TENNESSEE VALLEY AUTHORITY

Regional Resource Stewardship Council

November 18 and 19, 2024

Welcome!

The RRSC Meeting will begin at 12:00 pm ET

Welcome

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RRSC Live and Virtual Meeting

- **We welcome members of the public attending in person and virtually. Those attending virtually are in view and listen only mode**. There will be a Public Listening Session at this meeting. Written comments are always welcomed (tva.com/rrsc).

- **Any RRSC Members who are attending virtually are able to mute and unmute their own line.** Council Members who are attending virtually may use the raise hand function to be recognized for questions or comments.

- **RRSC Members attending in person**, please turn on your light when you want to comment or ask a question and I will call on you. I will identify the person I call on so that those attending virtually will be able to identify the speaker. Please speak loudly so that those in the room and those attending virtually can hear your comments.

Safety First!

- **In case of fire or other building emergency,** exit the doors you entered to the room. Exit the building via the front doors. Turn right and gather outside.
- **In case of severe weather**, you will be guided to an interior room.

TVA TENNESSEE VALLEY AUTHORITY

Introductions

Name

Position, Organization, Location

Looking Forward to this Fall

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RRSC Term 13 Members

Introductions:
Name
Position, Organization, Location
Looking Forward to this Fall

Ryan Brown
Commonwealth of Virginia

RaeLynn Butler
Muscogee (Creek) Nation

Michael Butler
Tennessee Wildlife Federation

Keith Carnahan
Meriwether Lewis Electric Cooperative

Alan Gates
Pennyrile Electric

Richard Holland
Packaging Corp of America

Cline Jones
Tennessee River Valley Association

Kim Klinker
Klinker Management

Ron Lambert
Nature Conservatory

Whitney Lipscomb
State of Mississippi

Tom Littlepage*
ADECA Office of Water Resources

John McConnell
McConnell Insurance
Commonwealth of Kentucky

Will Nelson
Nelson Tractor Co.
State of Georgia

Ron Robertson
Tennessee Farmer

Danette Scudder
TN Valley Public Power Association

Catherine Via
TN Farm Bureau Federation

Stacey White
Arab Electric Cooperative, AL

Randy Wiggins
Cherokee County, NC

*** Council Chair**

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Agenda

RRSC Meeting – Day 1
November 18, 2024 Young Harris, GA
All times are ET

12:00 pm	**Welcome** **Designated Federal Officer Melanie Farrell; RRSC Chair Tom Littlepage**
12:10	**Introductions of Council Members – Jo Anne Lavender, Facilitator** **Agenda Review**
12:30	**TVA Update – Melanie Farrell, VP, Valley Engagement and Support**
12:35	**Helene Update – Tom Barnett, VP, River Management and Dam Safety**
12:50	**River Management Climate Change Study** **Patrick Massey, Program Manager, Dam Safety** **Sean Turner, Oak Ridge National Lab** **Miles Yaw, Program Manager, TVA River Management**
3:00	Break
3:15	**Integrated Resource Plan (IRP) Update** **Candy Kelly, Senior Manager, Resource Strategy** **Hunter Reed, IRP Project Manager**
4:15	**Public Listening Session**
5:15	**Day 1 Closing Remarks** **Adjourn**

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Agenda

RRSC Meeting – Day 2
November 19, 2024 Young Harris, GA
All times are ET

8:30	**Day 1 Recap** **Day 2 Agenda Review**	Facilitator, Jo Anne Lavender
8:40	**Advice Question Discussion**	
10:00	**Break**	
10:15	**Natural Resources Update - Scott Lea, Senior Manager, Natural Resources**	
10:35	**River Management Update - James Everett, GM, River Management**	
10:55	**Cultural Resources Update – Paul Avery, Archaeologist**	
11:15	**Finalize Advice Statement**	
12:15	**Final Comments and Meeting Wrap Up**	
12:30	**Adjourn Meeting**	

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TVA Update

Melanie Farrell, Designated Federal Officer

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Helene Update

Tom Barnett, VP, River Management and Dam Safety

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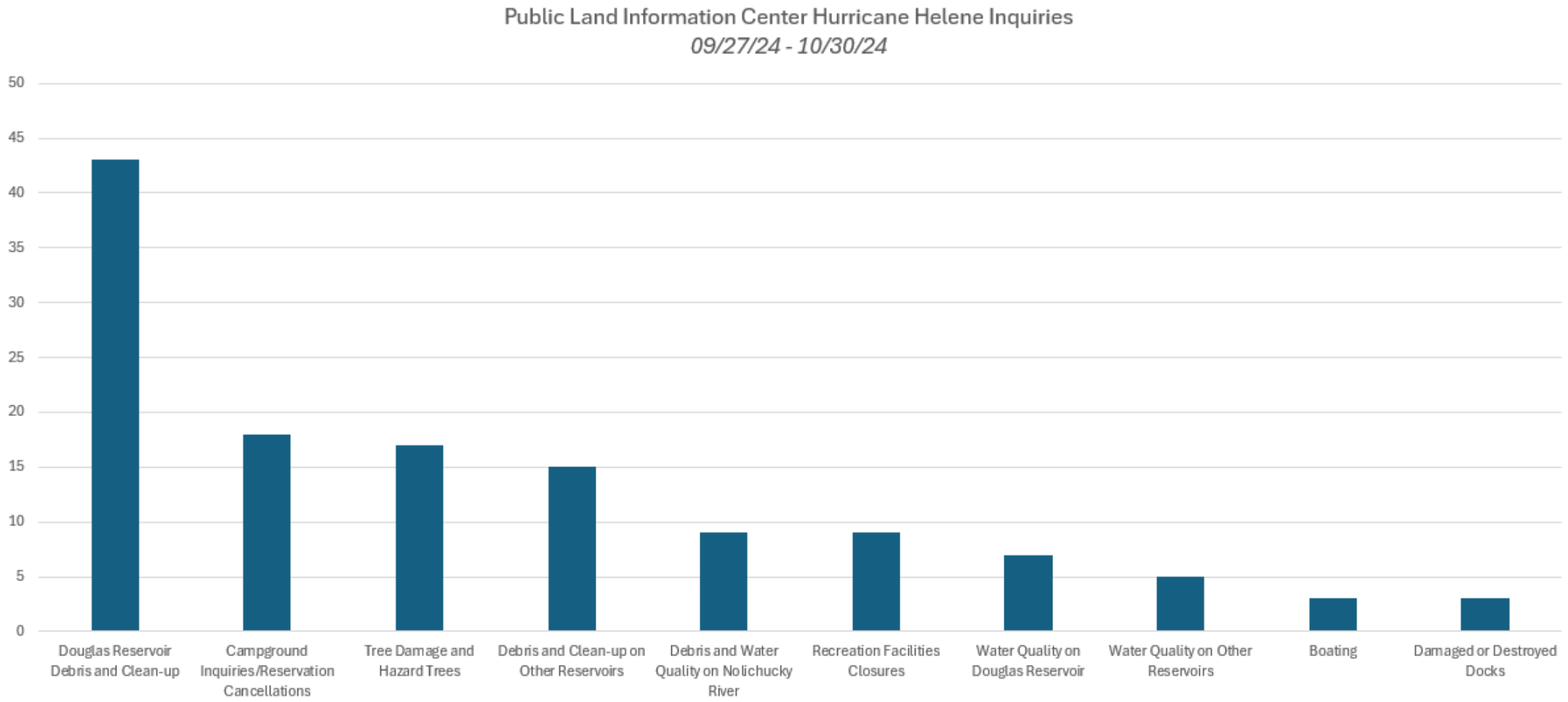
Hurricane Helene Response

- Assessments of damaged sites.
- Contractual obligation for concessionaire campgrounds.
- Osceola Island Bridge on South Holston Dam Reservation.
- Stream access sites.
- Private water-use facility and infrastructure damage and Section 26a permitting needs.
- Property reclamation requests.

Hurricane Helene Response

- 129 stakeholder inquires received by the Public Land Information Center from 09/27/24 – 10/30/24.



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River Management Climate Change Study

November 18, 2024

Regional Resource Stewardship Council

Big Picture First - Advice Question

Based upon the preliminary findings of TVA's study of climate change impacts to river system management, what additional considerations should be factored in to ensure TVA continues to balance river system benefits?

Topics

Purpose and Background

Climate Change Overview

Climate Change on TVA River Management's 6 Benefit Areas

Modelling Limitations, Assumptions, & Variability/Uncertainty

Planned communications and future considerations

Group Discussion

Today's Speakers

- Patrick Massey, TVA Dam Safety
- Sean Turner, Oak Ridge National Laboratory
- Miles Yaw, TVA River Management

Risk and Frequency of Extreme Weather Events

- Risk informed decision making enhances decisions by considering all available information and accounting for uncertainty
- The reservoir system is designed and managed based on risk of weather events
- How might climate change affect hydrological risk and what is our tolerance to these changes?

The top photo shows historic flooding in 1867 on the Tennessee River in Chattanooga. The bottom photo is a view from the same vantage point in 1957.

Hurricane Helene Event (September 23-29, 2024)

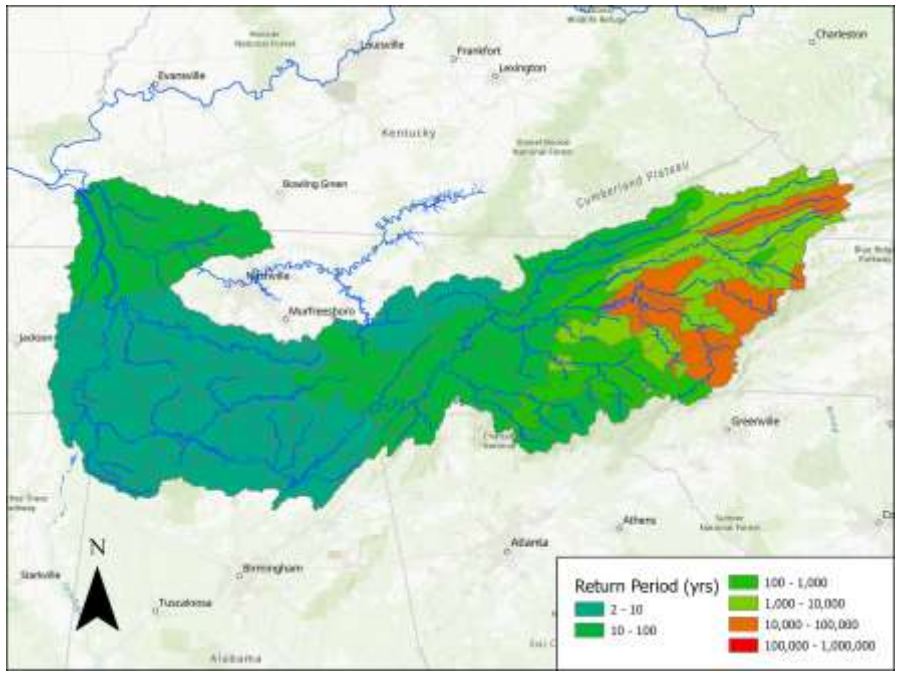
RAINFALL IN THE EASTERN TENNESSEE VALLEY

7.67 inches

10 times normal

Billions in Damages

Areal Rainfall Frequencies



Rainfall for the Nolichucky basin averaged 9.7 inches and corresponds to a 1-in-7,900-year rain event; Douglas 1-in-51,000 (preliminary TVA estimates)

Crest Levels

Nolichucky River
- Highest flood of record for the dam, exceeding previous record from 1977 by 9.5 feet

French Broad River
- Crested 13.3 feet above Flood Stage
- Largest flood on the French Broad in Newport since 1867

Pigeon River
- Crested 21.7 feet above Flood Stage, a new record
- Largest flood on the Pigeon in Newport since 1902

Watauga River
- Crested 4.9 feet above Flood Stage
- Largest flood on the Watauga in Elizabethton since 1940

Doe River
- Crested 2.8 feet above Flood Stage
- Largest flood on the Doe in Elizabethton since 1998

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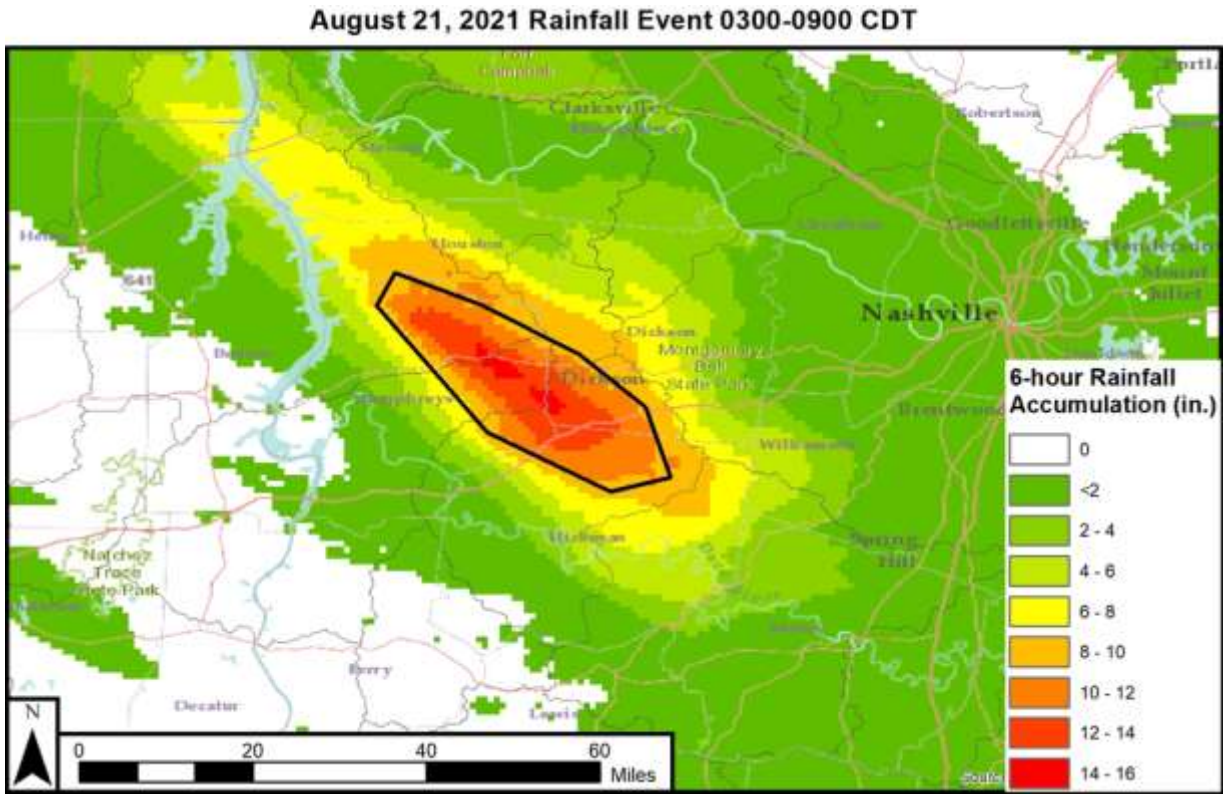
Waverly Event (August 20-21, 2021)



How rare was this?

1:52,000 to 1:236,000

Purpose

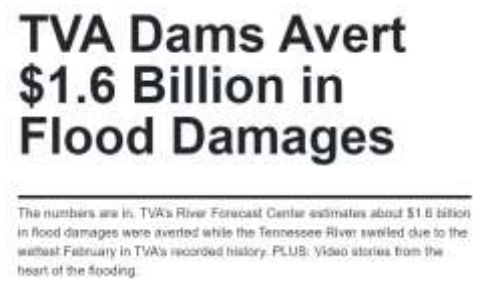
How will climate change affect the Tennessee River System as we know it?

Climate Change Studies

- **Focus on 6 Benefit Areas [TVA, ORNL, & Research Triangle Institue (RTI)]**
  - Broader, general study

- **Reservoir Hydrothermal Analysis (ORNL & TVA)**
  - More specific to this area of water quality

- **Flood and Dam Safety Risk (TVA)**
  - A more focused look at extreme flood risk



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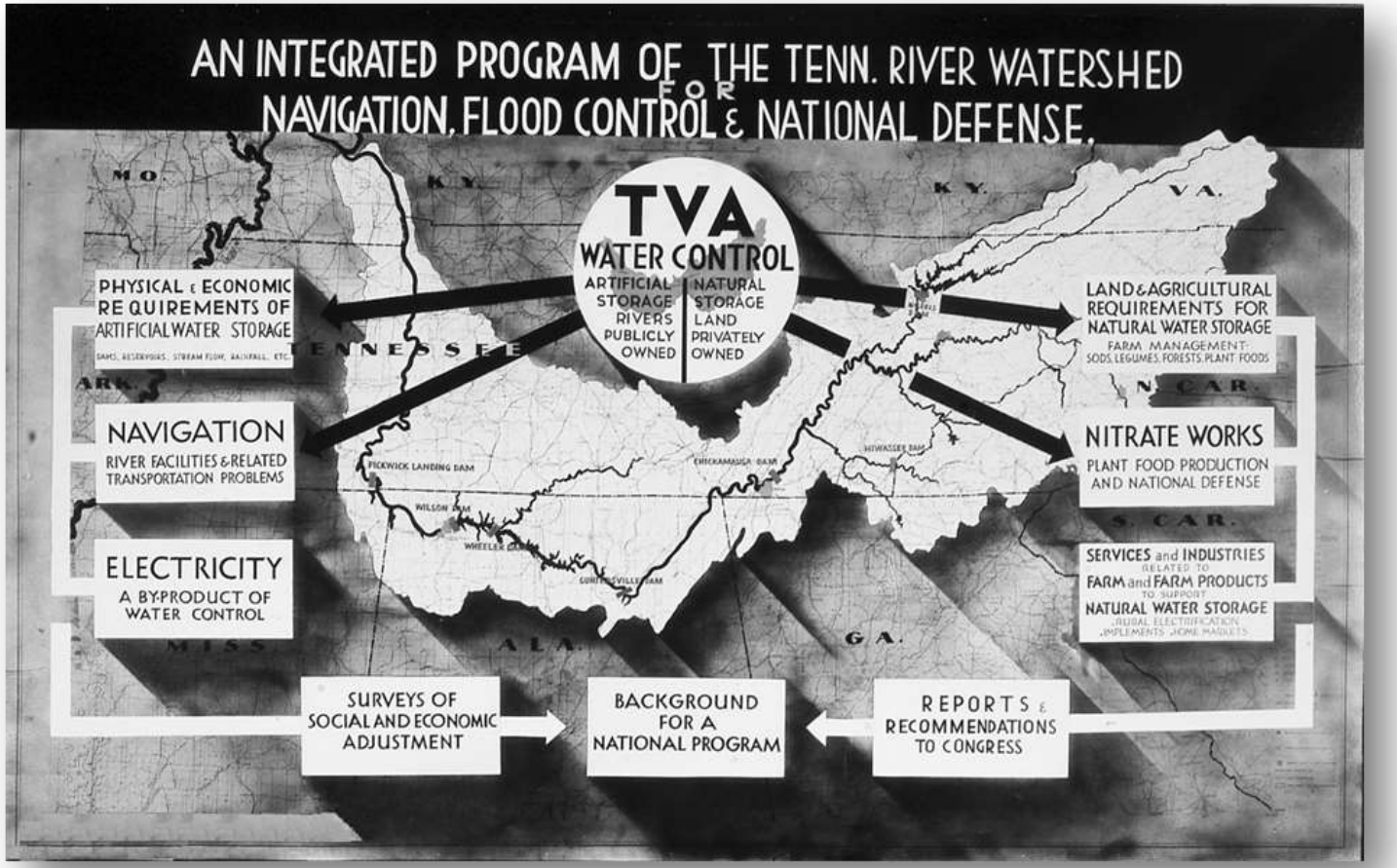
Integrated Resource Management

River system assigned multipurpose role through TVA Act in 1933.

(section 9a) …to regulate the stream flow primarily for the purposes of promoting **navigation** and **controlling floods**.

So far as may be consistent with such purposes, …for the **generation of electric energy**…



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Integrated Tennessee River System Overview

Flood Control

Navigation

Power Generation

Water Supply

Water Quality

Recreation

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Background – Climate Change

CMIP6: Coupled Model Intercomparison Project Phase 6 → Think Every New Season

GCMs: Global Climate Models / General Circulation Models → NWS & Various Private Models

SSPs: Shared Socioeconomic Pathways → Different paths and intensities

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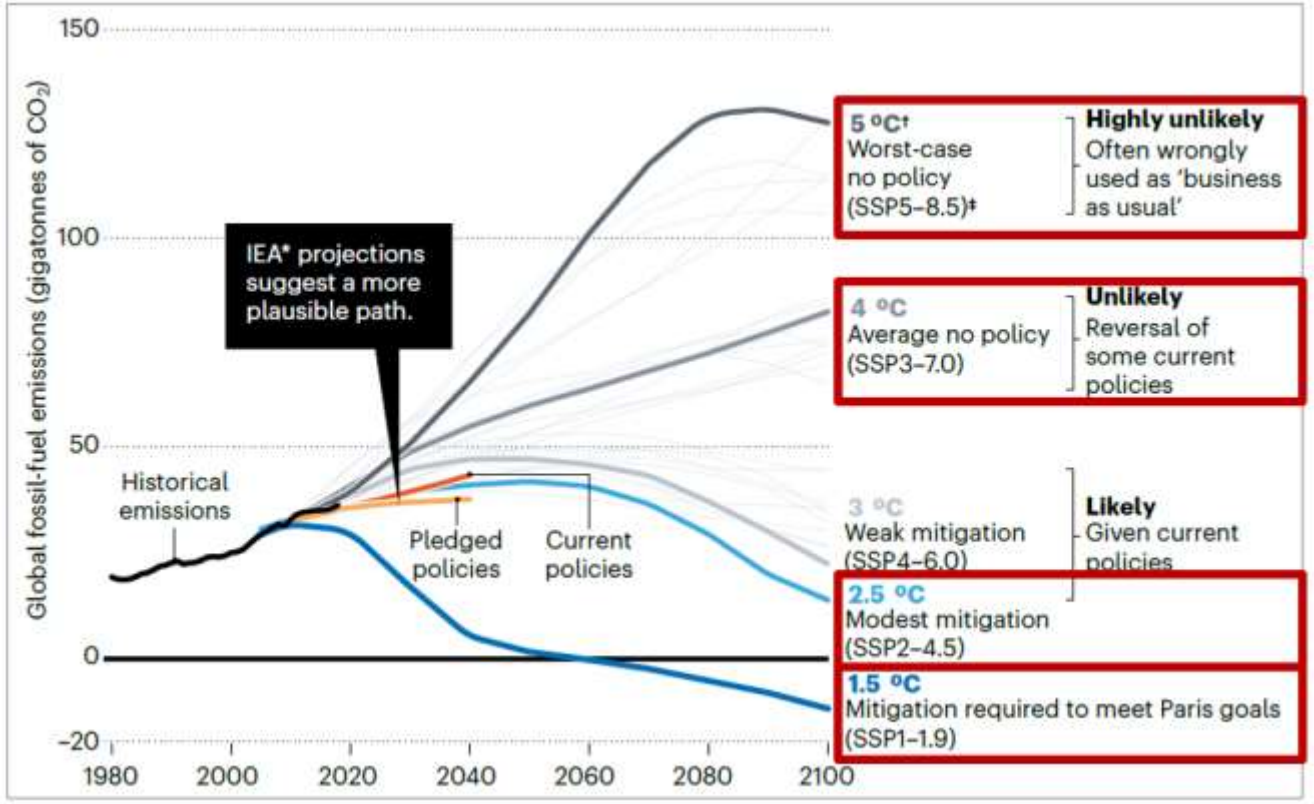
Background – Climate Change

- Currently, there are more than 35 models (GCMs) from different institutions around the world in the latest release
- These models can have up to 5 different versions of CO2 emission projections (SSPs)
- TVA selected a sample of the models and 4 SSPs in our study
- SSP2-4.5 appeared the most practicable and less extreme



Five CMIP6 SSP scenarios (reproduced from Haus and Peters, 2020)

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GCM Downscaling and Bias-Correction

- **Dynamical – RegCM4**

  Utilizes physical process based regional climate models.

