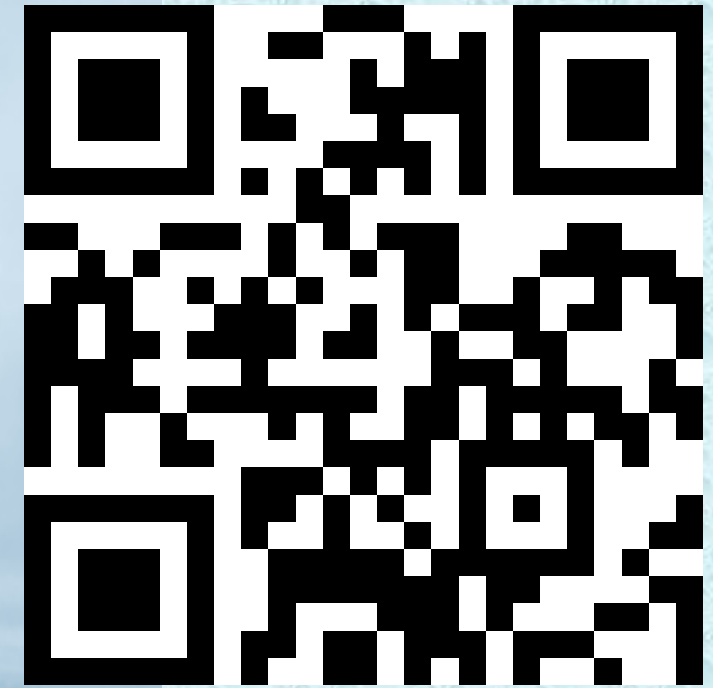


HAWQS

Hydrologic and Water Quality System Modeling Made Simple



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***The views expressed in this presentation are those of the author(s) and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency*

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What is HAWQS?

- A web-based interactive water quantity and quality modeling system using SWAT as its core modeling engine
- Allows analysis at various watershed scales
- Supports simple and complex economic, policy, and impact analyses:
 - Flow, Sediments, Nutrients, pathogens

Benefits of HAWQS

- Public domain databases, tools, and output visualization
- Cloud based interface (accessed by phone/ tablet/ laptop/ desktop)
- No GIS skills required
- Complete input datasets compatible across SWAT versions
- Calibrated models
- Model sharing, uploading, and group access to projects
- Crowd sourcing of models and community of practitioners (COP)
- **More efficient – reduces SWAT modeling time and effort by 90%**

Applications of HAWQS

- Benefits of conservation practices at local scale
- Point and nonpoint pollution control scenarios
- Agricultural and urban management alternatives
- Climate change scenarios on water quality and quantity
- Benefit assessment of water programs
- Development of regulations and policies and assessment of existing policies