  Computationally expensive and time consuming.

  Provides a large suite of physically consistent variables.

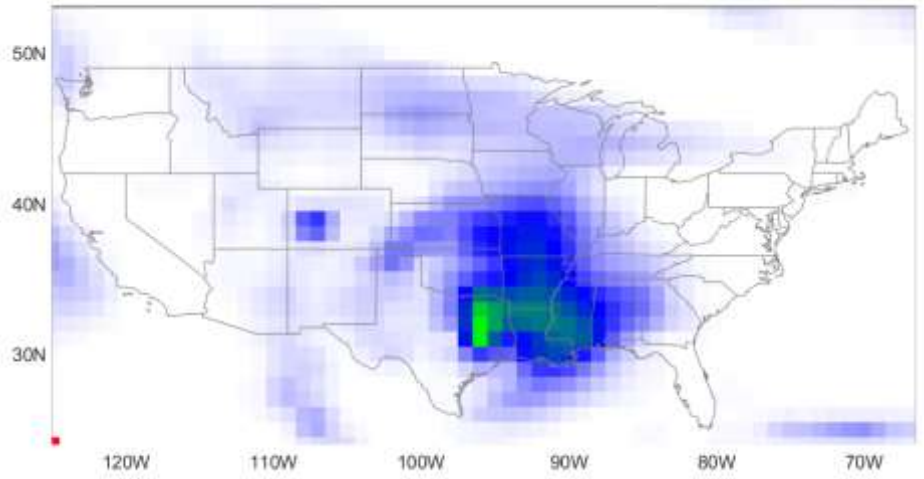
- **Statistical – DBCCA**

  Utilizes empirical relationships between GCM and observations.

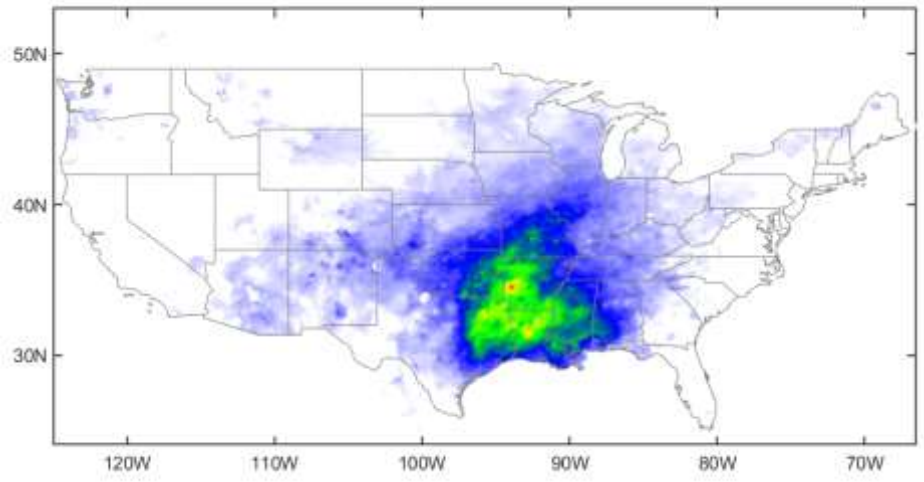
  Computationally efficient and faster.

  Provides only a few variables dependent on the availability of good quality observations.

Original GCM



After Downscaling

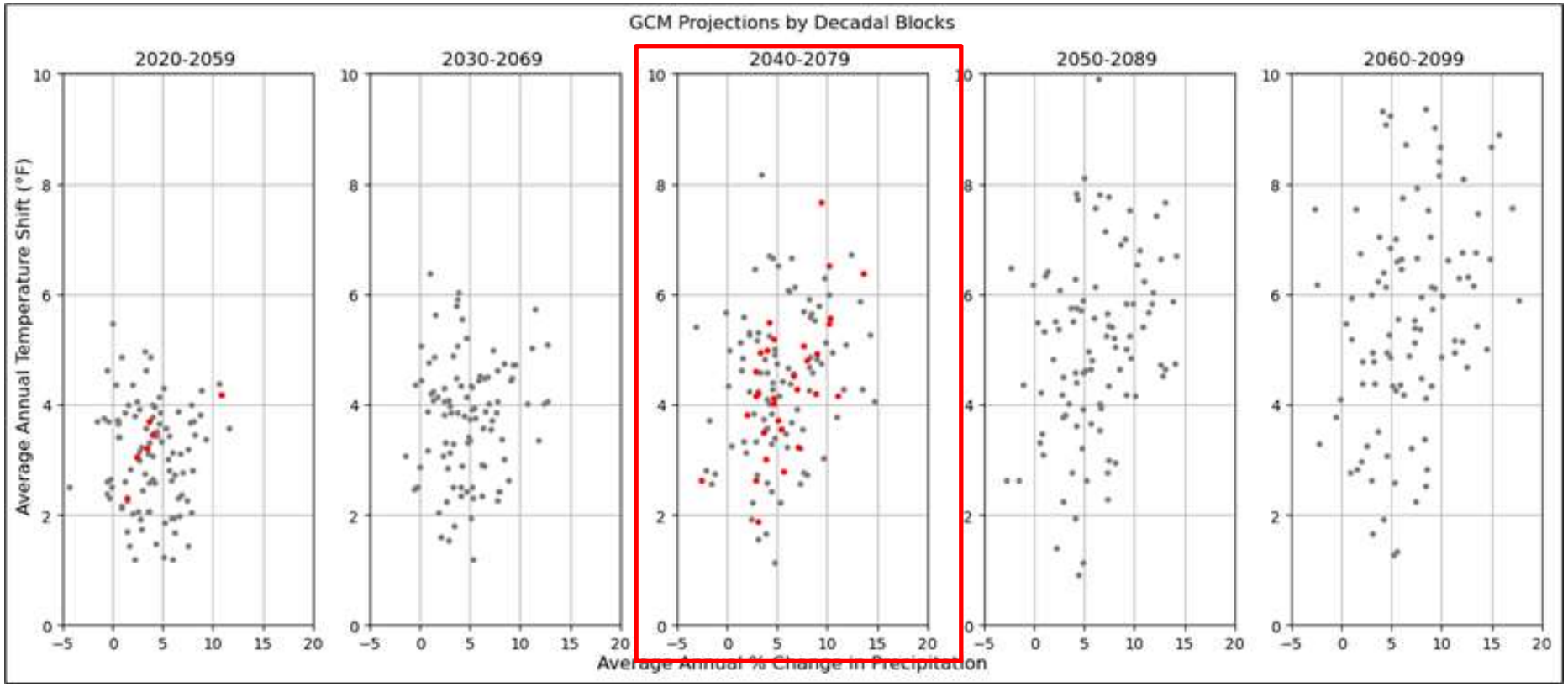


Rastogi et al. (2022), How May the Choice of Downscaling Techniques and Meteorological Reference Observations Affect Future Hydroclimate Projections?, *Earth's Future*, *10*(8), e2022EF002734, https://doi.org/10.1029/2022EF002734.

Background – Climate Change

Longer Projections
More Uncertainty

Projections for "Future" Climate ~ 40 Years Out



Shorter projections
Less Uncertainty

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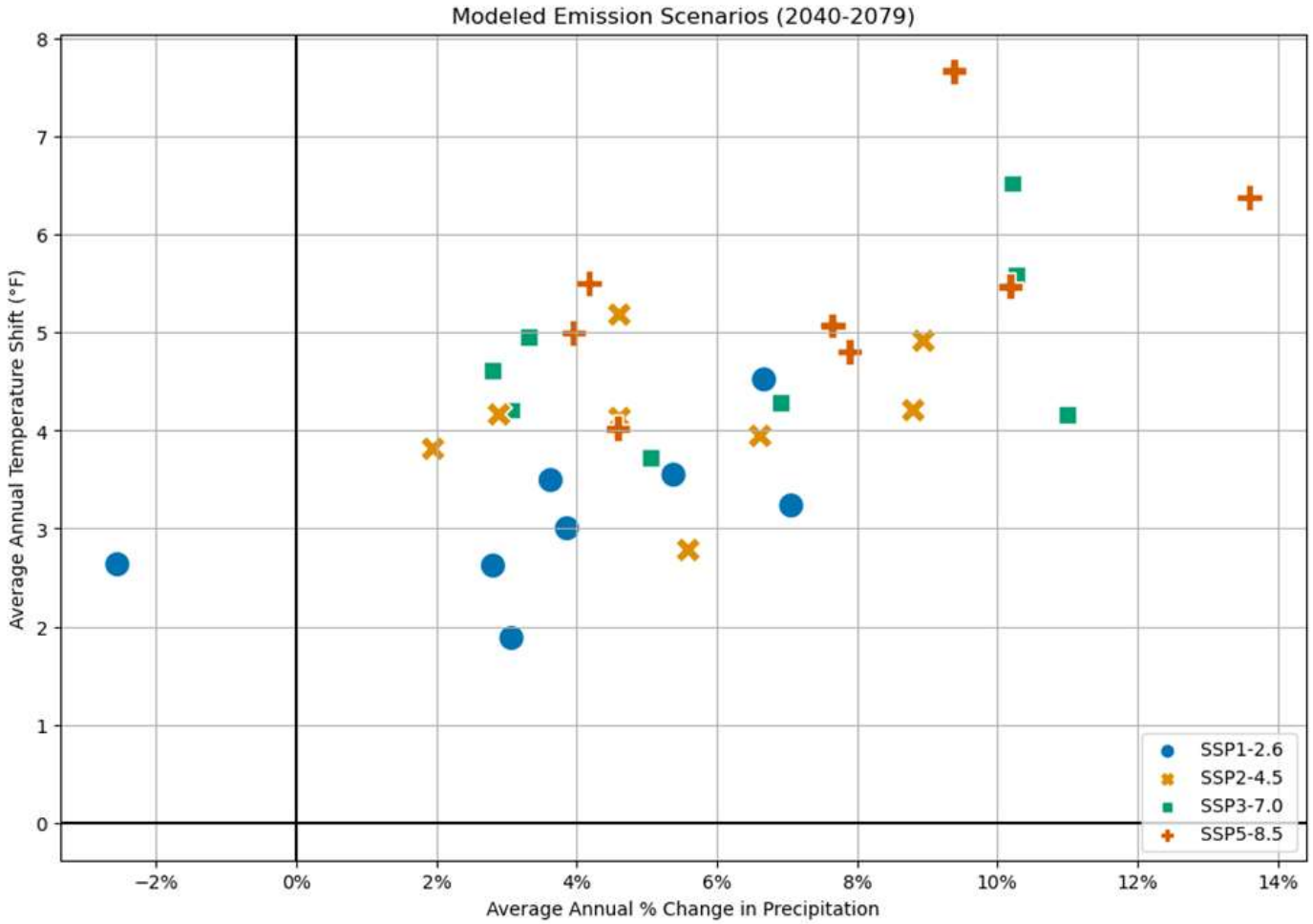
Background – Climate Change

No.	Models Selected
1	ACC ESS-CM2
2	BCC-CSM2-MR
3	MRI-ESM2-0
4	MPI-ESM1-2-HR
5	EC-Earth3-Veg
6	CanESM5
7	NorESM2-MM
8	CNRM-ESM2-1

SSP1-2.6:	3°F ↑T	4% ↑P
SSP2-4.5:	**4°F ↑T**	**6% ↑P**
SSP3-7.0:	5°F ↑T	7% ↑P
SSP5-8.5:	6°F ↑T	8% ↑P

~40 Years into the Future



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Background – Climate Change

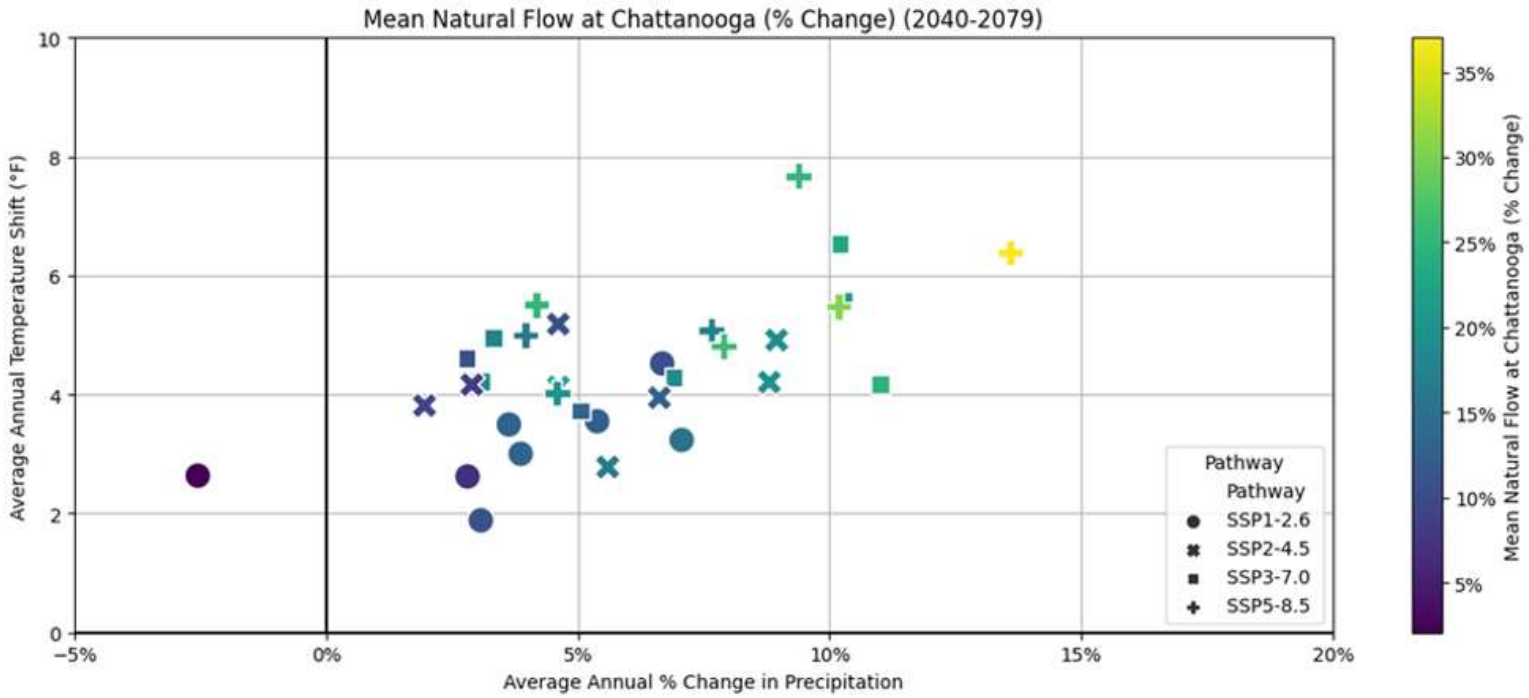
SSP1-2.6: ~11% Avg. Increase in Flow

SSP2-4.5: ~15% Avg. Increase in Flow

SSP3-7.0: ~18% Avg. Increase in Flow

SSP5-8.5: ~25% Increase in Flow

~40 Years into the Future



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Hydropower

Patrick Massey

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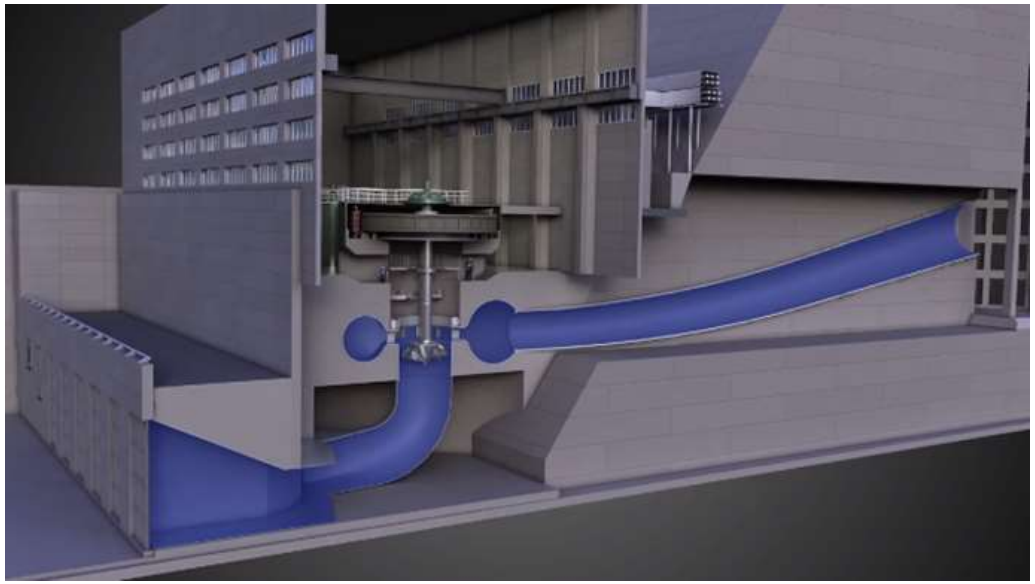
Hydropower

- Hydropower is about 10% of TVA's energy portfolio
- Represents replacement value of approximately $500 million annually
- Proven to be a valuable and flexible asset for TVA as energy prices and fuel are affected by market volatility



Hydropower Benefit - Historical

What is River Management's objective for this benefit?

- Optimize turbine availability with inflow forecast to supply low-cost, reliable hydropower

Measure of success and current performance?

- Consistently optimizing hydropower at 29 dams
- Peaking resources to meet TVA's daily fluctuations in demand

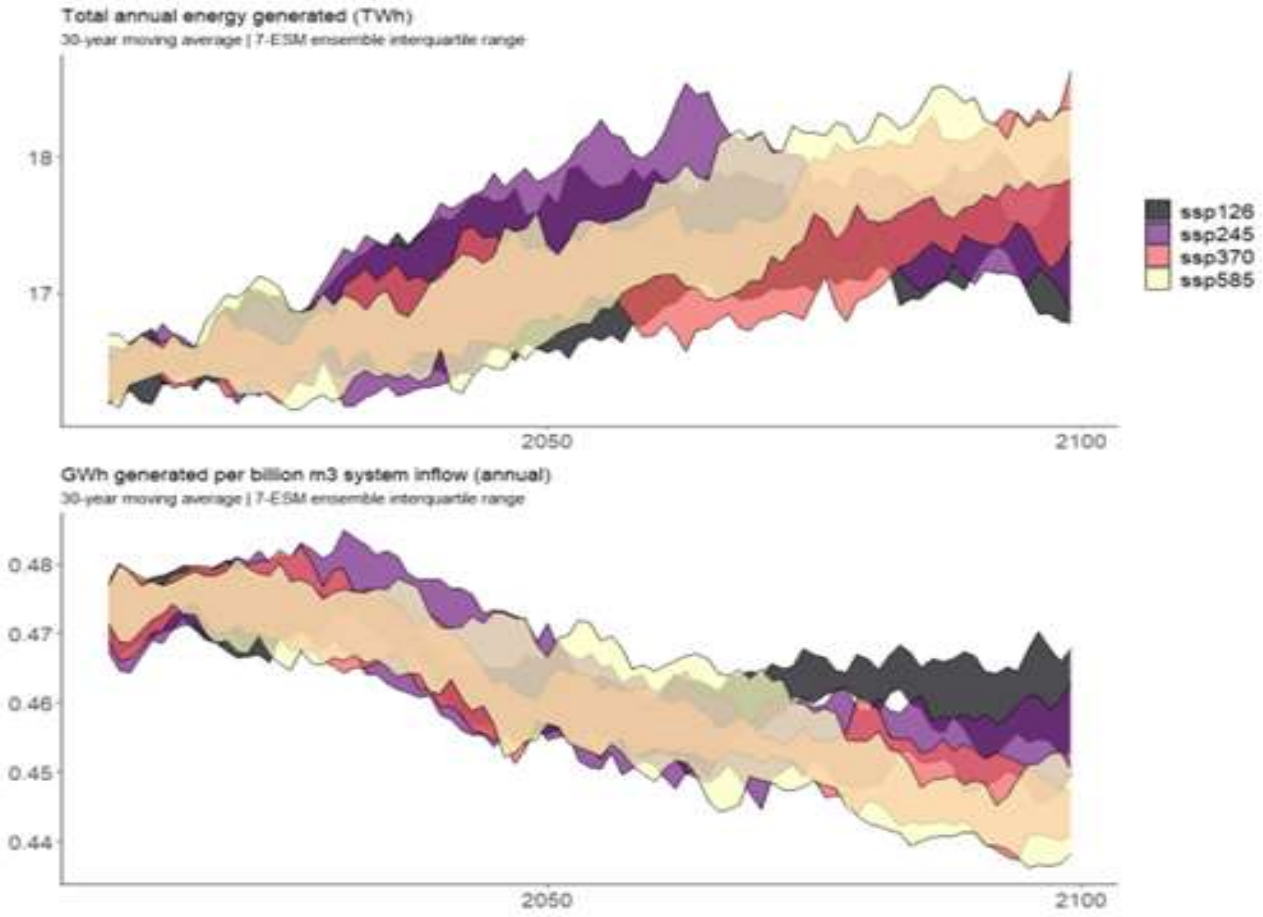
Hydropower Benefit - Future

How may TVA's ability to achieve objectives of this benefit change?

- In general, we expect greater rainfall which will provide for greater hydropower opportunities

How much change?

- Results showed a median increase of 1 million MWH/year (vs ~12 million MWH/year currently)
- **~8% Increase in Hydropower Production Ability**



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Recreation

Patrick Massey

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Recreation

- The most popular questions from the community:
  - Why can’t we have summer pool all year long?
- University of Tennessee study estimated value of the system at $12 billion annually – Likely underestimated!
- Our area is unique for all its tourism and features tied to water recreation
  - World-renowned Ocoee River system rafting area
  - Fishing
  - Camping
  - Boating

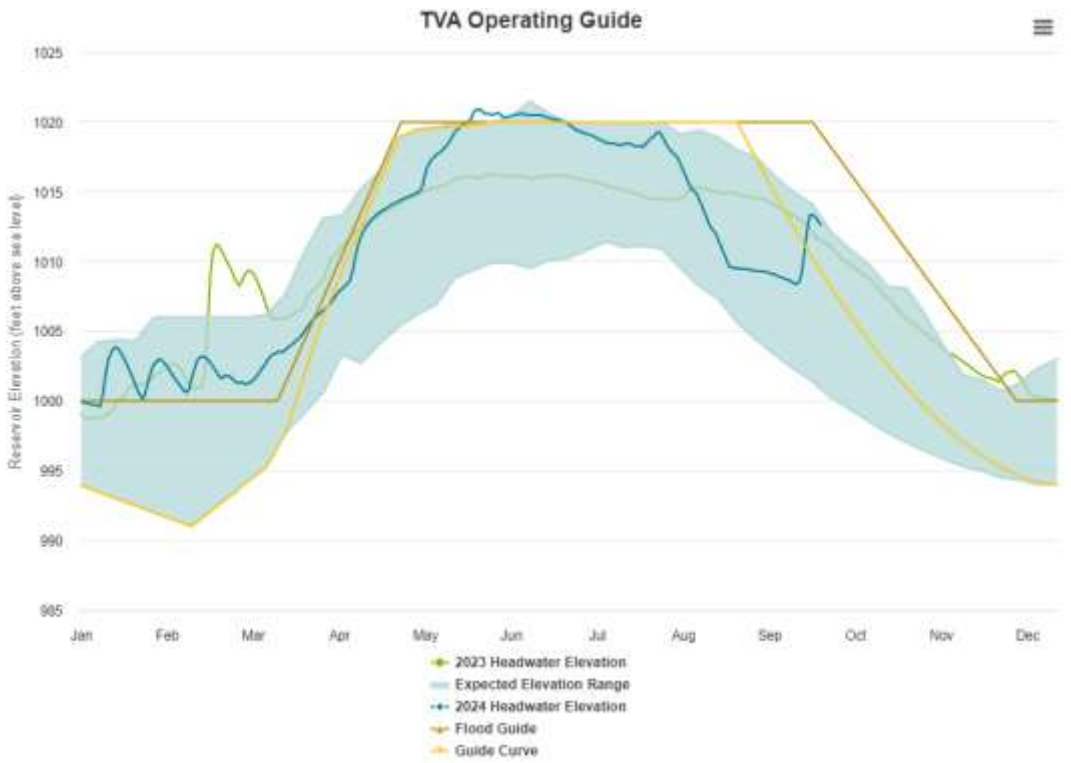
Recreation Benefit - Current

What is River Management's objective for this benefit?

- Increasing suitability of use and desirability for recreation and tourism revenues within the Valley economy
- Improving recreation on reservoirs and tailwaters

Measure of success and current performance?

- Upstream: By keeping pool levels within our operating balance curves and near our guide curves
- Downstream: By keeping flows between an appropriate minimum/maximum range



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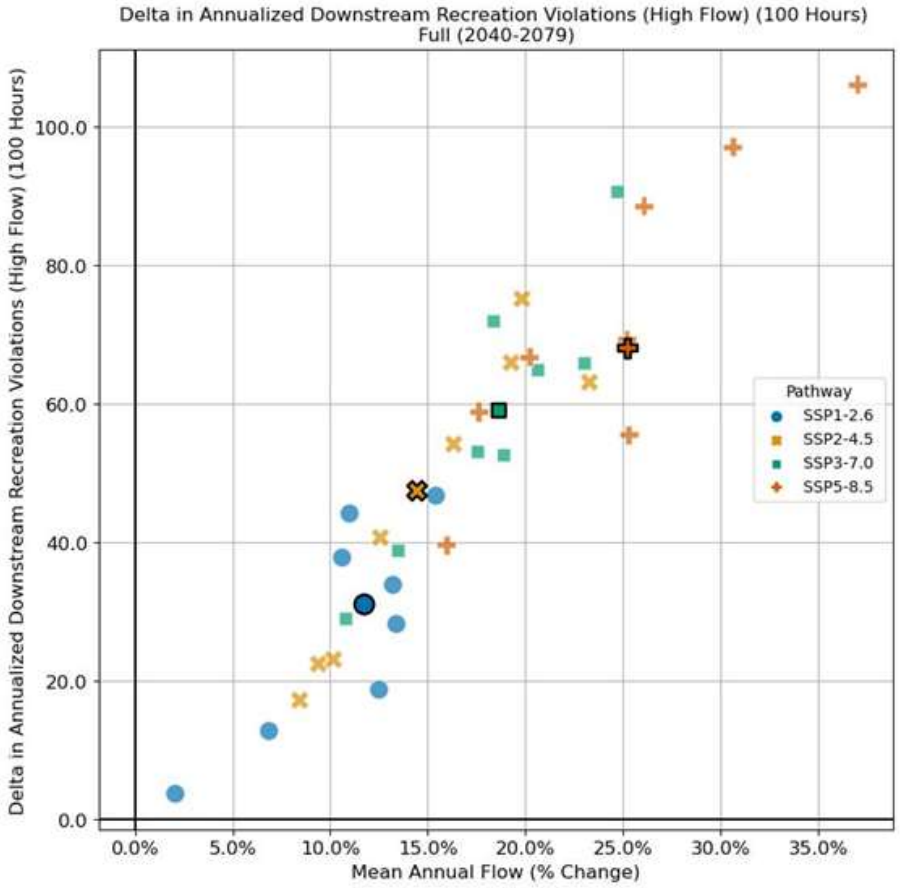
Recreation Benefit - Future

How may TVA's ability to achieve objectives of this benefit change?

- Upstream: Neutral change due to higher pool levels
  - Decrease in low elevation violations
  - Increase in high elevation violations
- Downstream: Slightly negative change in downstream flow recreation due to increased high flow violations

How much change?

- Upstream: No significant loss
- Downstream: Loss of 2-3 days / year of time



Example of Downstream Recreation Violations during High Flow

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Water Supply

Patrick Massey

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Water Supply Overview

- There are approximately 700 surface water intakes in the Tennessee Valley.
- Over 5.2 million people rely on the Tennessee River and its tributaries for their source of drinking water.
- Dependable water is as fundamental to the economic growth of the Valley as is dependable, low-cost electricity.
- Ensure adequate, sustainable supplies of water for the region's continued growth, while protecting the integrity of TVA's integrated operation of the river system.

Water Supply Benefit - Current

What is River Management's objective for this benefit?

- Providing enough water for municipal, agricultural, and industrial purposes.

Measure of success and current performance?

- Preventing lake levels from lowering to a point where established users cannot pull in water with set intake elevations

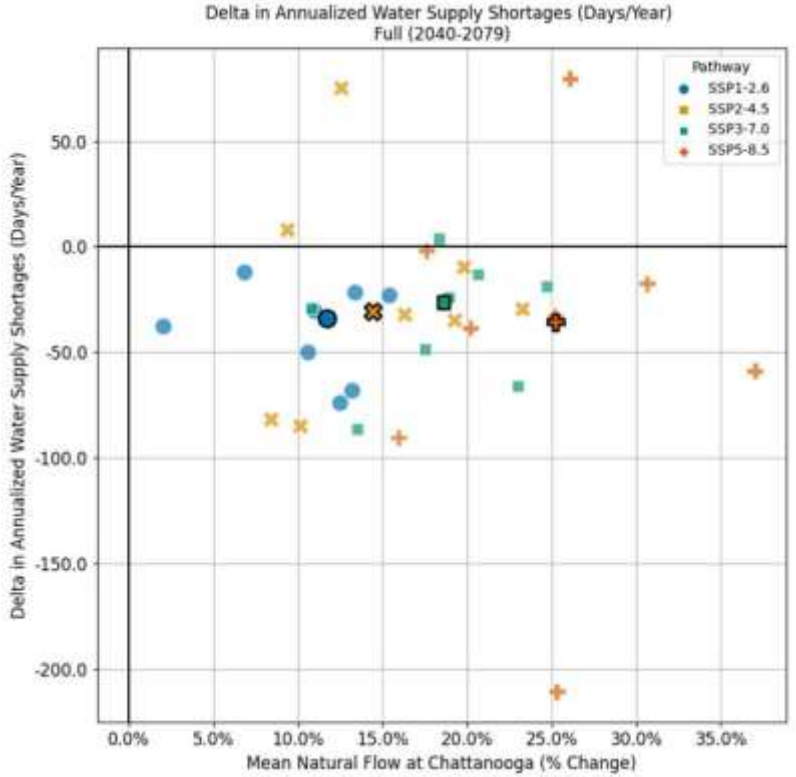
Water Supply Benefit - Future

How may TVA's ability to achieve objectives of this benefit change?

- Mixed, but largely positive with a general decrease in shortage potential for most users

How much change?

- A small portion of runs did indicate the potential for additional isolated shortages in the future, but most did not.
- Overall results show that we can improve our historical shortage reliability by 8%
- Note the increased frequency of extreme weather events such as droughts can be impactful (with timing of event) to water supply



Median Values of Water Supply Shortages

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Water Quality – Hydrothermal

Sean Turner

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Hydrothermal Overview

- Forecasting water temperature
- Evaluating new projects or emerging problems in the river system that affect our thermal plants or hydro plants
- Providing environmental protection of sensitive species in the Valley affected by water temperature issues

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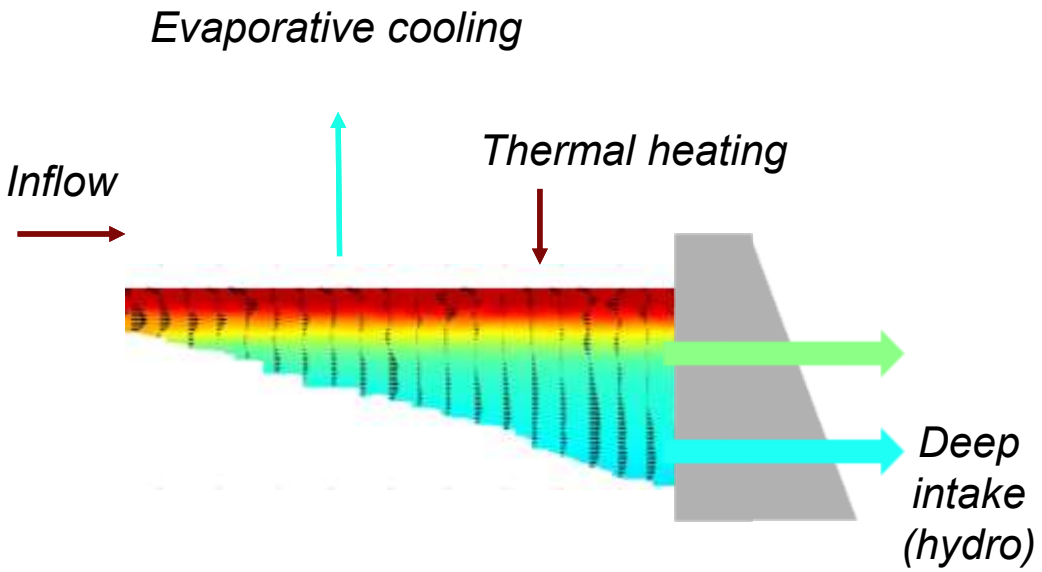
Water Quality – Hydrothermal Benefit - Current

What is River Management's objective for this benefit?

- Reliably maintaining water temperatures for ecological habitats and power plant cooling

Measure of success and current performance?

- Ensuring no surprise thermal derates for any TVA thermal plant
- Ensuring advance warning of aquatic plant issues at Browns Ferry Nuclear Plant



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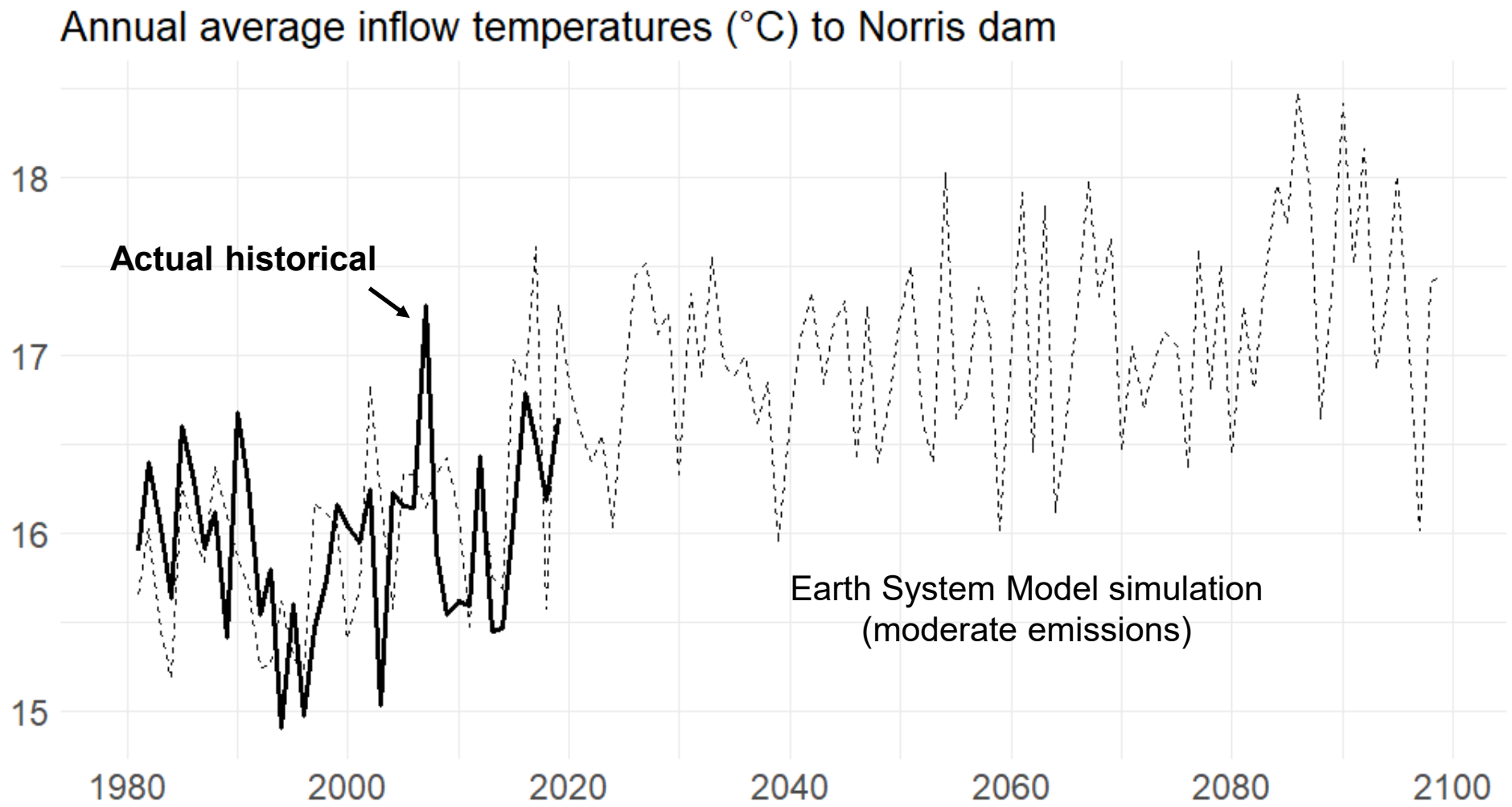
Water Quality - Hydrothermal Benefit - Future



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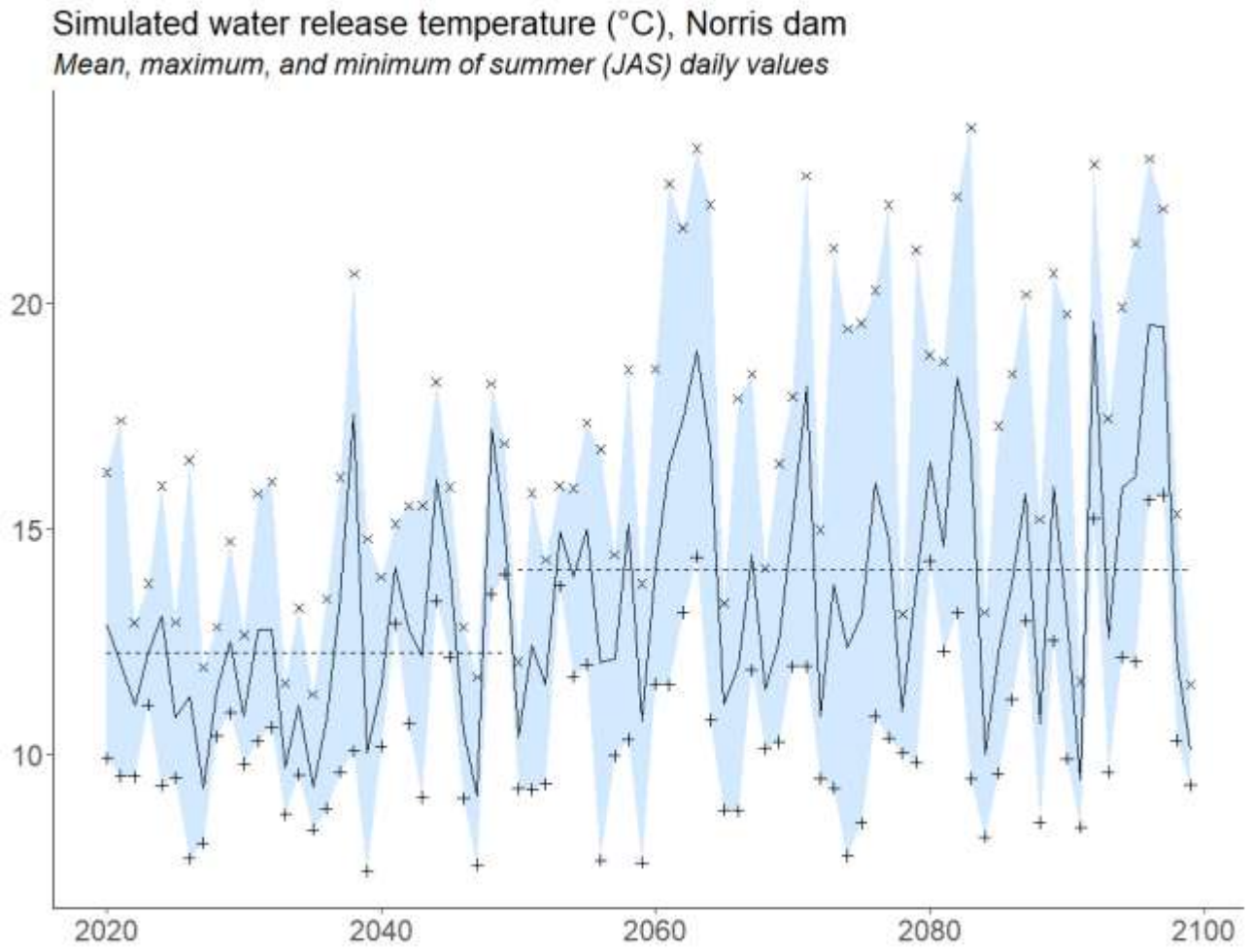
Water Quality - Hydrothermal Benefit - Future

How may TVA's ability to achieve objectives of this benefit change?

- Reservoir inflow temperatures are driven by air temperatures
- Climate change may impair the reservoir's ability to store cool water for summer release

How much change?

- Average summer cool water release temperature from Norris increases from **12°C** (2020-2049) to **14°C** (2050-2099)
- Increased frequency of summer high temperature release events arise with deepening of the warm-water layer



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Water Quality – Minimum Flows

Sean Turner

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Minimum Flow Overview

- Ecological Health
  - Reservoir Ecological Health Program
  - Snail Darter Delisting
- Reservoir Release Improvements
  - Increased dissolved-oxygen concentrations in more than 300 miles of river downstream from TVA dams
  - Improved water flows in 180 miles of river
  - Improvements in tailwater macro-invertebrate and fish communities
  - Reintroduction and recovery of some threatened and endangered species

Water Quality – Minimum Flows - Current

What is River Management's objective for this benefit?

- Improving water quality and aquatic habitat in reservoirs and tailwaters
- Protecting and improving ecologically health and ecologically significant areas

Measure of success and current performance?

- Maintaining movement of water for ecological benefits, malaria management, and water quality
- At many of TVA's dams, we have minimum flow requirements that we meet and have a high success in meeting

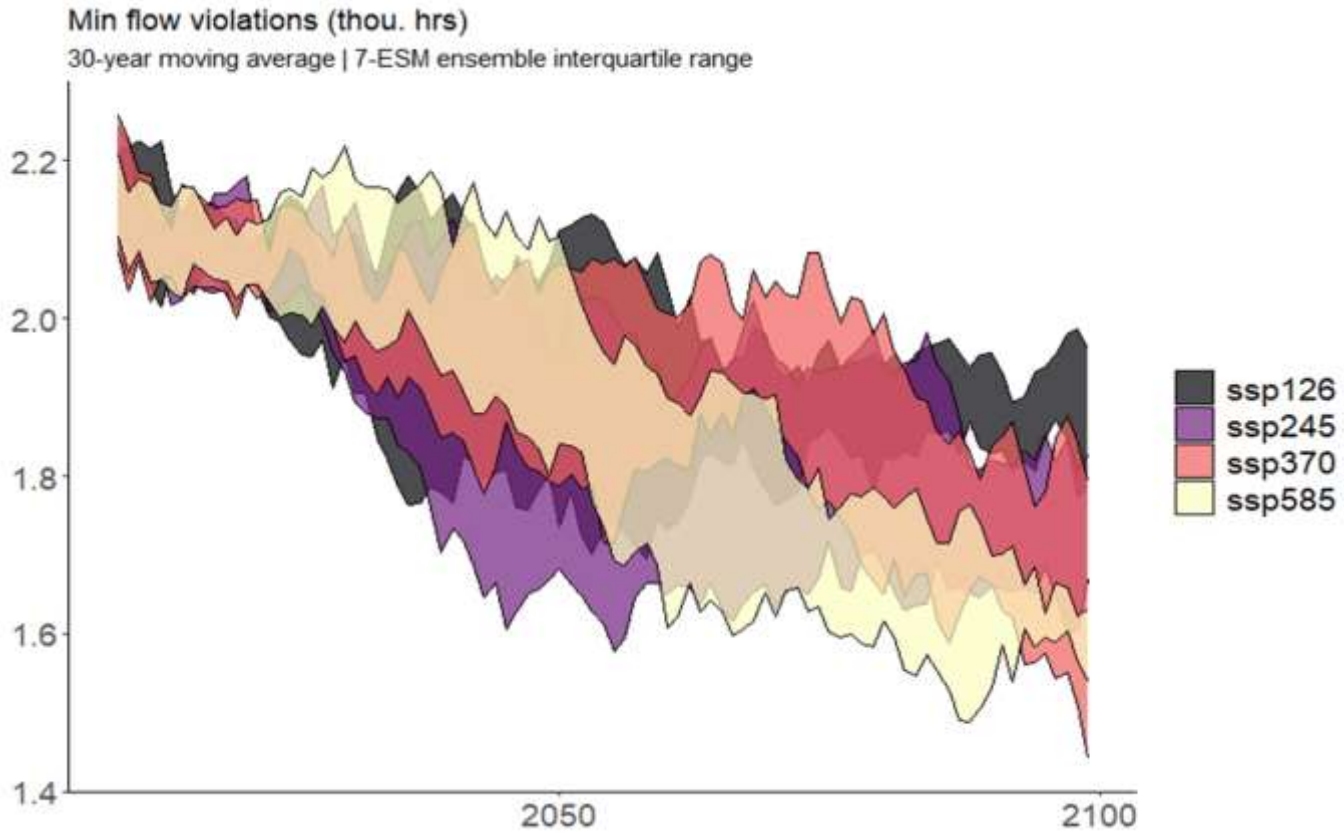
Water Quality – Minimum Flows - Future

How may TVA's ability to achieve objectives of this benefit change?

- Generally positive
- Biggest threat to meeting this benefit would be drought conditions severely impacting the reservoir levels

How much change?

- Most scenarios indicate up to 30% less risk of meeting minimum flows.