U.S. HAWQS v2.0

hawqs.tamu.edu

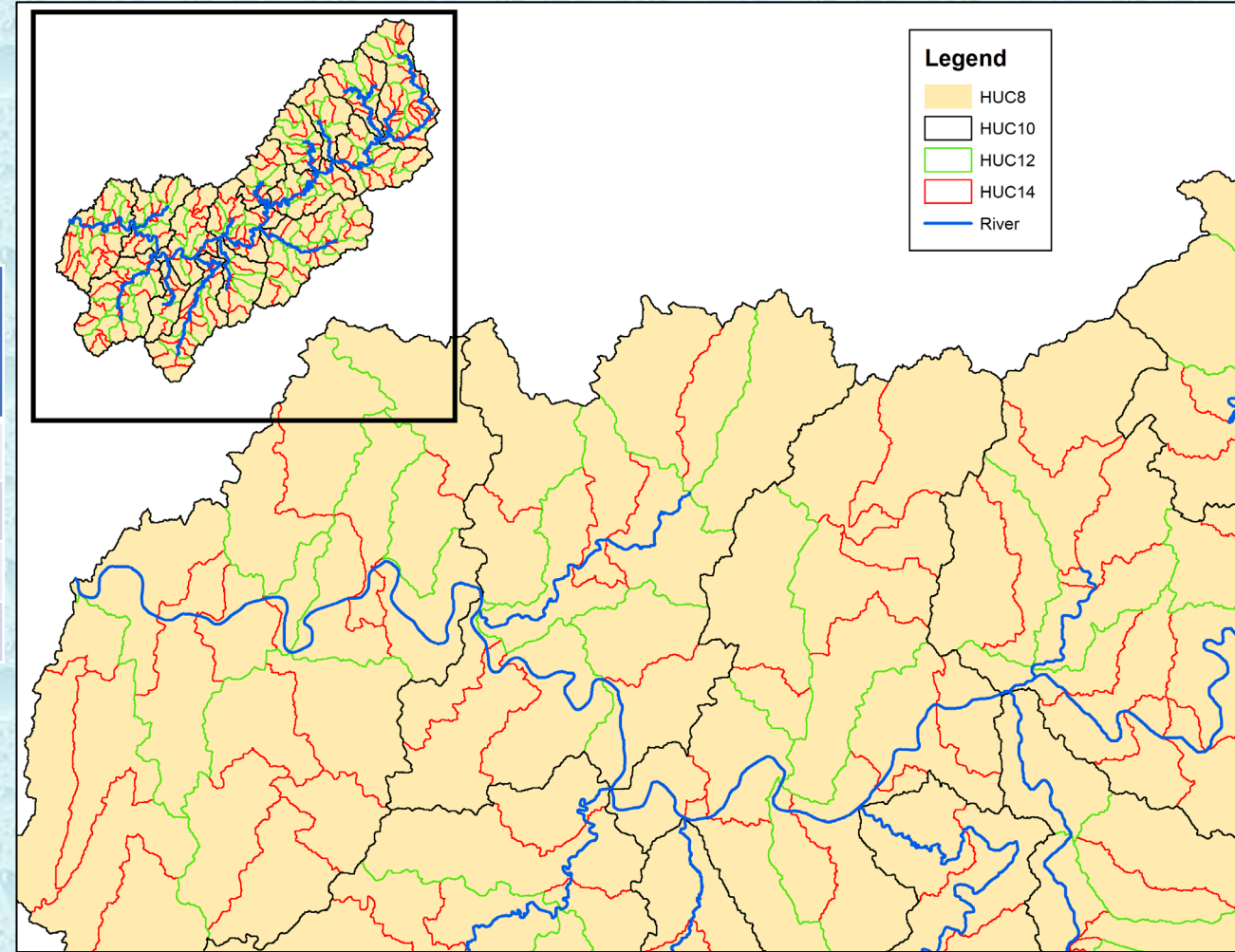


Federally Approved Input Datasets

Input Dataset	Source	Specifications
Weather	PRISM	1981 – 2020 (gridded)
	NEXRAD	2005 – 2020 (gridded)
Soil	USDA National Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database	2018
	USDA NRCS State Soil Geographic (STATSGO) Database	2018
Land Use	National Land Cover Database (NLCD)	2016
	USDA National Agricultural Statistics Service (NASS) Cropland Data Layer (CDL)	2014 – 2017
	USDA NASS Fields	2006 – 2010
	U.S. Fish and Wildlife Service (FWS) National Wetlands Inventory (NWI)	2018
Aerial Deposition	National Atmospheric Deposition Program (NADP)	1980 – 2020 (monthly)
Watershed Boundaries	EPA NHDPlus v2	2019
Stream Networks	EPA NHDPlus v2	2019
Elevation	USGS National Elevation Dataset (NED)	2018 (10-meter DEM)
Point Sources	EPA Hypoxia Task Force (HTF)	2019
	EPA Integrated Compliance Information System National Pollutant Discharge Elimination System (ICIS-NPDES)	2019
	USDA NRCS crop management zone data	2010
Ponds, Potholes, and Reservoirs	U.S. Army Corps of Engineers (USACE) National Inventory of Dams (NID)	2018
	EPA NHDPlus v2	2019
Crop Data	USDA NASS CDL	2014 – 2017
Wetlands	FWS NWI	2018
Water Use	USGS Water Use in the United States	2015

Subbasins by HUC Scale Across the U.S

Spatial Scale	Total Subbasins	Average Subbasin Area		Average Number of HRUs per HUC
		km ²	mi ²	
HUC8	2,112	3,690	1,425	2,920
HUC10	15,301	509	200	680
HUC12	79,836	98	38	229
HUC14	352,847	22	8	89



U.S. HAWQS v2.0 Demo

Login or Register

hawqs.tamu.edu

Log in using **existing credentials** or **register** for a new account

The screenshot shows the HAWQS website interface. At the top left, the logo reads "HAWQS Hydrologic and Water Quality System A National Watershed and Water Quality Assessment Tool". In the top right corner, there are links for "Log in" and "Documentation & Support". A "Log in" modal window is open, featuring a "user name" input field (highlighted with a red box and arrow), a "Password" input field, a green "Log in" button, and links for "Forgot your password?" and "Don't have an account? Register now." (highlighted with a purple box and arrow). The main content area contains text describing HAWQS version 2.0 as a web-based interactive water quantity and quality modeling system that employs the Soil Water Assessment Tool (SWAT). It lists features such as pre-loaded input data, output tables and charts, a user guide, and online development tools. Below this, there are two columns of text: the left column discusses how HAWQS enhances the usability of SWAT by simulating various management practices, and the right column explains that users can select from three watershed sizes (8-digit, 10-digit, and 12-digit) and that the system allows for aggregation and scalability of water quality estimates across large geographic areas.

**Tier I access upon registration - request for higher Tier access to run larger projects



Recent Activity

Projects

Group Projects

+ New Project

Create a Project

HAWQS Dataset

HUC8

HAWQS Version 2

HUC8

HUC10

HUC12

HUC14

HAWQS Version 2 Calibrated

HUC12 Flow Calibrated

HAWQS Version 1

HUC8 v1

HUC10 v1

HUC12 v1

User-submitted datasets

Back_Creek_Calibrated_daily

Downstream subbasin

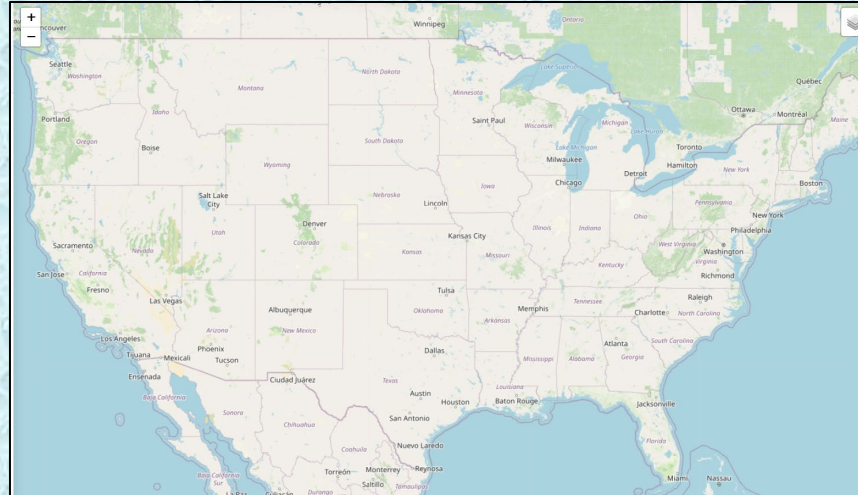
031502

03150201

03150202

03150203

03150204



HAWQS Dataset

HUC8

Downstream subbasin

03150204

▶ Advanced options

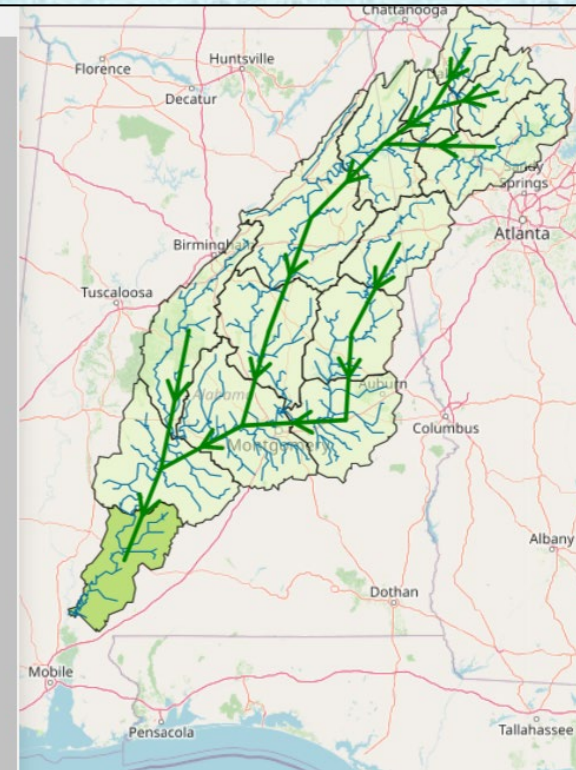
The selected watershed contains 14 subbasins and 54,152 HRUs. [View routing table.](#)