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Navigation

Miles Yaw

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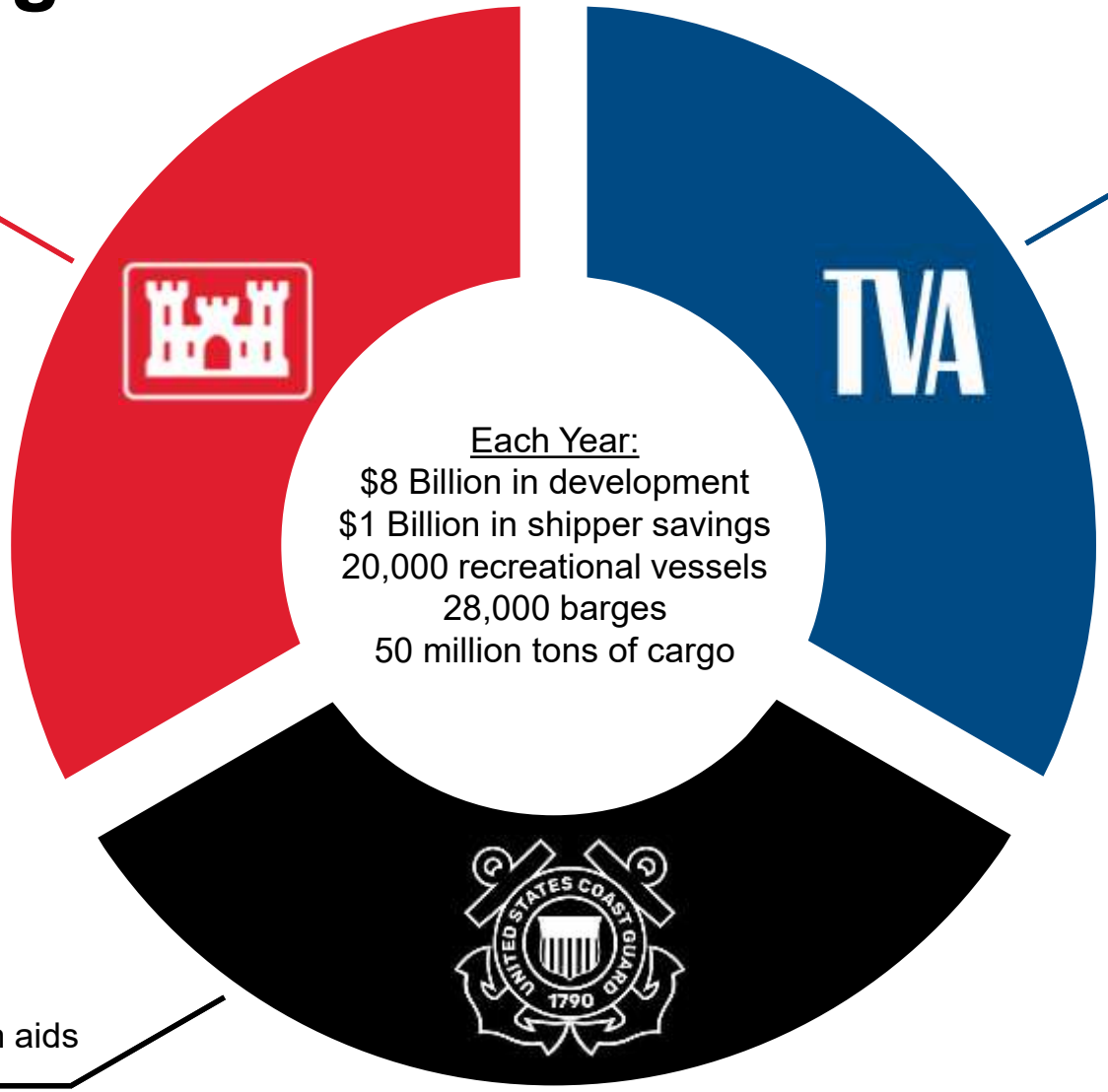
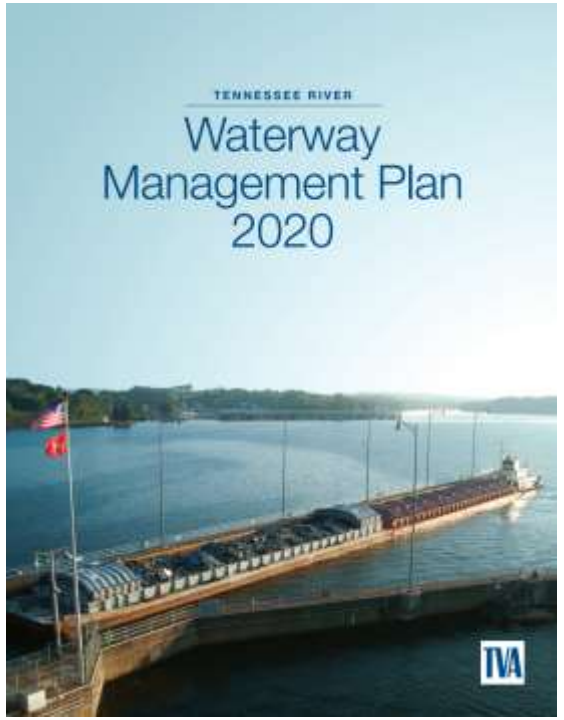
Navigation Program

Daily Lock Operations
Major Capital Projects
Regulatory Reviews and Permitting:
Section 404b, Section 10

Lock and Dam Ownership
Regulatory Reviews and Permitting:
Section 26a, EAs, EISs
Maintain 374 miles of navigation aids
Development and Implement the
Waterway Management Plan

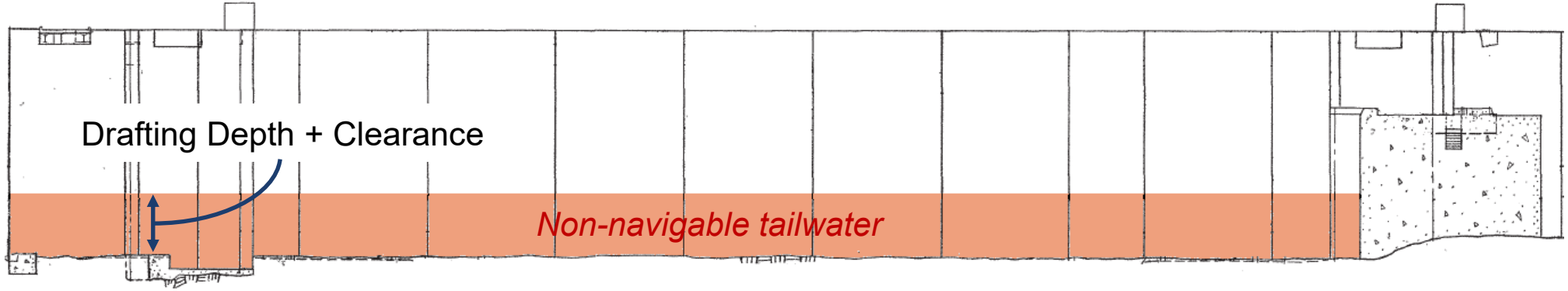




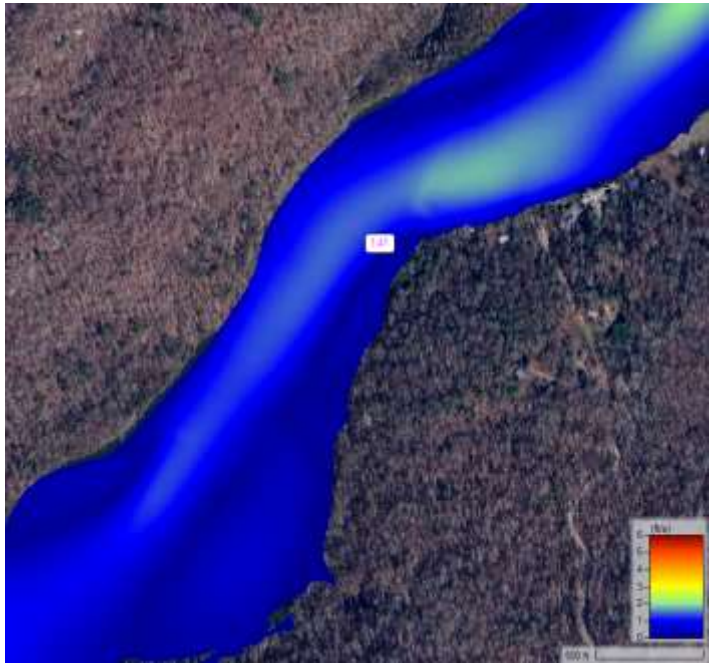
Enforcing Maritime Law
Ensuring commercial marine safety
Maintenance of commercial navigation aids

Navigation Risks

Low Water Violations:



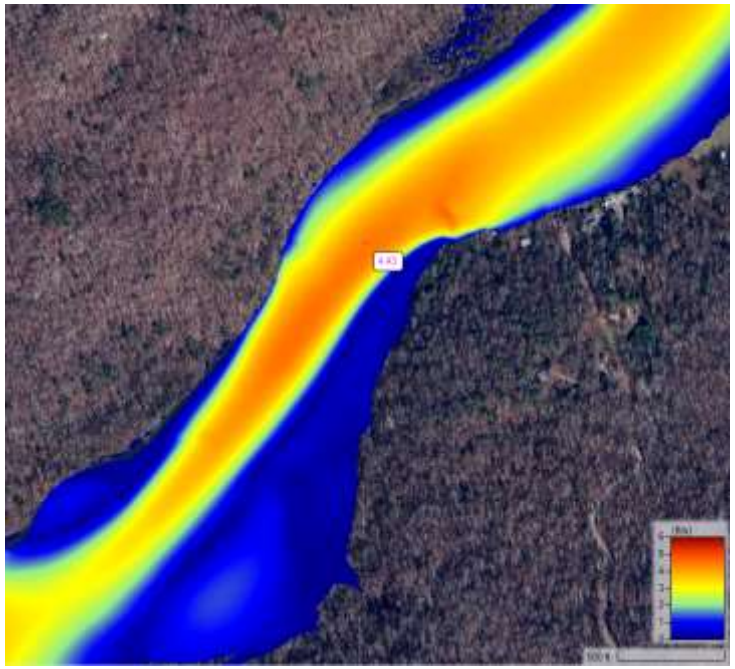
High Water Violations:



Water Velocities 3x greater during flood conditions

than under normal flow

in the Tennessee River Gorge



Navigation Benefits

What is River Management's objective for this benefit?

- Lowering the cost of transporting materials on the commercial waterway

Measure of success and current performance?

- Maintenance of navigable river flows and channel conditions
- Ensuring locks can be used with limited disruption
- Models show an expected total annual shutdown duration of ~250 hours, combined (99.6% navigability)
- No expected low water violations

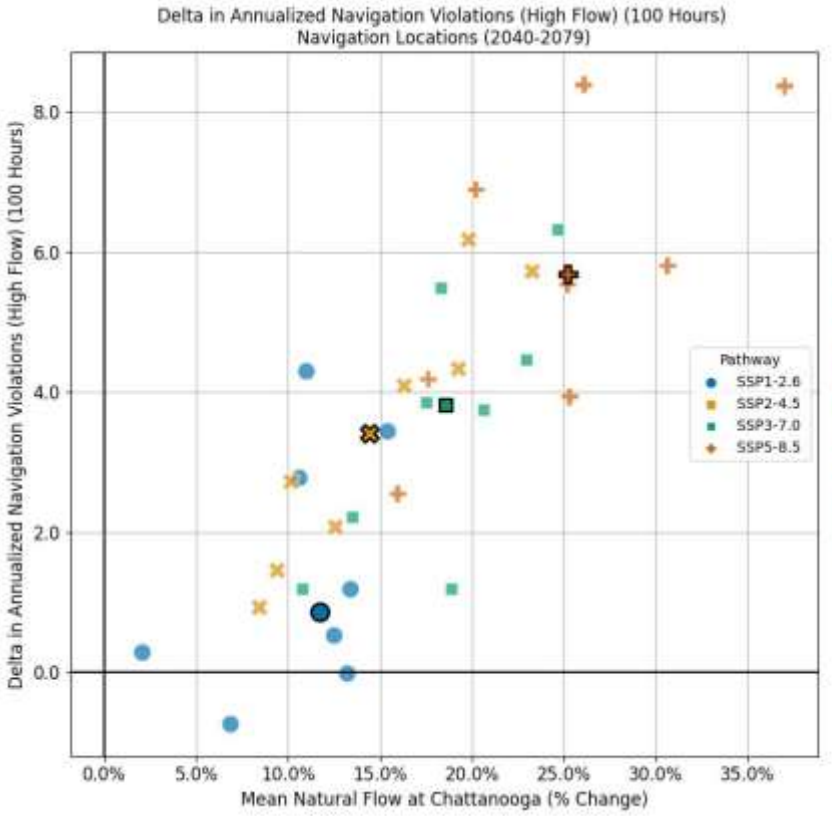
Navigation Benefit - Future

How may TVA's ability to achieve objectives of this benefit change?

- More water means more high flow violations

How much change?

- High flow violations projected to increase to ~590 hours (99.2% navigability)



	Min (100 Hours)	Med (100 Hours)	Max (100 Hours)
SSP1-2.6	-0.74	0.86	4.30
SSP2-4.5	0.93	3.40	6.20
SSP3-7.0	1.20	3.80	6.30
SSP5-8.5	2.60	5.70	8.40

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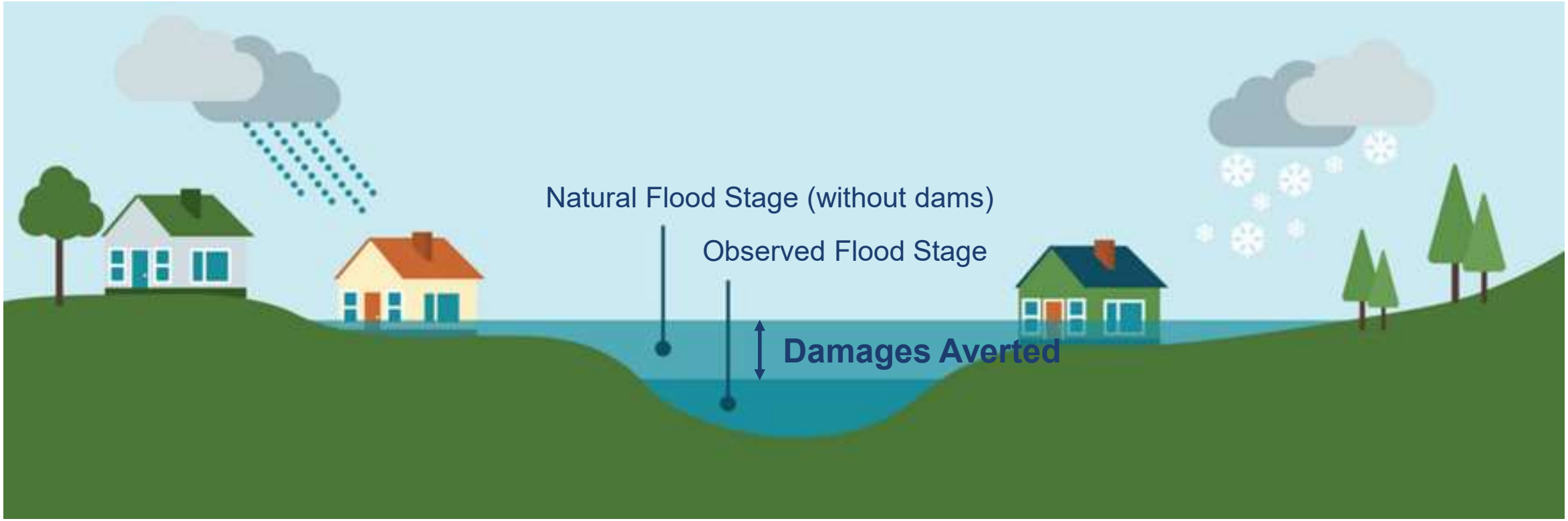
Flood Risk and Damages Averted

Miles Yaw

TVA TENNESSEE VALLEY AUTHORITY

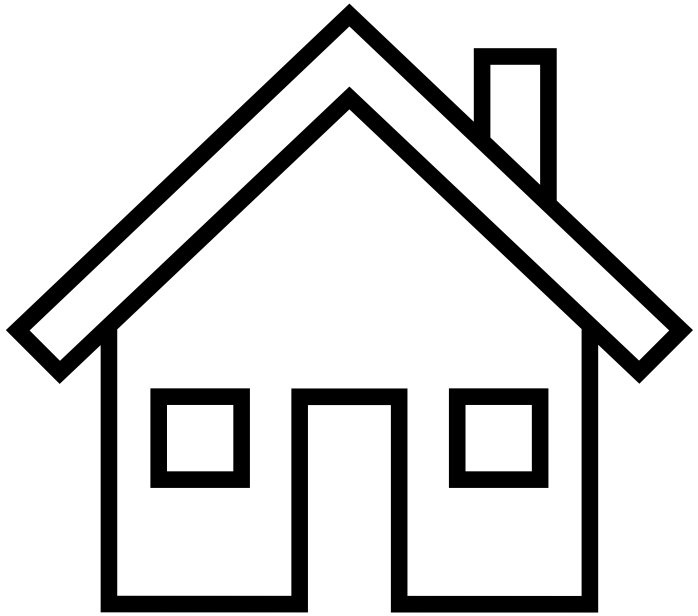
Flood Risk



Adapted from National Levee Safety Guidelines

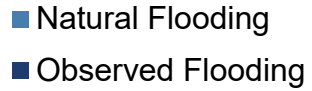
Flood Damages Averted: the difference in estimated direct economic damages between the observed regulated flood and the natural, unregulated flood; i.e., how bad it was vs. how bad it could have been

Flood Risk



Current Risk

Climate Change Risk?



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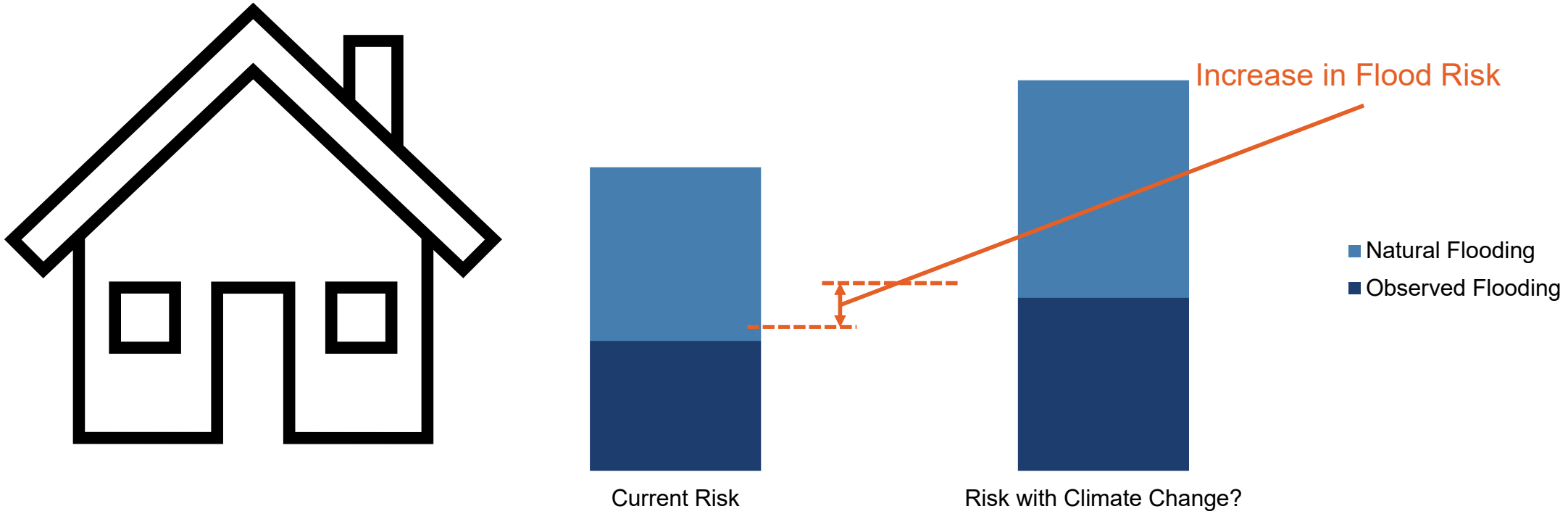
Flood Risk



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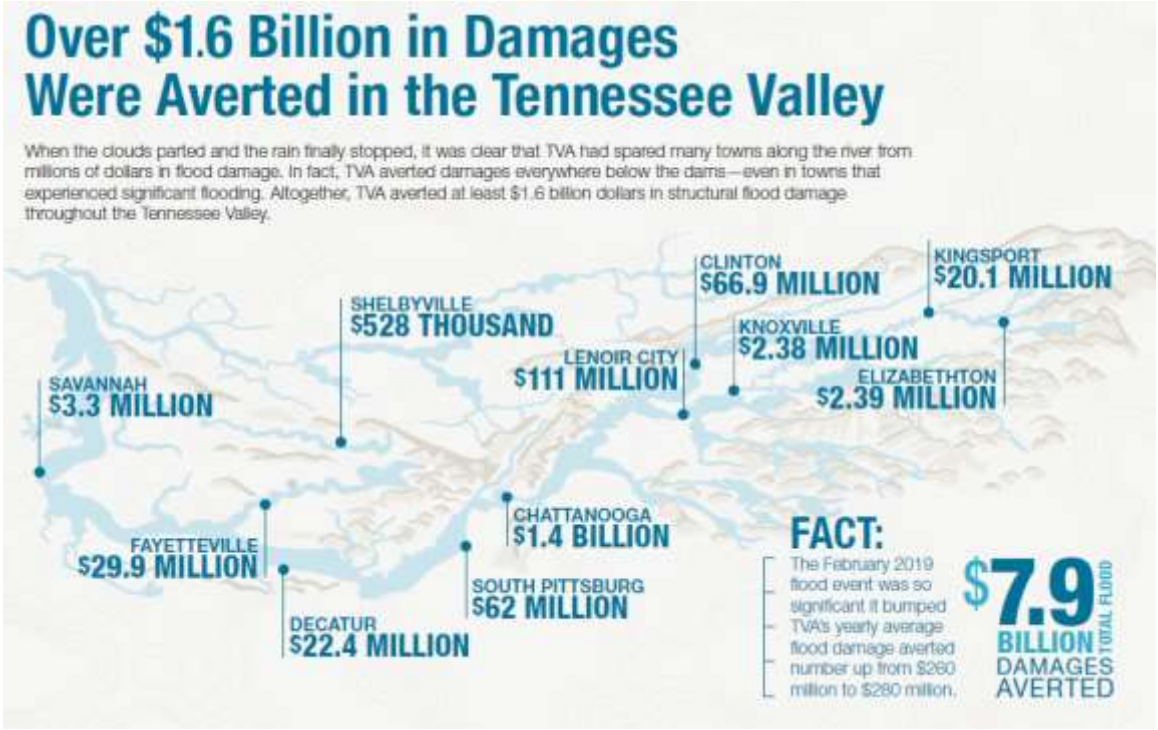
Flood Damages Averted - Current

What is River Management's objective for this benefit?

- Reducing flood risk and flood-related damages.

Measure of success and current performance?

- Managing reservoir levels to reduce flood-related damages as measured by damages averted.
- Keep pool levels within our operating balance curves and near our guide curves to reduce flood risk



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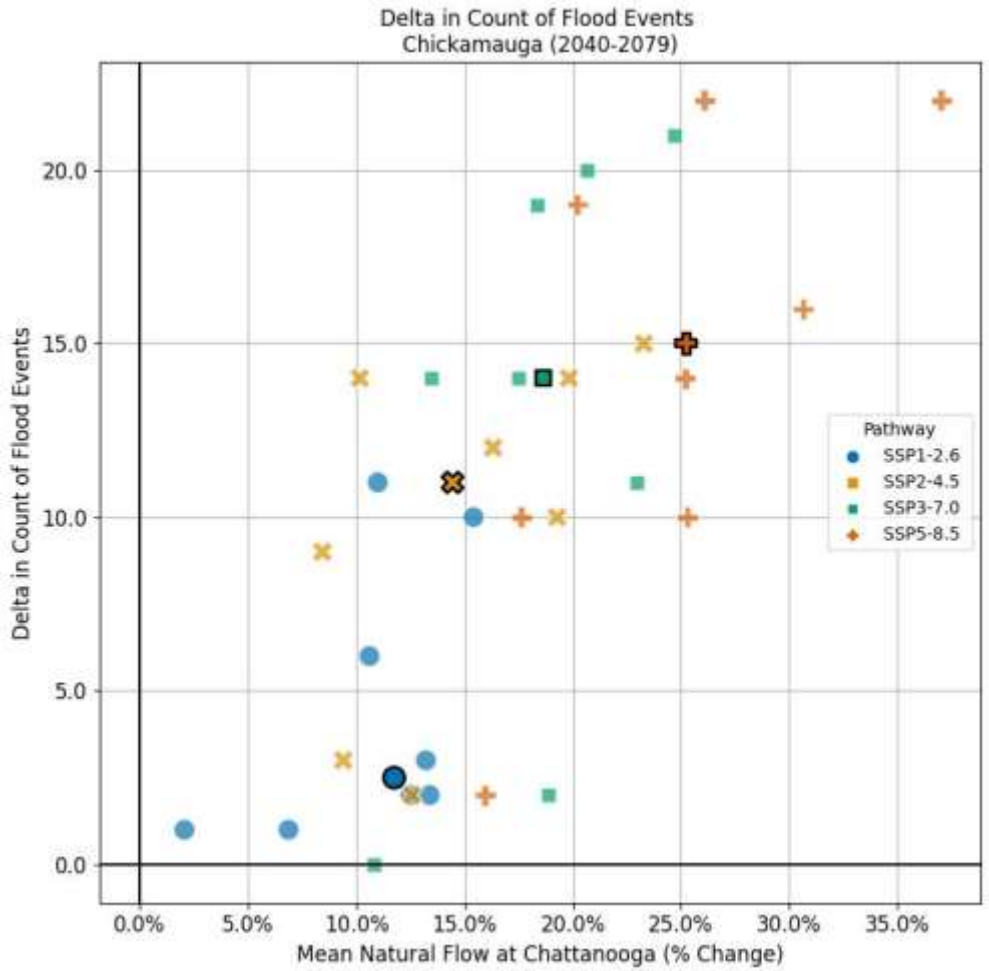
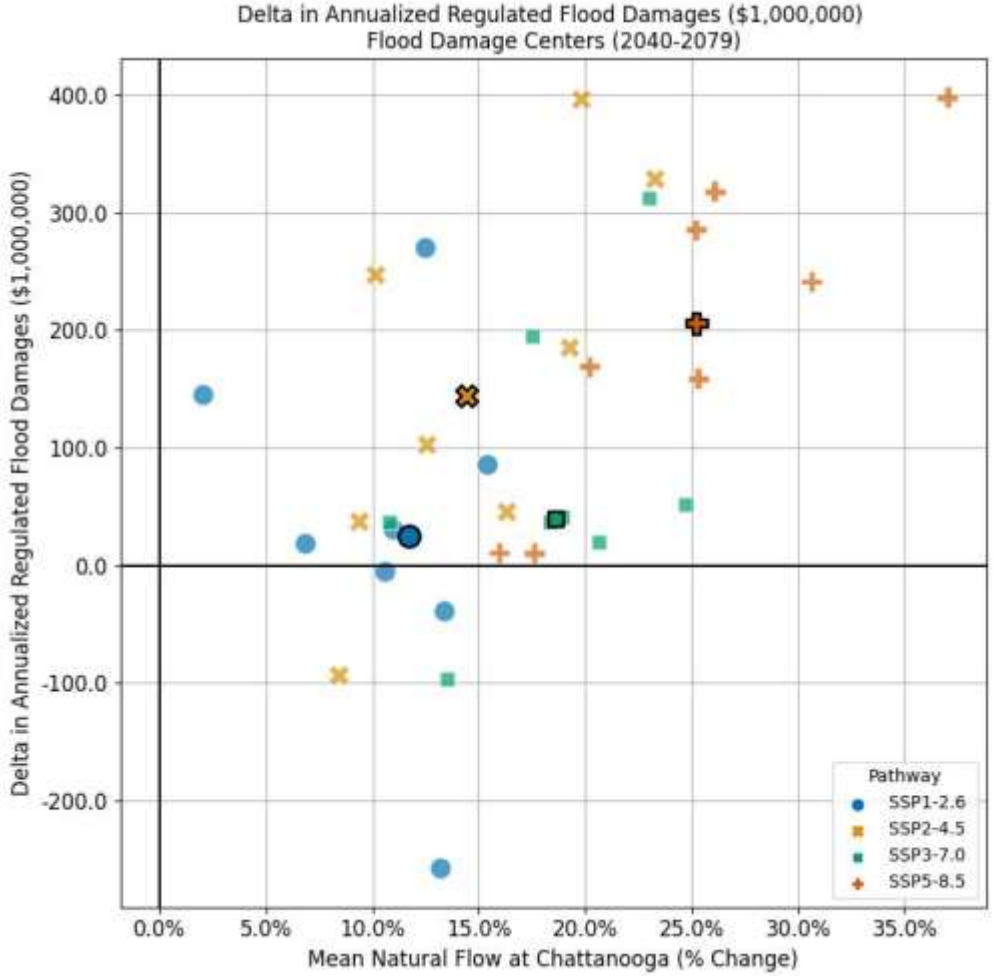
Flood Damages – Projected Changes





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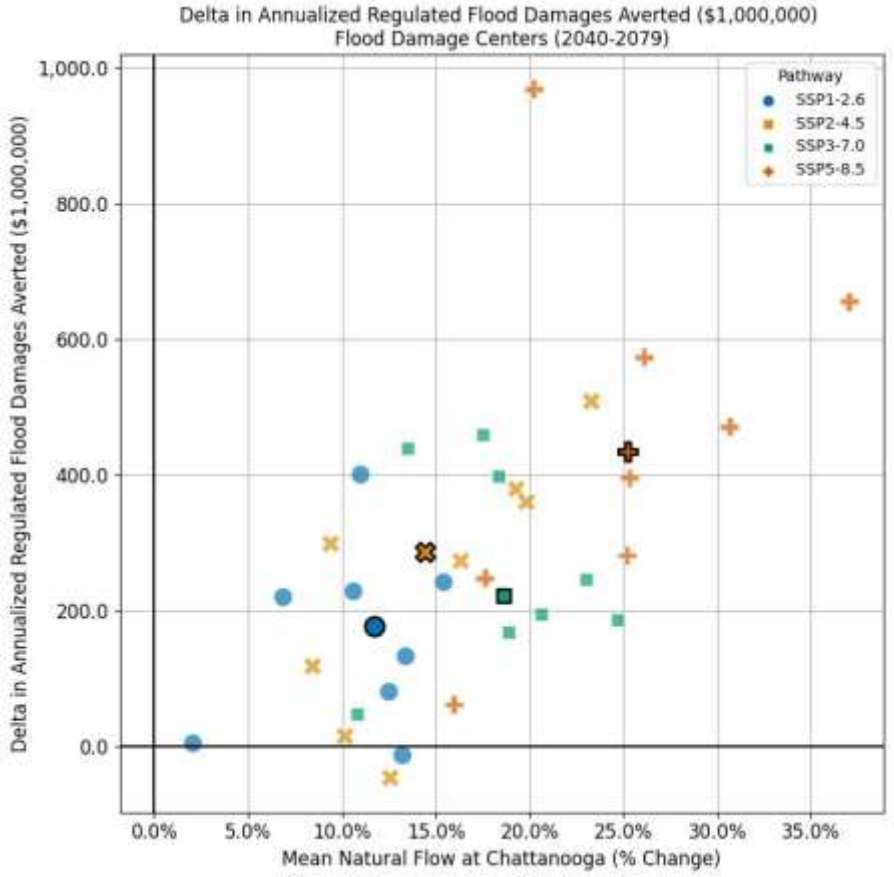
Flood Damages Averted - Future

How may TVA's ability to achieve objectives of this benefit change?

- Current policies provide an increasing benefit to flood damages averted in the future.

How much change?

- Projected scenarios show the value of damages averted increasing by as much as 250%



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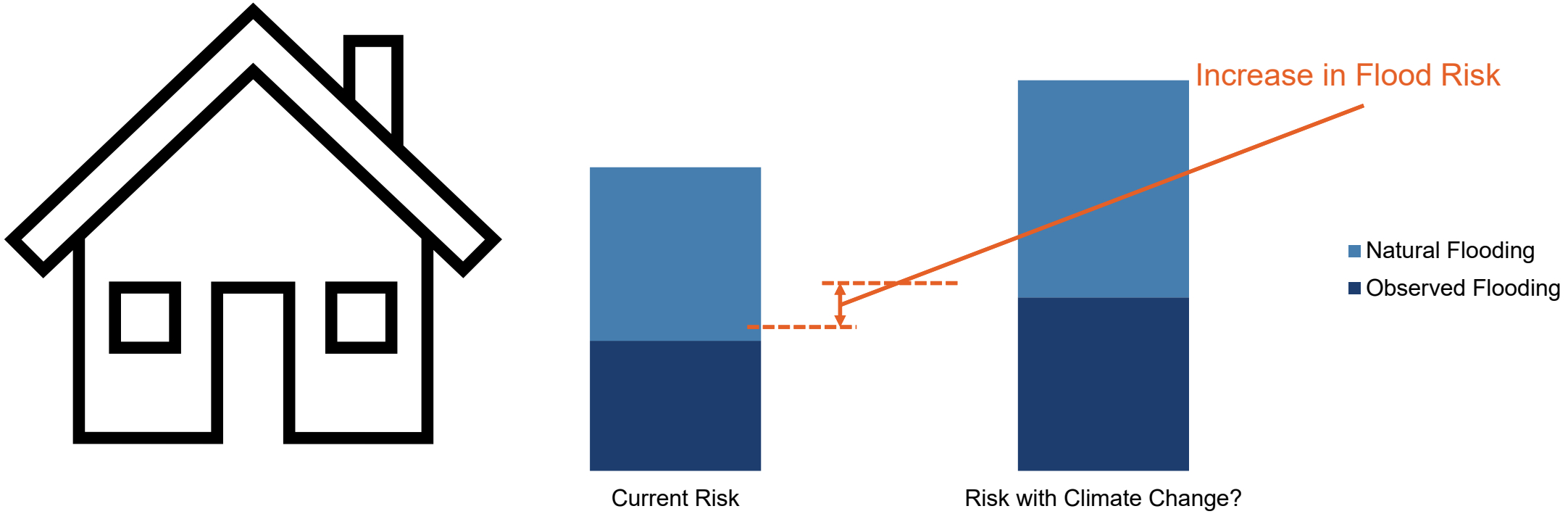
Flood Risk



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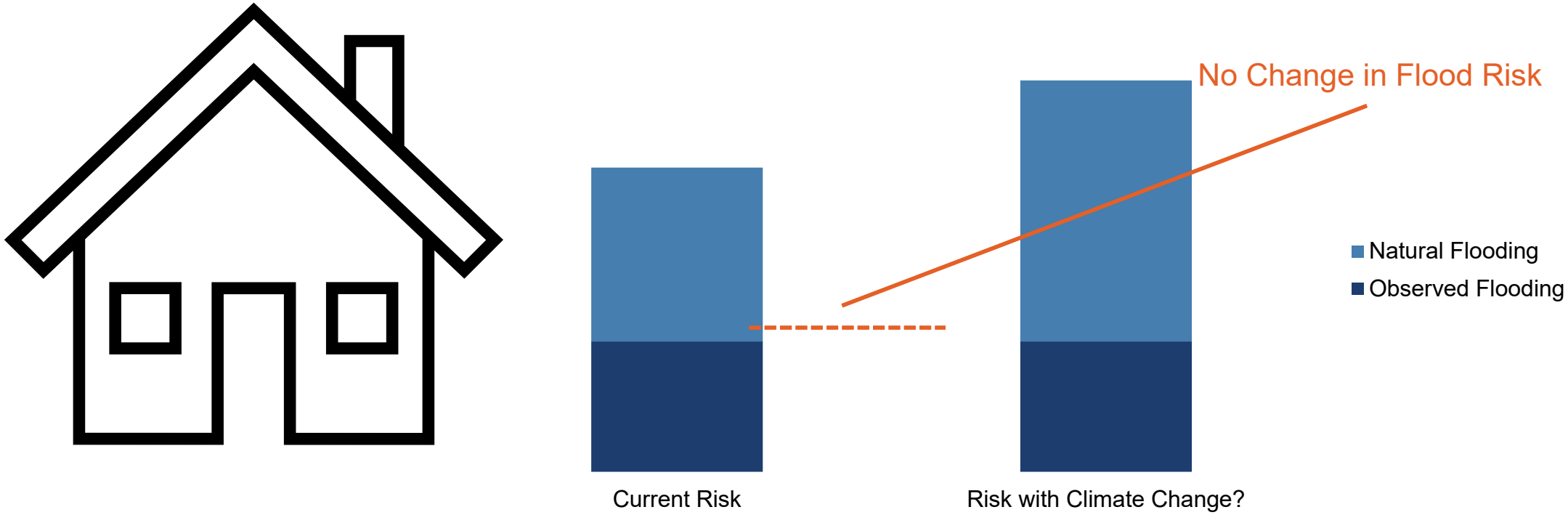
Flood Risk



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The Fine Print and… what do we do about it?

Miles Yaw

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A few things to keep in mind

1. Projections are not reality

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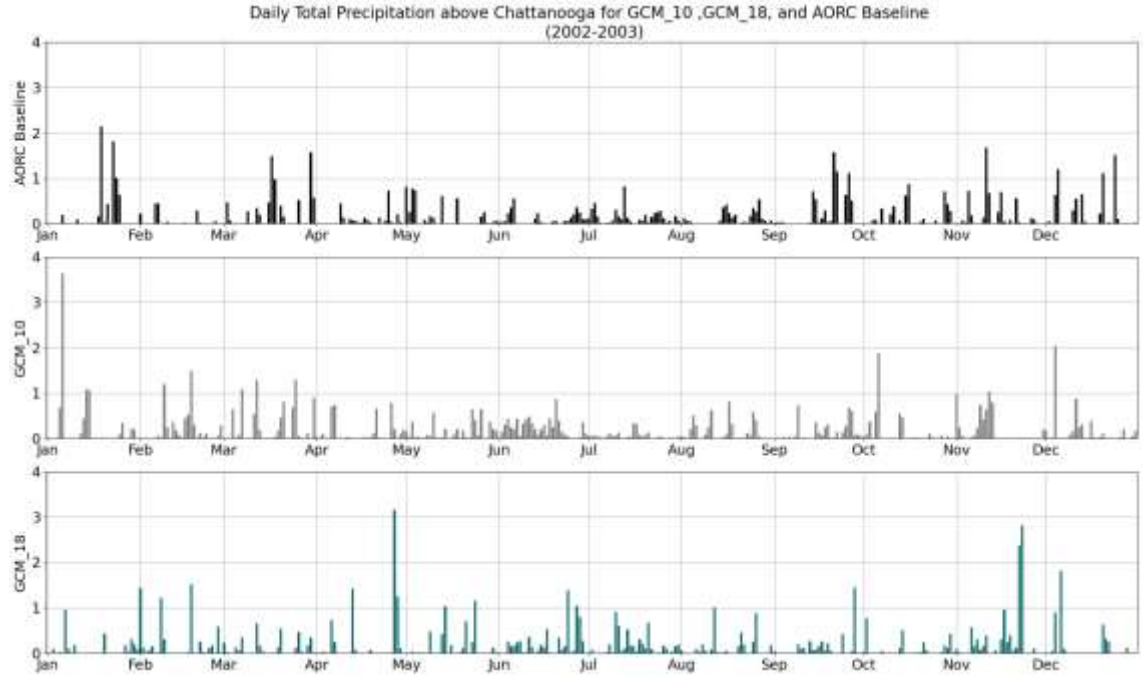
4. Variability in the hydrologic cycle manifests over large temporal and spatial scales



TENNESSEE VALLEY AUTHORITY

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A few things to keep in mind

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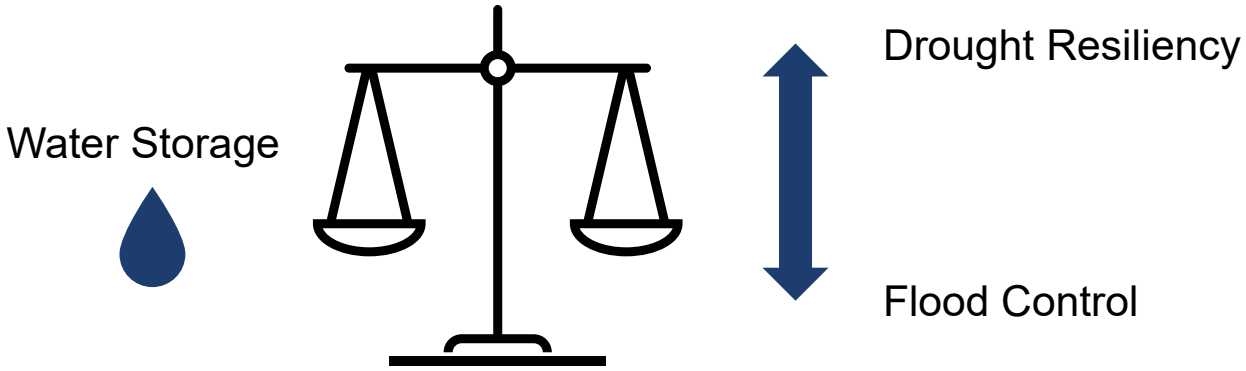
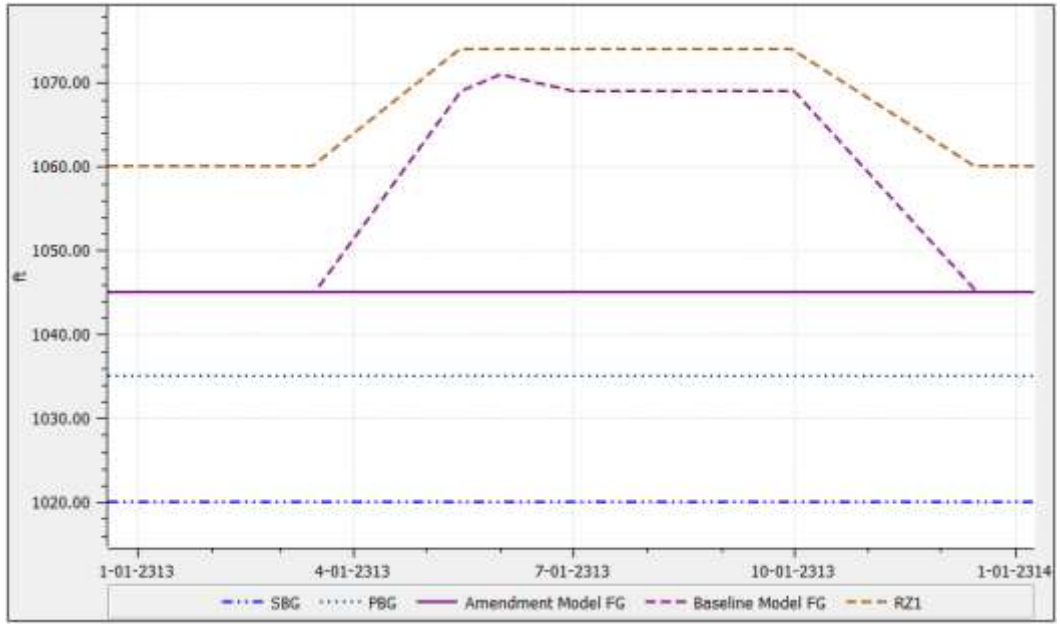
3. GCMs have unknown future skill, especially with rainfall. Temperature is not rainfall.
4. Variability in the hydrologic cycle manifests over large temporal and spatial scales
5. Future climate scenarios, mitigations, and adaptations are deeply uncertain
6. Flood risk reduction and drought resiliency are not complimentary.



A Mitigation Example

- Take the Big 5 tributaries - Norris, Hiwassee, Fontana, Cherokee, Douglas and operate at winter pool all year long.
- VERY UNPOPULAR



Benefit Area	Performance Change
Flood damages	↑
Flood damages averted	↑
Navigation violations	↑
Hydropower production	↓
Water Storage	↓
System Minimum Operations	↓
Hydrothermal Performance	↓
Water Supply Performance	↓
Recreation	↓

What to do?

"…at present there is insufficient command of the climate change modeling and the modeling of its effects on hydrology and water resources to make any attempts to quantify these aspects of hydrological risk." *(World Bank, 2021)*

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Summary

- In general, study shows the future climate in the Tennessee Valley is wetter than historically observed conditions since measurement collections, but droughts are still likely.
- In addition to change in amounts, patterns could be different than historically observed
- Early findings indicate that moderate operational changes may not have sizable impacts on future flood risks.
- Equally as important is understanding the uncertainty, limitations, and variability of current climate change modeling done to-date.
- Current best practice to rely on adaptive management, sound engineering judgment, and how society perceives acceptable risk.

Overview

Sector	Resiliency
Hydropower	Generally positive outlook. Relatively negligible impacts to hydropower abilities; Potential to increase.
Recreation	Mixed results. Increase in recreation opportunities due to more flood events but more recreation opportunities following due to increased reservoir levels than normal.
Water Supply	Mixed results. Majority of water supply users not at risk but some scenarios did indicate the potential of water supply susceptibility with certain events.
Water Quality*	Mixed results. Minimum flow availability may improve in most cases. Ecological and temperature potentials appear to worsen with higher ambient temperatures and weather event extremes. Hydrothermal to be assessed in other studies. Other water quality metrics (i.e., biological, sediment, etc.) not assessed in this study that will likely degrade due to local runoff from increased flood events.
Flood Damage	Conditions become more challenging, but TVA's system still helps. Majority of scenarios at flood damage centers showed a substantial increase to flood damages in those communities but TVA's system still provides an increase in damages averted.
Navigation	This benefit area is predicted to be less reliable due to more flood events. Managing navigation appears to see more interruption potential with increased frequency of future flood events.

Big Picture First - Advice Question

Based upon the preliminary findings of TVA's study of climate change impacts to river system management, what additional considerations should be factored in to ensure TVA continues to balance river system benefits?

BREAK

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Draft 2025 Integrated Resource Plan (IRP)

Regional Resource Stewardship Council (RRSC)
November 18, 2024

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Today’s Agenda

TVA’s mission and the role of the IRP

IRP Overview and Key Inputs

Draft 2025 IRP Results

How to Provide Your Comments

Draft 2025 IRP Overview and Key Inputs

Candy Kelly, Sr. Manager, Resource Strategy

2025 Integrated Resource Plan

The IRP is a study of how TVA could meet customer demand for electricity between now and 2050 across a variety of futures.

A programmatic Environmental Impact Statement (EIS) accompanies the IRP to evaluate its environmental effects.

An updated IRP is needed to:

- Proactively establish a strong planning foundation for the 2030s and beyond
- Inform TVA's next long-range financial plan

The IRP provides strategic direction on how TVA will continue to provide low-cost, reliable, and increasingly cleaner electricity to the residents and businesses across the Valley region.