Show routing on map

Give your project a name

HUC8 - 03150204



Create Project







SUMMARY

Name	HUC8 - 03150204
Subbasins	14
HRUs	54,152
Total area	58,893.17 km ²
Watershed	HUC8, 03150204





SET-UP

-  Set HRUs
-  Create scenario

DATA

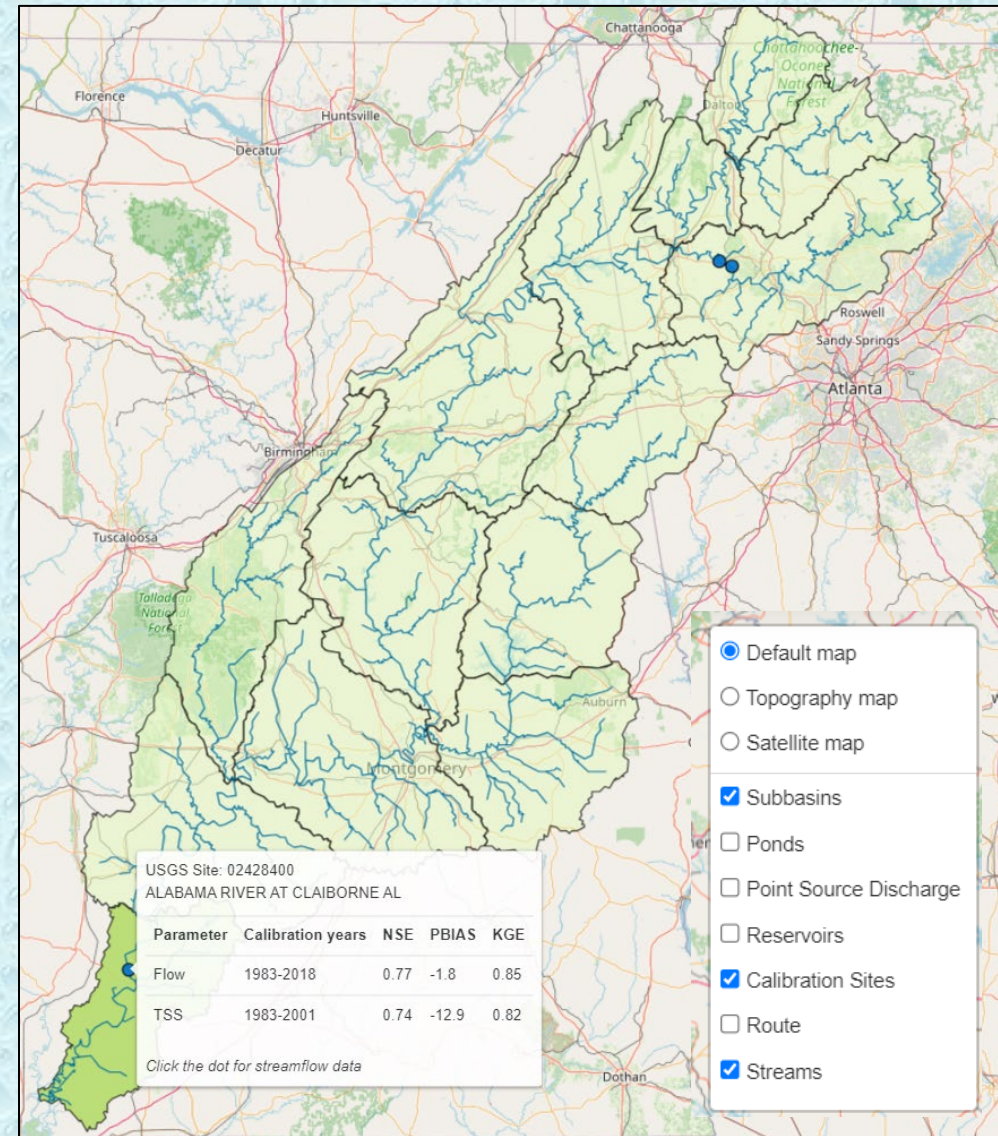
-  Metadata
-  Project downloads
-  Uploaded documents
-  Feedback and error reports

ACTIONS

-  Share project
-  Copy project
-  Change project name
-  Delete project

Project Summary

- Details of watershed
- HRU set-up
- Scenario creation
- Download project
- Upload documents
- Share projects
- Calibration statistics
- Streamflow data
- Point Sources/Reservoirs/Ponds



SET-UP

☰ Set HRUs

⚙️ **Create scenario**

Create a new scenario

Scenario name
Default

Weather data
PRISM

Simulation start date: 01/01/1981
Simulation end date: 12/31/1985

Set-up/warm-up years: 2

SWAT output print setting: Daily

SWAT model version to run: SWAT 2012 rev. 688 (Temperature)

- SWAT 2012 rev. 636
- SWAT 2012 rev. 659
- SWAT 2012 rev. 670
- SWAT 2012 rev. 681
- SWAT 2012 rev. 682
- SWAT 2012 rev. 683
- SWAT 2012 rev. 684
- SWAT 2012 rev. 685
- SWAT 2012 rev. 687 (Temperature)
- SWAT 2012 rev. 688 (Temperature)**

Create a Scenario

Default Scenario

Overview Customize SWAT Inputs

Weather dataset	PRISM (v2.0)
Starting simulation date	1/1/1981
Ending simulation date	12/31/1985
Set-up/warm-up years	2
SWAT output print setting	Daily
SWAT model version to run	SWAT 2012 rev. 684

[Run Scenario](#)
[Edit/Copy Settings](#)
[Back](#)

Create a new scenario

Scenario name
Default

Weather data
PRISM

Actual climate

- PRISM
- NEXRAD

Climate scenarios - CMIP5

- CanESM2
- CCSM4
- GISS-E2-R
- HadGEM2-ES
- MIROC5
- ACCESS1-3
- GFDL-CM3
- HadGEM2-CC
- IPSL-CM5A-LR
- IPSL-CM5A-MR
- MIROC-ESM-CHEM
- MRI-CGCM3

Default Scenario

Overview

Customize SWAT Inputs

General watershed inputs and databases

Calibration data

Basin input data

Fertilizers

Nutrient efficiency

Urban input data

Land use update

Weather data

Climate sensitivity/variability analysis

Weather generator

SWAT output to print

HRU variables to print

HRUs to print

Subbasin inputs

Curve number

Pothole variables

Sediment routing method

Point source

Ag management/BMPs/Conservation practices

General parameters

Operations management

Customize SWAT Inputs

- Select calibration parameters
- Upload up to 25 different land use scenarios
- Adjust monthly rainfall and temperature
- Add in constant, daily, monthly, or yearly point sources
- **Modify agricultural management**
- **Simulate Best Management Practices (BMPs) and Watershed Protection Plans (WPPs)**

Run Scenario

Run scenario



Click the button below to run the scenario. This will write your SWAT input files and SWAT editor tables (if checked), run the model, and process model outputs. If you still want to change your SWAT input data, click the cancel button.

Estimated run time: **34 minutes** 

- Write SWAT editor tables
- Skip output processing (charts, maps, csv will be unavailable)
- Email me when run completes



Run Scenario

Cancel

Estimated from your number of HRUs and simulation years. Subject to fluctuation based on number of concurrent users and projects running on HAWQS at any given time.

- Estimated run time
- Write SWAT editor tables (use offline)
- Reduce run time by skipping output processing
- Receive email when run is complete

Default Scenario

Overview Customize SWAT Inputs **Output Data**

This scenario last ran on Tue, Jul 26, 2022 2:24 PM. The run took 32 minutes.
The scenario output will be kept on our system until **Jul 26, 2023**.

[Run SWAT Check to identify potential model problems](#)

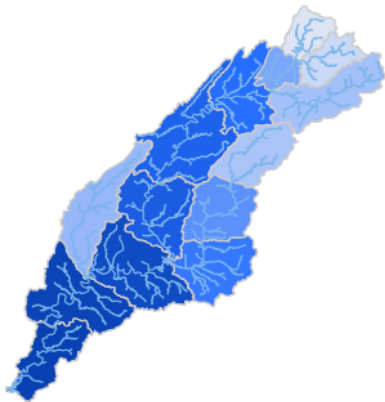
[Output charts](#)

[Output maps](#)

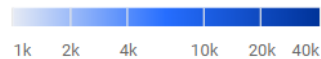
[Get Map](#)

[Change Colors](#)

Default Monthly Average FLOW_OUT



Monthly Average FLOW_OUT m3/s



Highcharts.com

Display Output

-- Select an output type --
-- Select an output type --
Reach (output.rch)
Subbasin (output.sub)
HRU (output.hru)