Planning is Grounded in Least-Cost Principles

In integrated resource planning, TVA applies fundamental least-cost planning principles:

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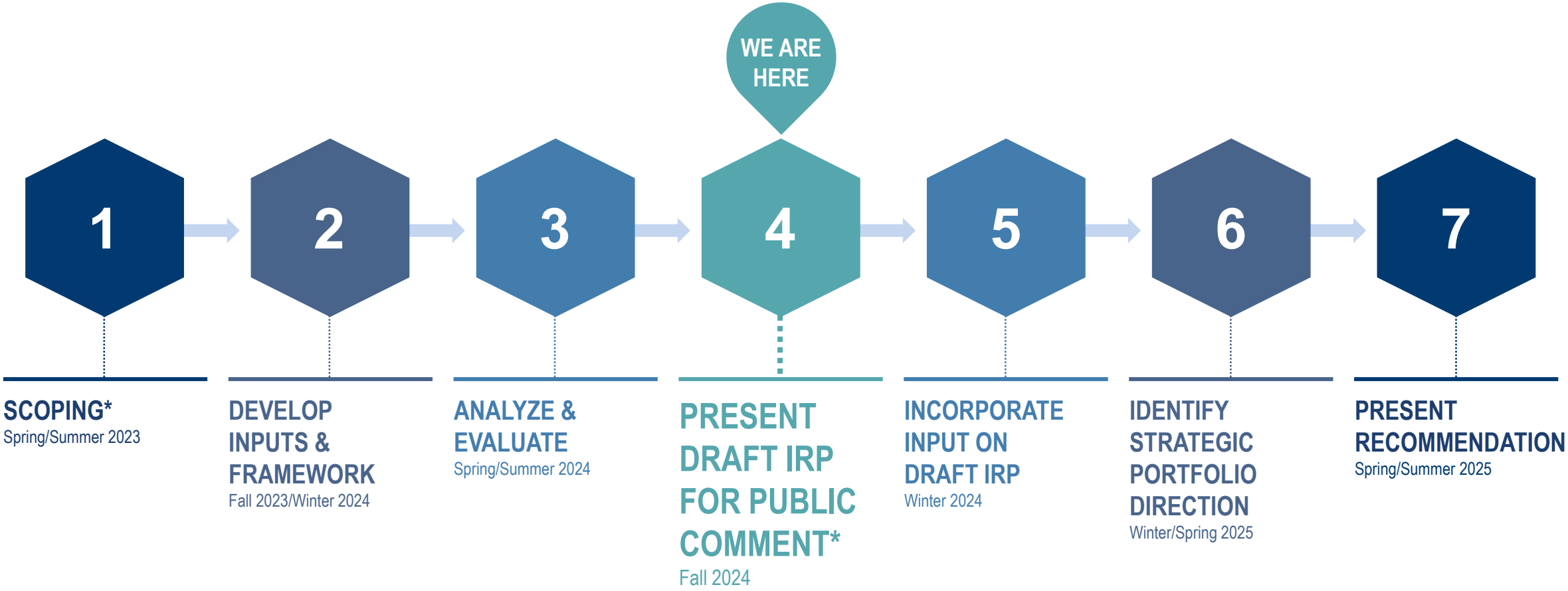
IRP Timeline



**Opportunity for public feedback during 45-day scoping and 60-day draft IRP and EIS public comment periods.*

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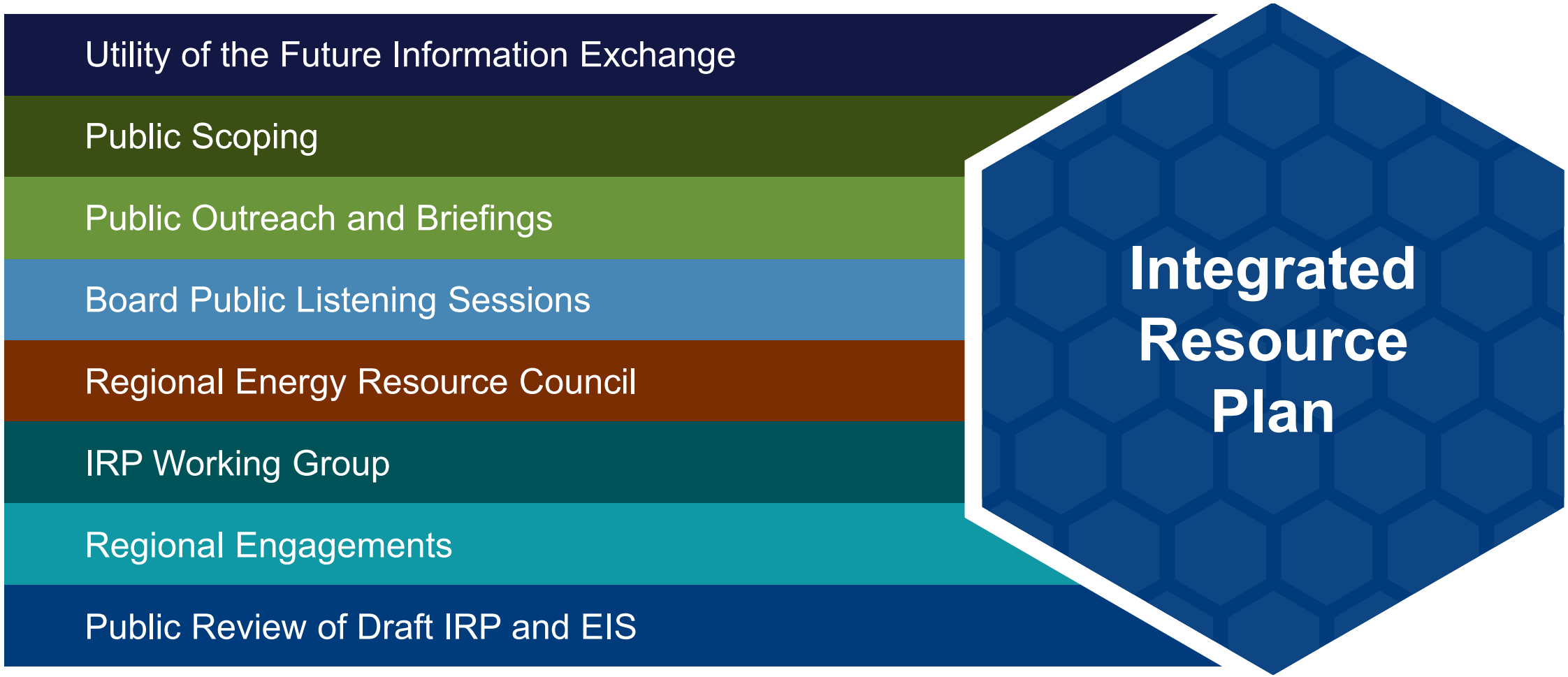
Stakeholder and Public Input



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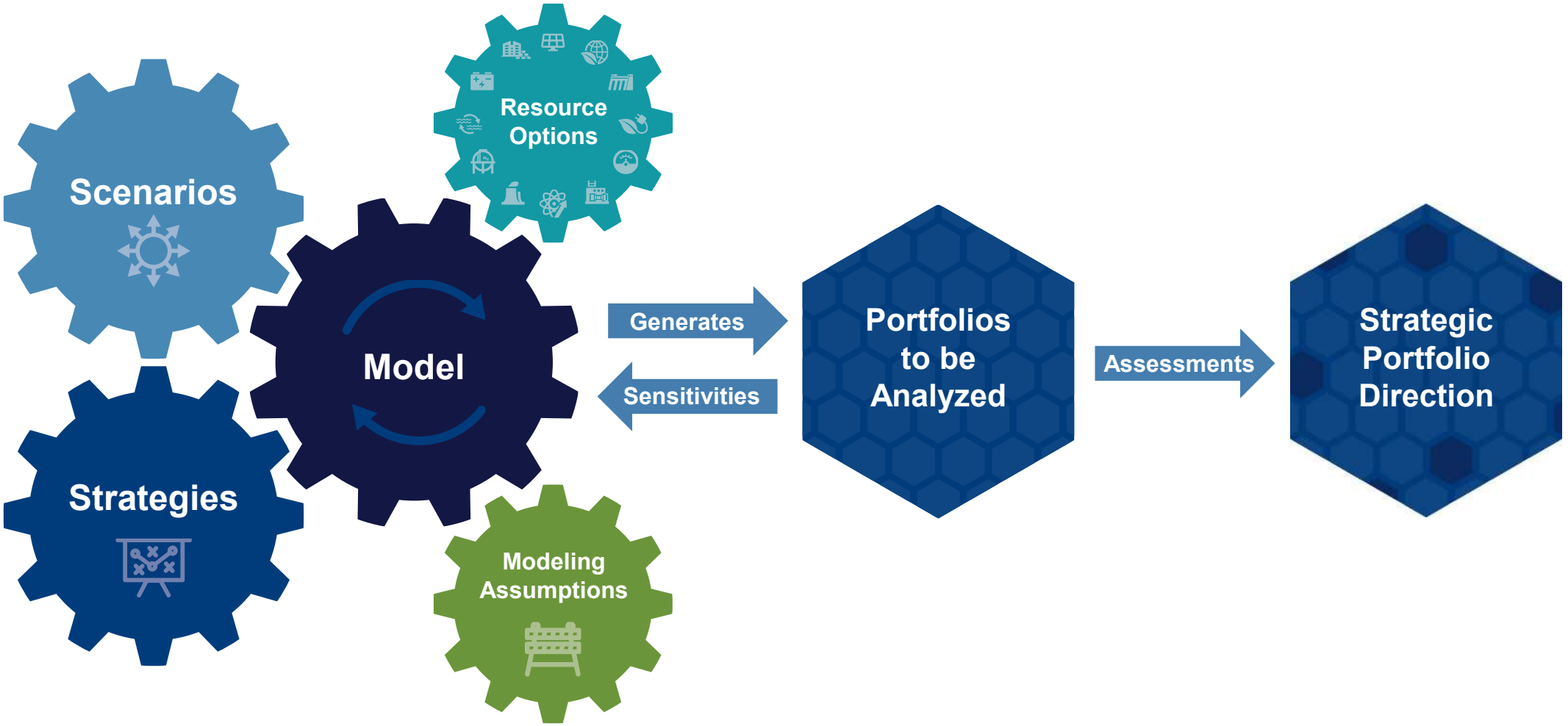
How the Integrated Resource Planning Process Works



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Resource Planning for Future Capacity Needs

Recommended path provides low cost, reliability, diversity, and flexibility.

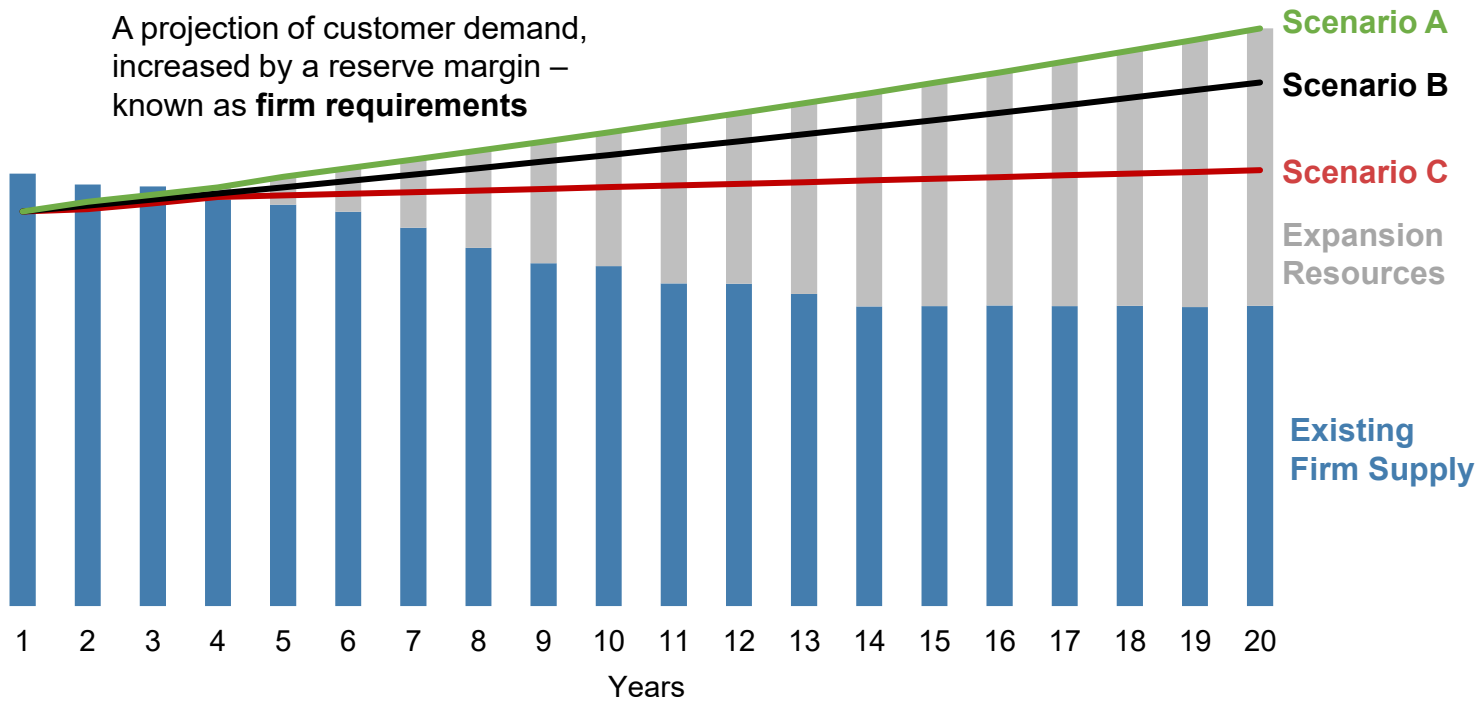
Resource planning is about optimizing the mix of future capacity.

Projections of new capacity needed are filled by the most cost-effective resources.

Multiple scenarios will be explored, reflecting different levels of forecasted demand.

Multiple strategies will be explored, resulting in different resource mixes to evaluate in each scenario.

Illustrative Capacity Gap Chart



IRP Scenarios and Strategies

SCENARIOS

1 Reference (without Greenhouse Gas Rule)
Represents TVA's current forecast that reflects moderate population, employment, and industrial growth, weather-normal trends, growing electric vehicle use, and increasing efficiencies

2 Higher Growth Economy
Reflects a technology-driven increase in U.S. productivity growth that stimulates the national and regional economies, resulting in substantially higher demand for electricity

3 Stagnant Economy
Reflects rising debt and inflation that stifle consumer demand and business investment, resulting in weaker than expected economic growth and essentially flat electricity demand

4 Net-zero Regulation
Reflects the impact of the May 2023 draft Greenhouse Gas Rule that targets significant reductions in electric utility CO_2 emissions beginning in 2030 and potential future utility regulations striving for net-zero by 2050

5 Net-zero Regulation Plus Growth
Reflects the impact of the May 2023 draft Greenhouse Gas Rule and potential future utility regulations, along with substantial advancements in clean energy technologies, that spur economic growth and extensive electrification

6 Reference (with Greenhouse Gas Rule)
Reflects TVA's current forecast and incorporates the impact of the Greenhouse Gas Rule finalized in May 2024 that targets significant reductions in electric utility CO_2 emissions beginning in 2030

STRATEGIES

A Baseline Utility Planning
Represents TVA's current outlook based on least-cost planning, incorporating existing programs and a planning reserve margin target. This reserve margin target applies in all strategies

B Carbon-free Innovation Focus
Emphasizes and promotes emerging, firm and dispatchable carbon-free technologies through innovation, continued research and development, and strategic partnerships

C Carbon-free Commercial Ready Focus
Emphasizes proven carbon-free technologies like wind, solar, and storage, at both utility-scale and through customer partnerships, along with strategic transmission investment

D Distributed and Demand-side Focus
Emphasizes existing and potentially expanded customer partnerships and programmatic solutions to reduce reliance on central station generation and promote virtual power plants

E Resiliency Focus
Emphasizes smaller units and the promotion of storage, along with strategic transmission investment, to drive wider geographic resource distribution and additional resiliency across the system

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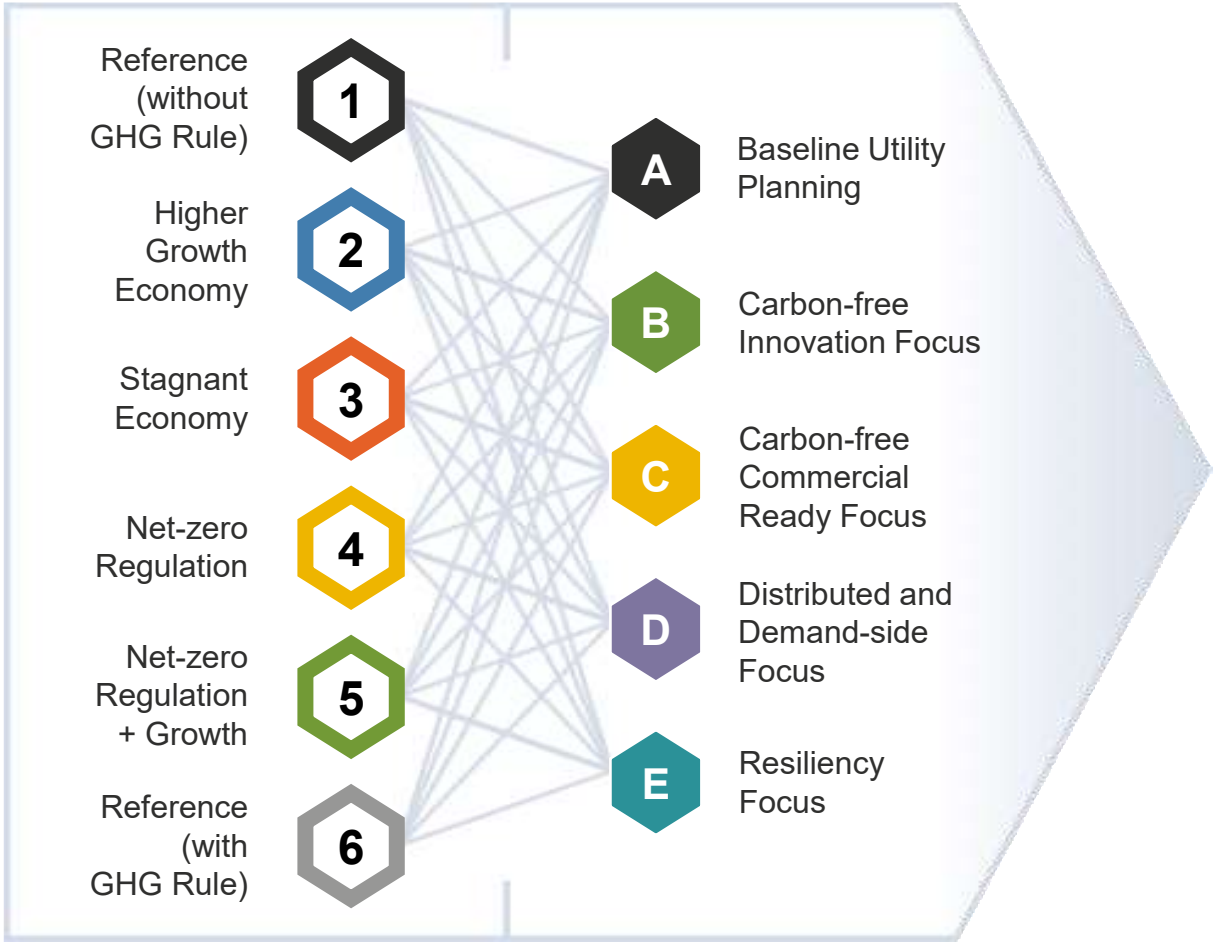
IRP Utilizes a Rigorous Analytical Process

6 SCENARIOS x 5 STRATEGIES



30 PORTFOLIOS

Stakeholder feedback and public comments informed the development of scenarios and strategies that combine to form 30 unique portfolios.

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IRP Resource Options

- Advanced pressurized water reactor
- Light water small modular reactor
- Gen IV small modular reactor

- Hydro uprates

- Supercritical pulverized coal
- Supercritical pulverized coal w/carbon capture

- Combined cycle
- Combined cycle w/ carbon capture
- Combustion turbine
- Aeroderivative
- Reciprocating engine
- Hydrogen blending
- Combined heat and power

- Utility scale solar
- Distributed solar
- Midwest wind
- Southeast high-hub wind
- High Voltage Direct Current wind

- Pumped storage
- Lithium-ion battery
- Advanced chemistry battery
- Distributed storage

- Energy efficiency
- Demand response

Draft 2025 IRP Results

Hunter Reed, IRP Project Manager

Draft IRP Results Suggest by 2035…

Between now and 2035

9 to 26 GW

Incremental firm capacity needs

3 to 20 GW

Solar nameplate additions

4 to 19 GW

Natural gas, hydrogen, and CCS additions

1 to 4 GW

EE and DR additions

In all scenarios, TVA will continue to provide AFFORDABLE, RELIABLE, RESILIENT, and increasingly CLEANER energy for the region for decades to come.

Up to 6 GW

Storage nameplate additions

Up to 4 GW

Wind nameplate additions

Up to 1 GW

Nuclear additions

Projected

75 to 90%

Reductions in CO_2 intensity from 2005 baseline

Power supply mix ranges, summarized in gigawatts (GW), vary based on energy demand, market conditions, policy and regulations, and technology advancements.

Draft IRP Key Themes Are…

New capacity is needed in all scenarios to replace retiring and expiring capacity, support economic growth, and enable further electrification of the economy.

Firm, dispatchable technologies are needed to ensure system reliability throughout the year.

Solar expansion plays an increasingly substantial role, providing economic, carbon-free energy.

Gas expansion serves broad system needs, with the potential for emerging carbon capture and hydrogen options to enable deeper decarbonization.

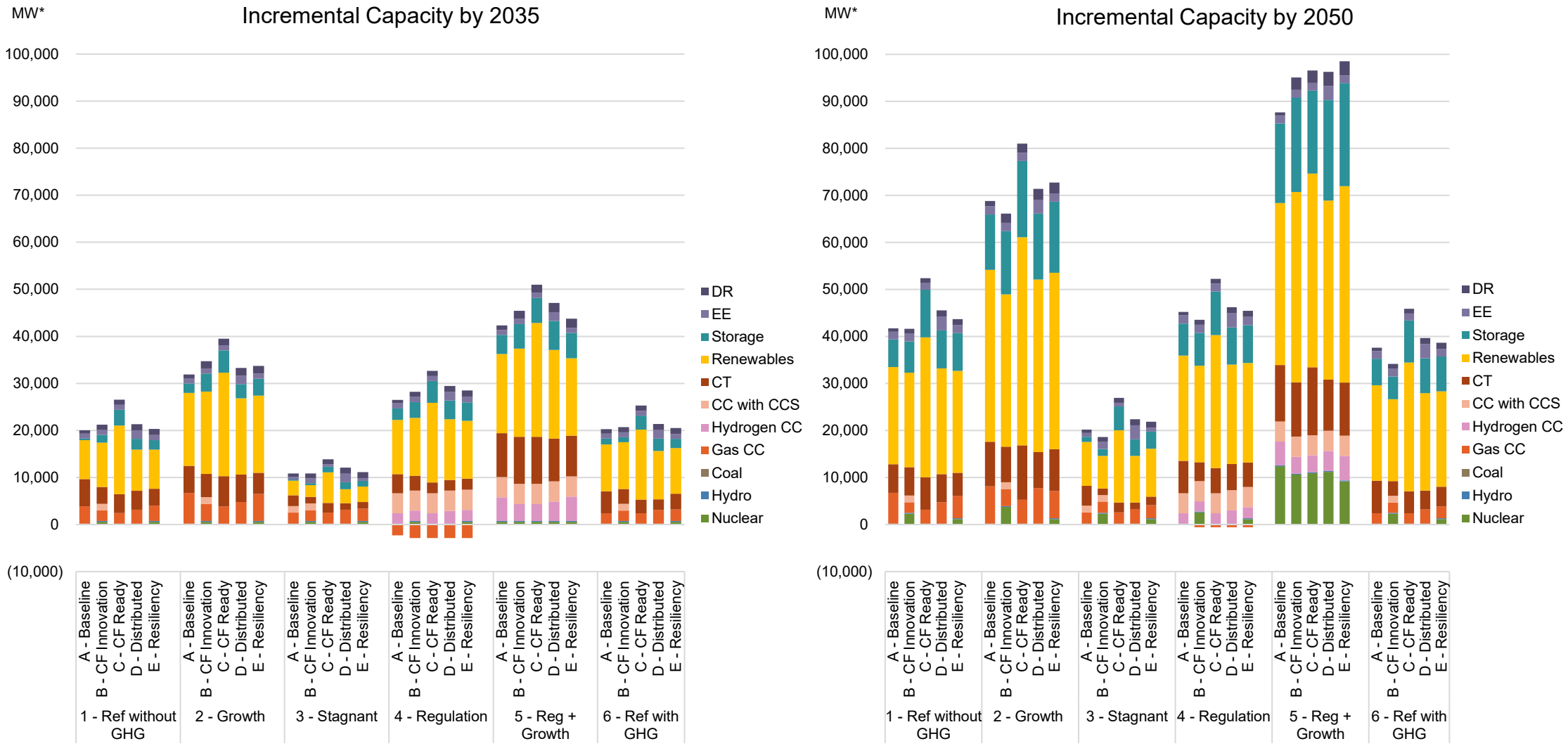
Energy efficiency deployment reduces energy needs, particularly between now and 2035, and demand response programs grow with the system and the use of smart technologies.

Storage expansion accelerates, driven by evolving battery technologies and the potential for additional pumped storage.

Wind additions have the potential to add more diversity and carbon-free energy to the resource mix.

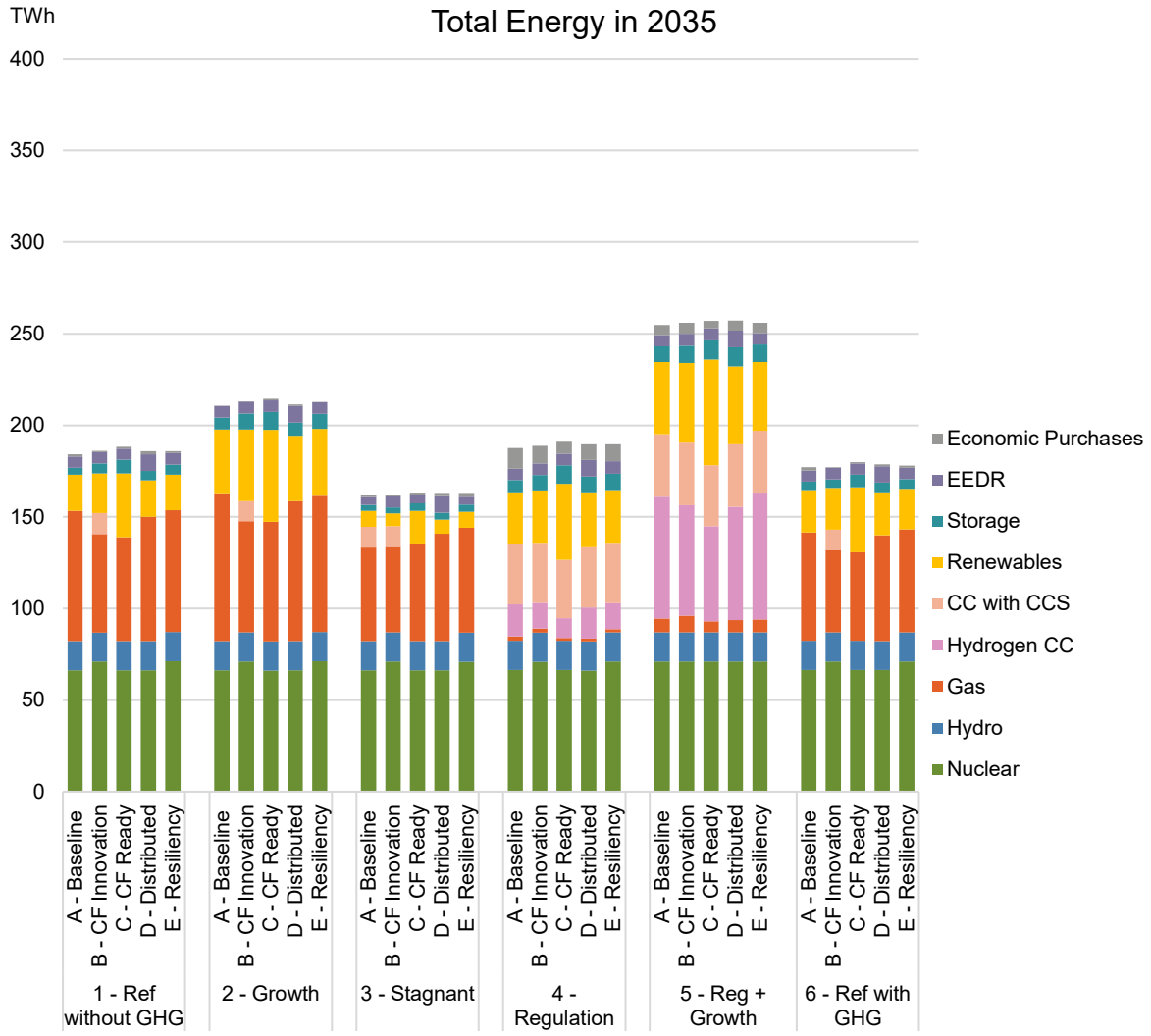
New nuclear technologies, with continued advancements, can also support load growth and deeper decarbonization.

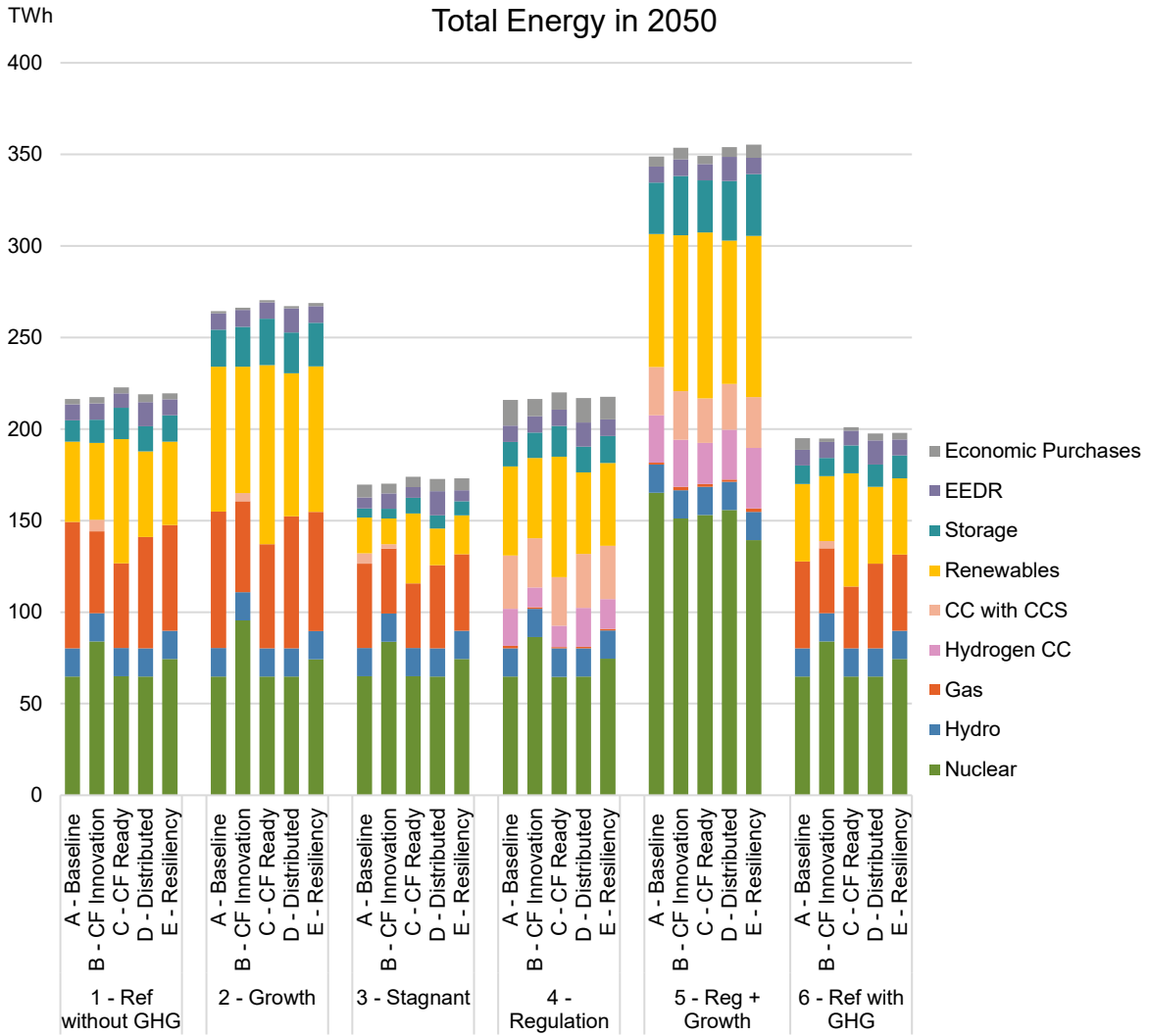
Incremental Capacity Plans



* MW summer net dependable capacity, except for renewables and storage that are shown in nameplate.

Total Energy Mix





Strategy Performance

Strategy	Low Cost	Risk Informed	Environmentally Responsible	Diverse, Reliable, and Flexible
A Baseline Utility Planning	$	!		
B Carbon-free Innovation Focus	$	!		
C Carbon-free Commercial Ready Focus	$	!		
D Distributed and Demand-side Focus	$	!		
E Resiliency Focus	$	!		

Good — Better — Even Better — Best

Draft Environmental Impact Statement

The draft EIS provides an overview of the IRP, discusses environmental conditions in the TVA region, and evaluates the potential environmental impacts of the IRP:

- Air quality
- Climate and greenhouse gases
- Water resources
- Land resources
- Solid and hazardous waste
- Fuel requirements
- Life cycle analysis
- Socioeconomics
- Environmental justice

Highlights of EIS Observations

Air Quality

Long-term reductions in air emissions of all types with expected coal retirements

Climate and Greenhouse Gases

Long-term reductions in CO_2 emissions and intensity

Water Resources

Reductions in water use from 2025 to 2050, except in Scenario 5 that has the most nuclear expansion

Land Resources

Increases in land use primarily driven by solar expansion

Solid and Hazardous Waste

Coal combustion residuals production drops to zero by 2035

Overall Observations

Strategies B and C, which promote carbon-free resources, have the lowest emissions; Strategy C has the lowest water and highest land use

2025 IRP Public Open Houses

Virtual Meetings

Oct 30 — After Business Hours
6:00pm Central

Nov 22 — During Lunch Hour
11:00am Central

Unable to make it to a virtual or in-person meeting?

- Visit TVA's IRP website at: www.tva.com/irp for registration information.
- Taped webinars will be available as well.

In-Person Meetings *at 6 PM Local Time*

Oct 28 — Antioch, TN
Southeast Community Center

Nov 4 — Oak Ridge, TN
East Tennessee Economic Council

Nov 7 — Hopkinsville, KY
The Bruce Center

Nov 12 — Huntsville, AL
Calhoun Community College

Nov 13 — Starkville, MS
The Gathering Starkville

Nov 14 — Memphis, TN
Museum of Science & History

Nov 20 — Rossville, GA
Rossville High School

Nov 21 — Chattanooga, TN
Kingdom Center

Dec 3 — Murphy, NC
Tri-County Community College

Dec 5 — Bristol, VA
Virginia High School

Public comment period runs from September 23 through December 11, 2024

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Public Listening Session

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Public Comment

This is a listening session; responses are typically not provided

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Adjourn

Day 2 RRSC Meeting

Begins at 8:30 am ET

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TVA
TENNESSEE
VALLEY
AUTHORITY
Welcome!
The RRSC Meeting will
begin at
8:30 am Eastern


TVA
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Regional Resource Stewardship Council
November 19, 2024– Day 2

Welcome

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Day 1 Recap

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Agenda

RRSC Meeting – Day 2
November 19, 2024 Young Harris, GA
All times are ET

8:30 am	**Day 1 Recap** **Day 2 Agenda Review**	Facilitator, Jo Anne Lavender
8:40	**Advice Question Discussion**	
10:00	**Break**	
10:15	**Natural Resources Update - Scott Lea, Senior Manager, Natural Resources**	
10:35	**River Management Update - James Everett, GM, River Management**	
10:55	**Cultural Resources Update – Paul Avery, Archaeologist**	
11:15	**Finalize Advice Statement**	
12:15	**Final Comments and Meeting Wrap Up**	
12:30	**Adjourn Meeting**	

Advice Questions Discussion

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Advice Question

Based upon the preliminary findings of TVA's study of climate change impacts to river system management, what additional considerations should be factored in to ensure TVA continues to balance river system benefits?

BREAK

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Natural Resources Update

Scott Lea, Senior Manager, Shoreline Management, Natural Resources

November 19, 2024

FY24 Accomplishments

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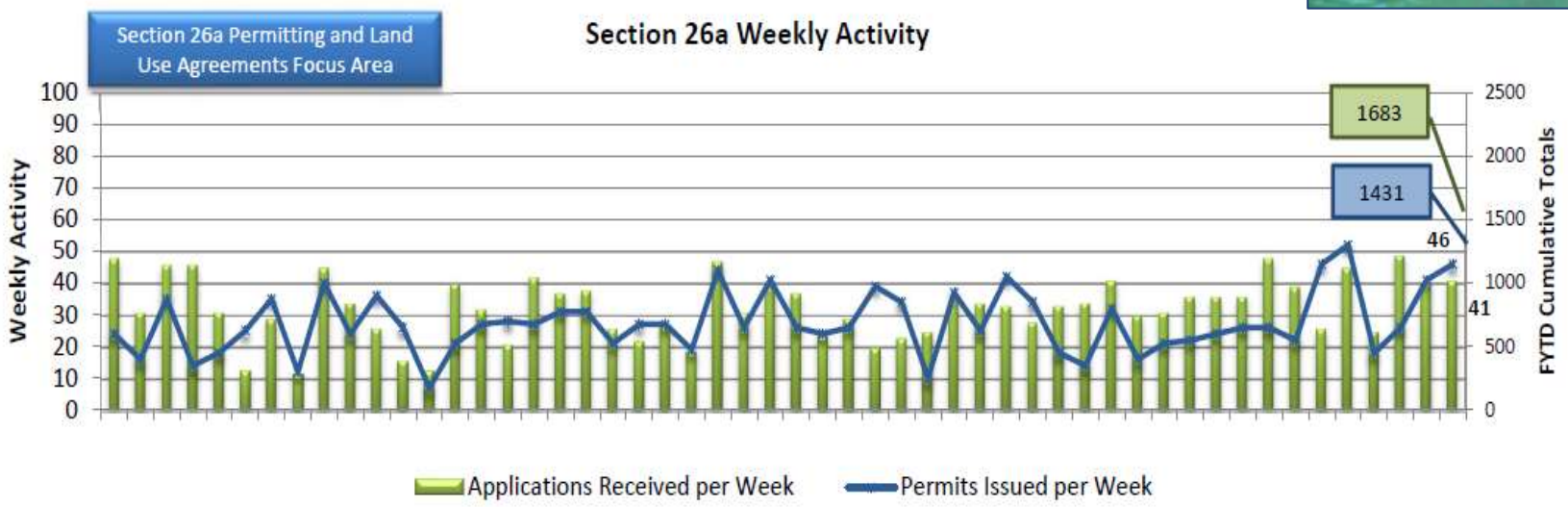
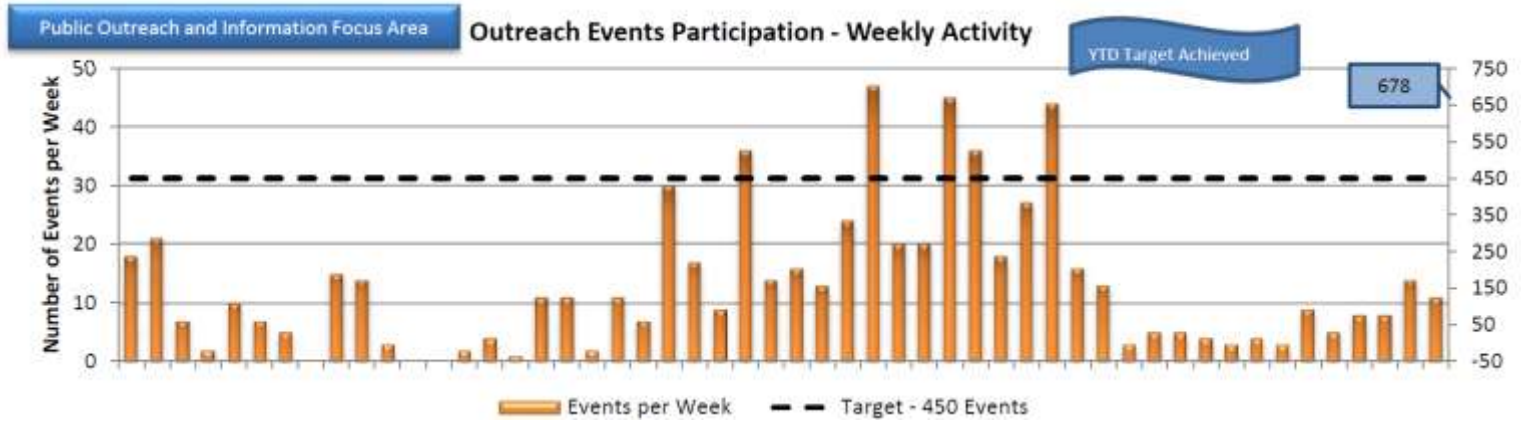
Section 26a and Land Use Agreements

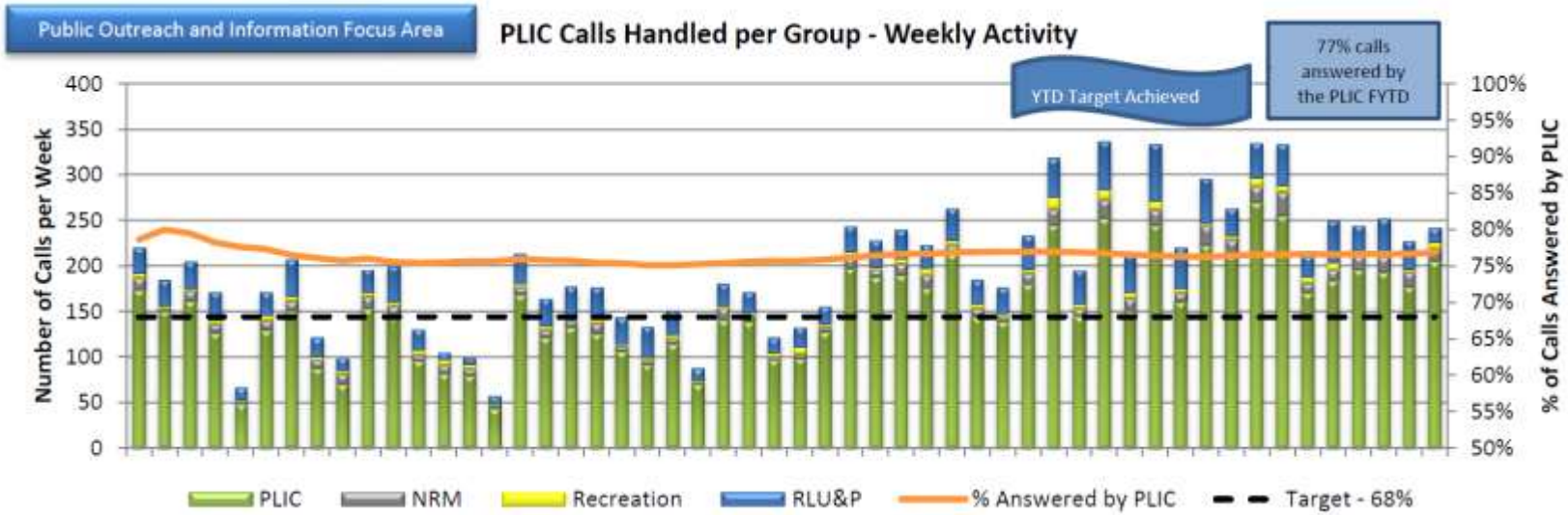
- 1,431 Section 26a permits issued.
- 1,683 Section 26a applications received.
- 23 land disposal projects completed.
  - 123 milestones completed.
- 114 land use permission agreements issued.



Public Outreach and Engagement

- 678 outreach events.
- 10,292 Public Land Information Center (PLIC) inquiries.
- 264 good news stories generated from Natural Resources work.





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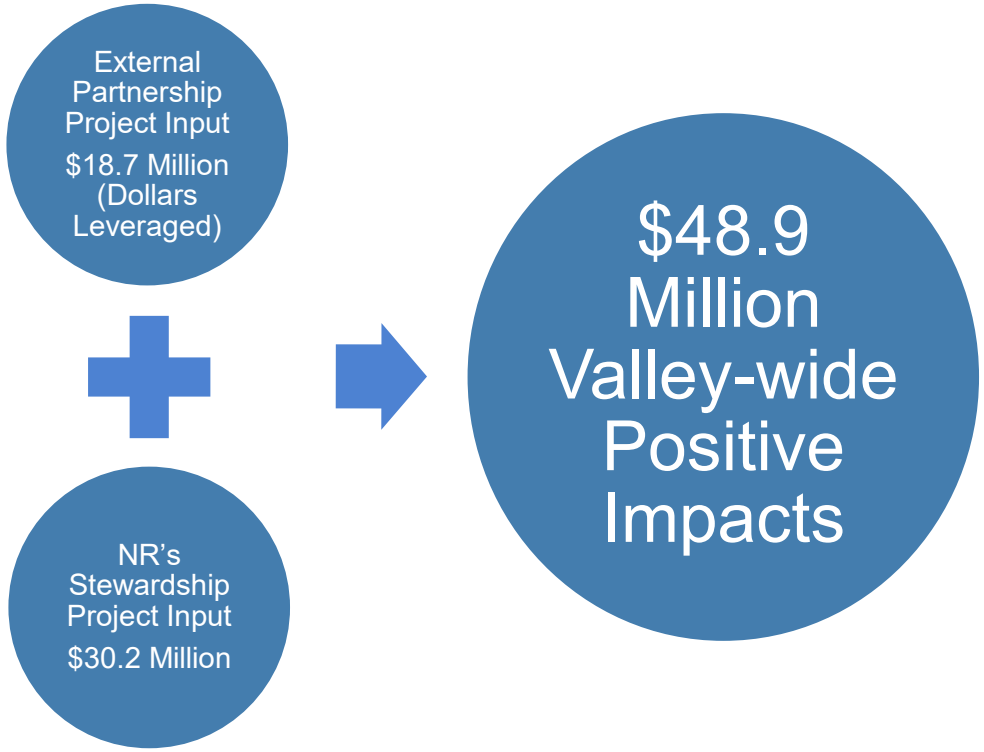
Powerful Partnerships

Diverse partnerships and community engagement are critical components of successful stewardship work. Natural Resources continues to seek new and creative ways to address funding and resource challenges to effectively manage public lands and associated resources and facilities.

Financial impacts of 500 stewardship projects with partners from FY22-24



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Highlight: Service in Community Cleanups

- Supported 53 community cleanups in FY24.
- $77,000 distributed in small increments to support community efforts.
- Increased focus on biodiversity aspects of clean-up work.
- Nearly 1,550 volunteers removed 220,061 pounds of trash in 30 Tennessee counties, and one county each in Georgia, Alabama, and Virginia.
- Tires and floating Styrofoam from docks are always a challenge!

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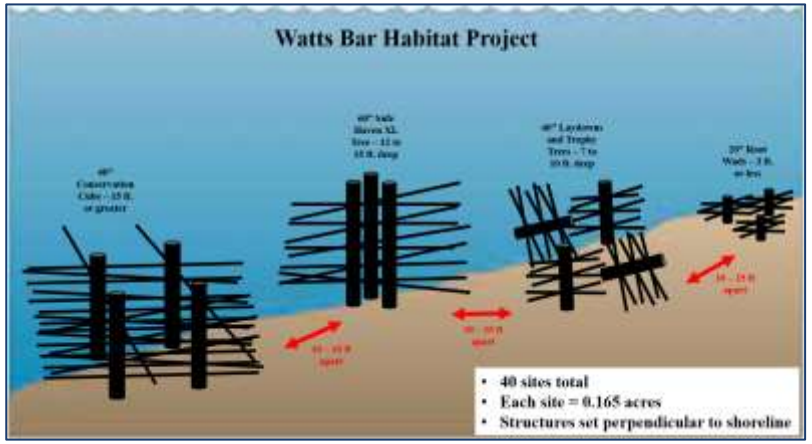
Highlight: Watts Bar Fish Habitat Improvement Project

- Partnership between TVA and TWRA.
- Mitigation efforts associated with the eastern dike stabilization at Kingston Fossil Plant.
- Installed 40 sites covering six acres.
- Structures made from PVC that will provide fish and nursery habitat for many years to come.
- Great collaboration between Kingston Fossil, Facilities Management, and several E&S groups including Natural Resources; Water Permits, Compliance, and Monitoring; Environmental Support; and Fisheries and Aquatic Monitoring.