-- Select a statistic --
-- Select a statistic --
Load/flow duration curve
Average
Maximum
Minimum
Box plots
Daily values

-- Select a subbasin from this list or click the map below --

Select parameters to chart

FLOW_IN - Average daily streamflow into reach (m3/s)

FLOW_OUT - Average daily streamflow out of reach (m3/s)
Line No y-axis

Average daily loss of water from reach by
Area (m3/s)

Average daily loss of water from reach by
Scatter

Average daily loss of water from reach by
Column

Average daily loss of water from reach by
Spline

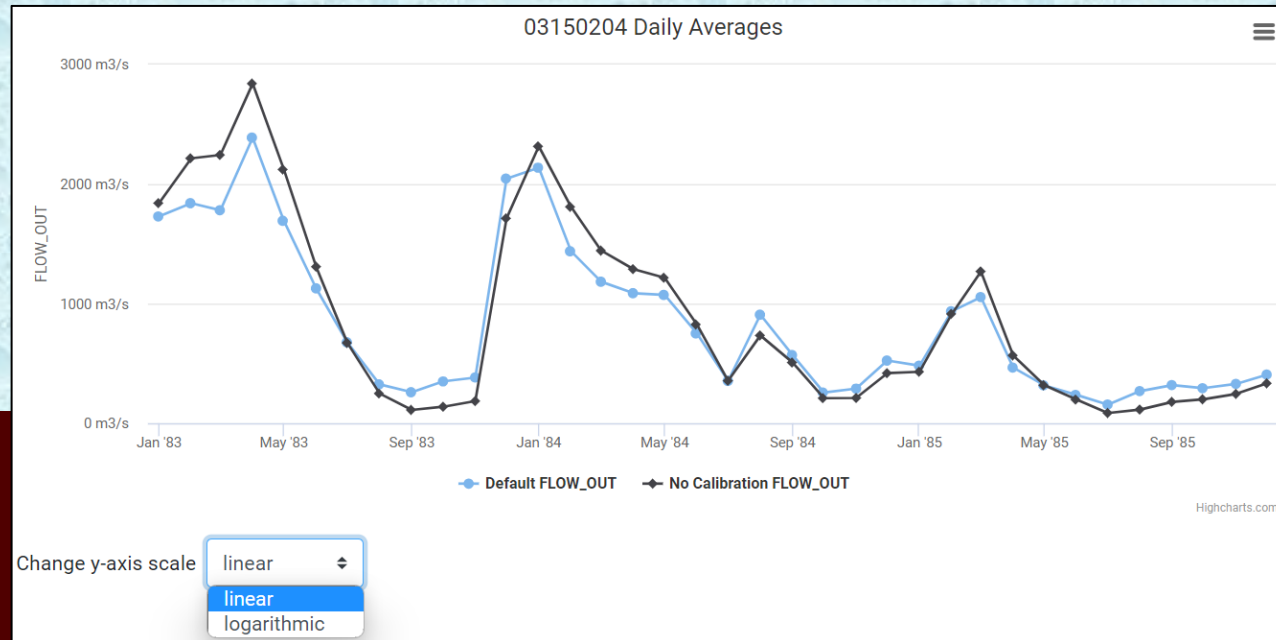
Display metric units
Set the default units displayed from your [account settings](#)

Select up to 3 other scenarios for output comparison (optional)

rev683

rev682

No Calibration



ADDITIONAL HAWQS PLATFORMS

SUPPORT AND FUNDING

State and Regional

(##).hawqs.tamu.edu

- Texas (TX)
- Oklahoma (OK)
- South Carolina (SC)
- Trinity River Authority (TRA)
- Tarrant Regional Water District (TRWD)
- Lower Colorado River Authority (LCRA)
- North Texas Municipal Water District (NTMWD)
- Meskwaki Nation (Meskwaki)



INTERNATIONAL HAWQS PLATFORMS

SUPPORT AND FUNDING

- South Africa (HAMSA)
[hamsa.hawqs.tamu.edu]

- Pernambuco Brazil (SUPER)
[super.hawqs.tamu.edu]

- Hydrologic Unit Model for InDia (HUMID)
[bhuvan.nrscs.gov.in]

- Global HAWQS
[global.hawqs.tamu.edu]

- Coming Soon: Ukraine



U.S. HAWQS v2.0

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Questions or Comments?

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RESEARCH