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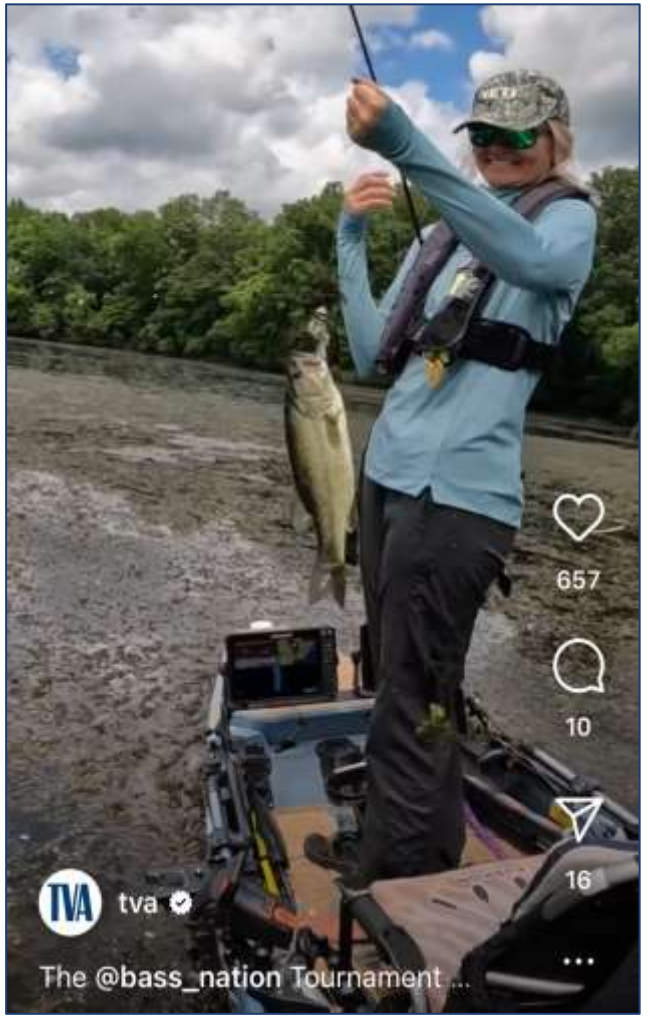
Aquatic Plant Management

- Management in vicinity of developed public shoreline only.
- Partnership with My Lake Guntersville.
- Year-round Power Operations support.
- Valley-wide in scope.



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Public Land Protection

- Conducted assessments of 10,005 acres of public land through Land Condition Assessments.
- Completed 157.3 miles of boundary maintenance (156.8 miles were remarked and 3.52 miles were reestablished through surveying).
- Inspected 3,107 Natural Resources assets on approximately 500 parcels across 34 reservoirs.
- Completed 1,716.8 miles of shoreline inspections on 10 reservoirs for Section 26a compliance, environmental commitments, violation and encroachment identification, and stakeholder interaction.
- Successful litigation and resolution on Norris Reservoir.

Floating Cabins

- Regulation amendments published in the Federal Register for public comment.
    - Proposal to move floating cabin compliance deadline from October 1, 2024, to October 1, 2029.
- Removal of two floating cabins that were in locations TVA cannot approve.
- TVA made multiple attempts to pursue voluntary compliance with the owners of each floating cabin.
- TVA was able to successfully remove the floating cabins using TVA's Facilities Management staff and an approved vendor.

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FY25 Look Forward

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Awareness: Section 26a Fee Increase

- Effective January 6, 2025, TVA will raise the standard application fee to $1,000 for minor construction activities, an increase from $500.
- In addition to the standard fee increase, certain activities that require more effort to review will be moved to full cost recovery status.

Section 26a is an amendment to the TVA Act.

- **Ensures the unified development and regulation of the Tennessee River System.**
- Provides regulatory authority necessary to **protect the development and regulation of the river system as well as TVA's operations**.

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Tims Ford Reservoir Land Management Plan (RLMP)

- Ongoing project to revise the 2000 Tims Ford RLMP.
- Includes evaluation of Zone 8 parcels, State of Tennessee land transaction, and grandfathered facilities.
- Public comment opportunities: FY24 public scoping, FY25 draft RLMP/environmental assessment.

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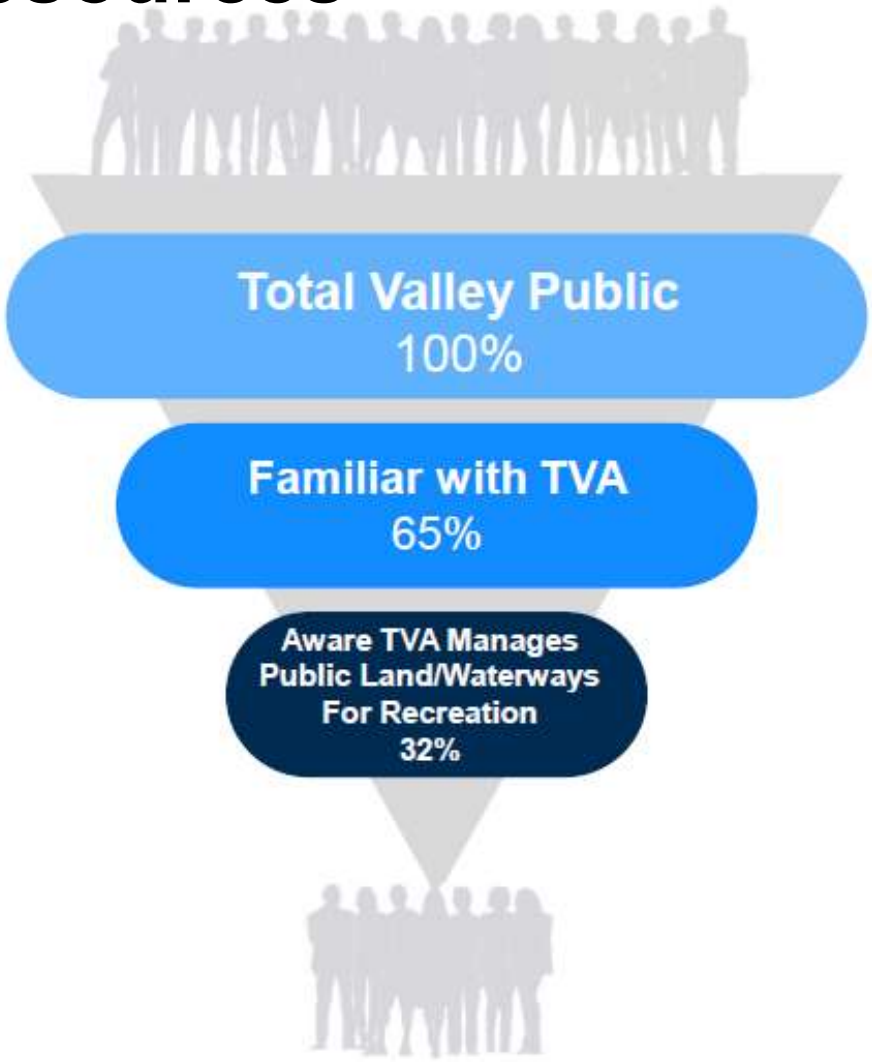
Public Views On Natural Resources

- **Awareness** – When stakeholders are aware of TVA's stewardship work, 75% of them believe the services provided are Extremely/Very Valuable.
    - Nearly two-thirds of the Valley public are not aware of TVA's stewardship work.



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River Management Update

James Everett, General Manager, River Management

November 19, 2024

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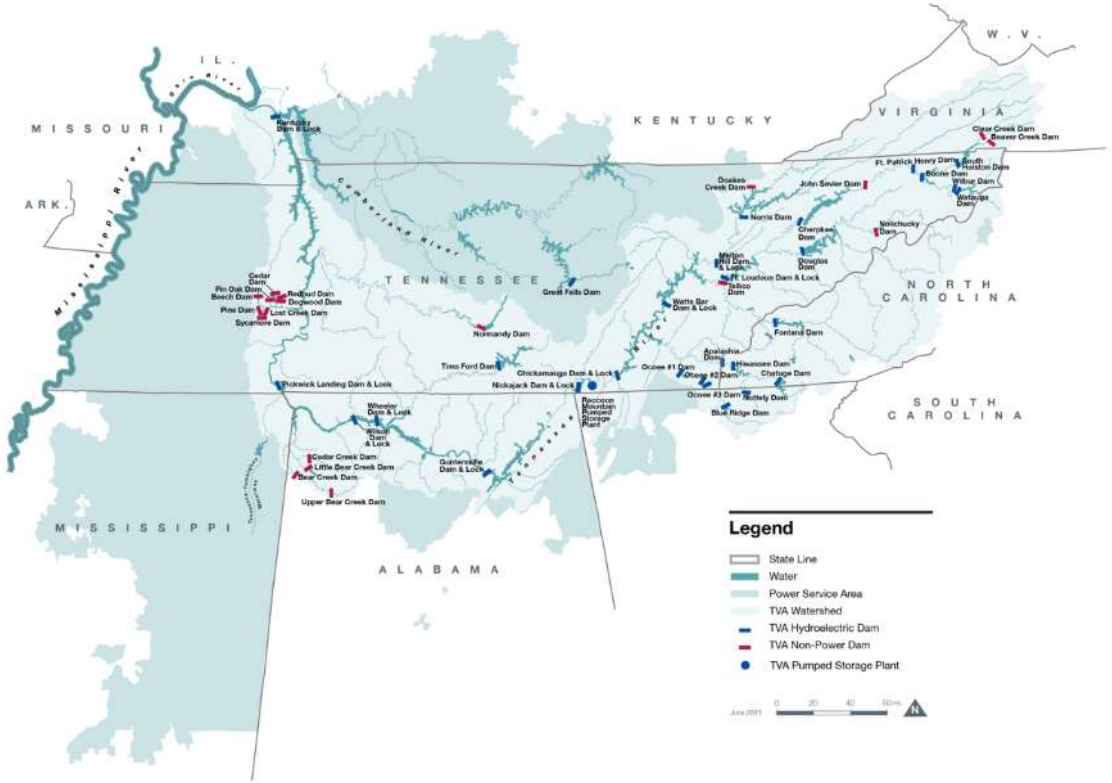
Purpose and Background

Purpose: Update the Council on TVA's river management mission and highlight our internal and external collaboration and partnerships. No action requested.

Background: River Management is responsible for the integrated operation of the Tennessee River system and balancing the competing demands on the system and the overall value to the public. River Management has been integral to TVA's mission of service since its inception.



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Integrated Tennessee River System Overview

Flood Control

Navigation

Power Generation

Water Supply

Water Quality

Recreation

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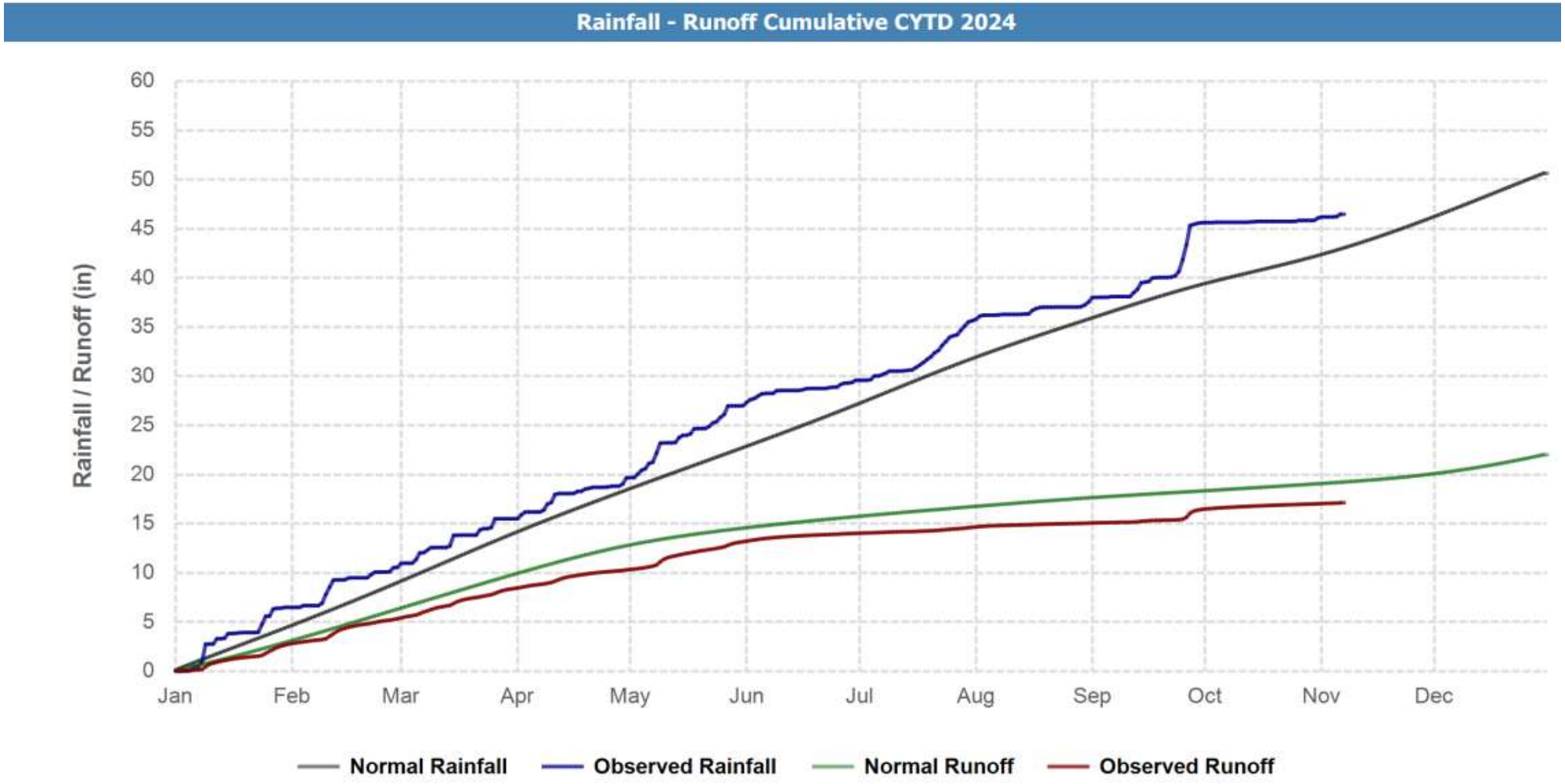
2024 Rainfall and Runoff

- 108% of normal rainfall and 89% of normal runoff through November 7, 2024



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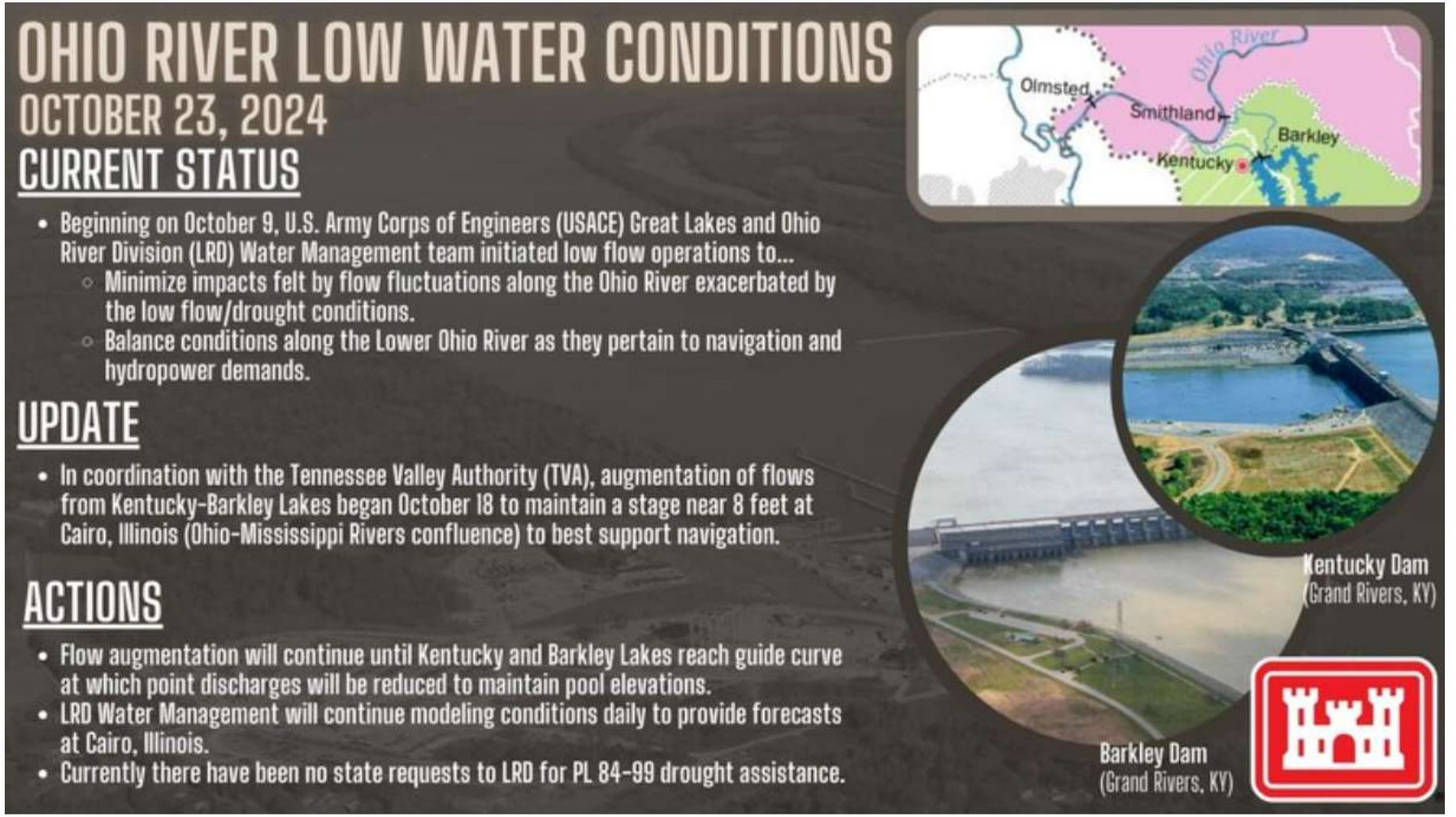
Navigation Highlights



- Releases from reservoirs support the nations inland waterway transportation system through efficient commodity movement.
- Worked with the U.S. Army Corps of Engineers to finalize a Memorandum of Understanding (MOU) around low-flow coordination responsibilities.

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Navigation – Wilson Lock Outage

The main lock chamber at Wilson closed to traffic on September 26, 2024, due to damage to the gate hinge system

The Auxiliary lock was placed into service the following day and continues to operate today, yet at considerable decrease in lockage efficiency

Temporary and long-term repair plans are being evaluated and communicated to the Navigation industry

Temporary repairs will be evaluated in December 2024 to determine options for limited return to service of the main chamber.

Permanent repairs in the January to April timeframe of 2025 will be needed for full restoration of the lock.

Lock outage results in significant que times and delays for industry (10-11 days as of late October 2024)

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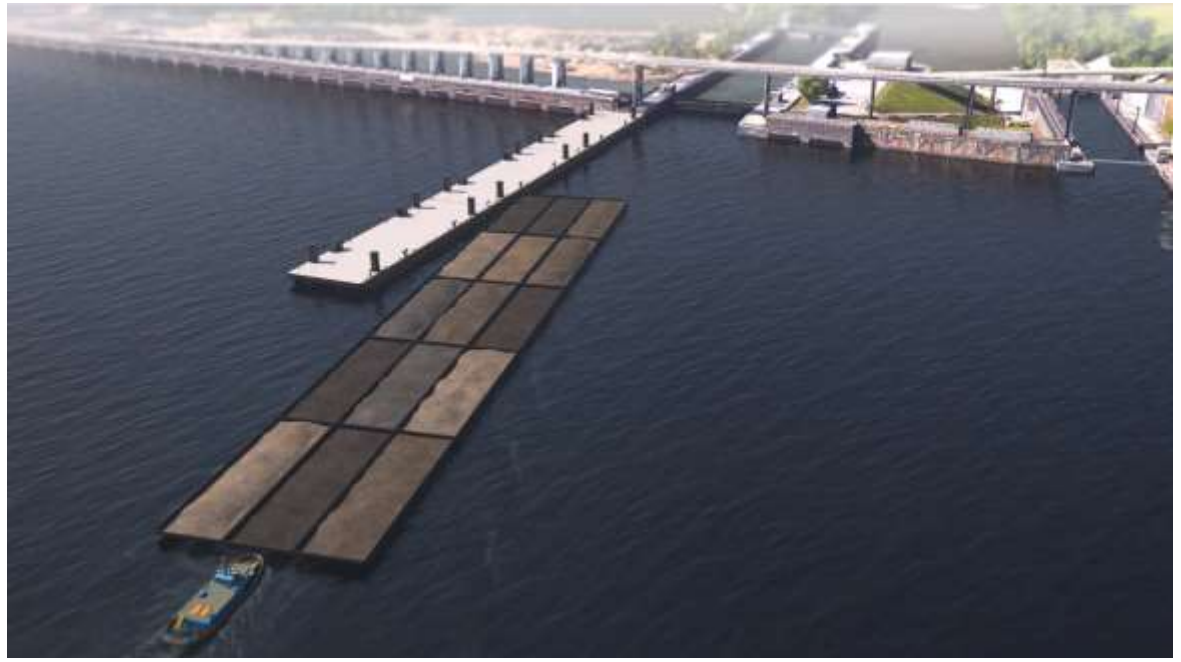
Navigation – Wilson Lock Guard Wall

Continuing to support lock operations through modified lockage procedures, special spillway flow operations, and a helper boat

Fabricating interim solution spud barge (rendering to the right) with installation completion planned for Fall of 2025

Worked with U.S. Army Corps of Engineers to develop a design estimate for the guard wall permanent solution while continuing to explore funding sources for the permanent solution

Communicating with the navigation industry and congressional stakeholders on existing lock restriction impacts and the path forward



Navigation – Motor Vessel Sideview

The Sideview received a new and safer crane that was installed and commissioned recently.

The crane replaces the previous equipment which was prone to frequent repairs and undersized to adequately and safely lift equipment and materials used to protect waterways from navigation hazards

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Floating Aquatic Vegetation Update

- Overall threat level remained green for majority of 2024
- Significant amounts of rooted vegetation upstream of Browns Ferry Nuclear
- Coordinating operations with Nuclear and Hydro

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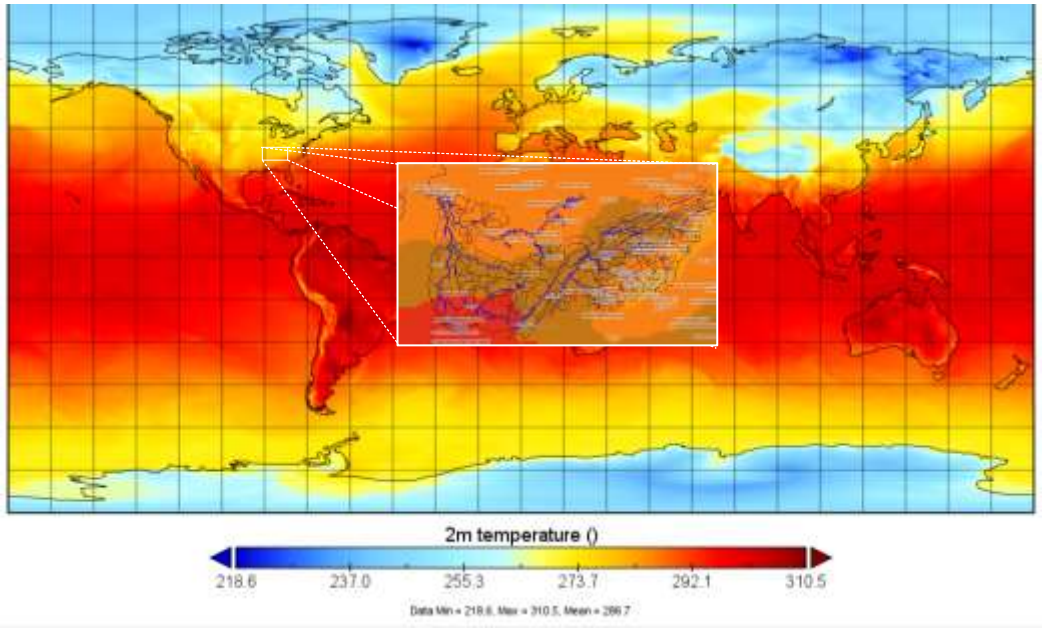
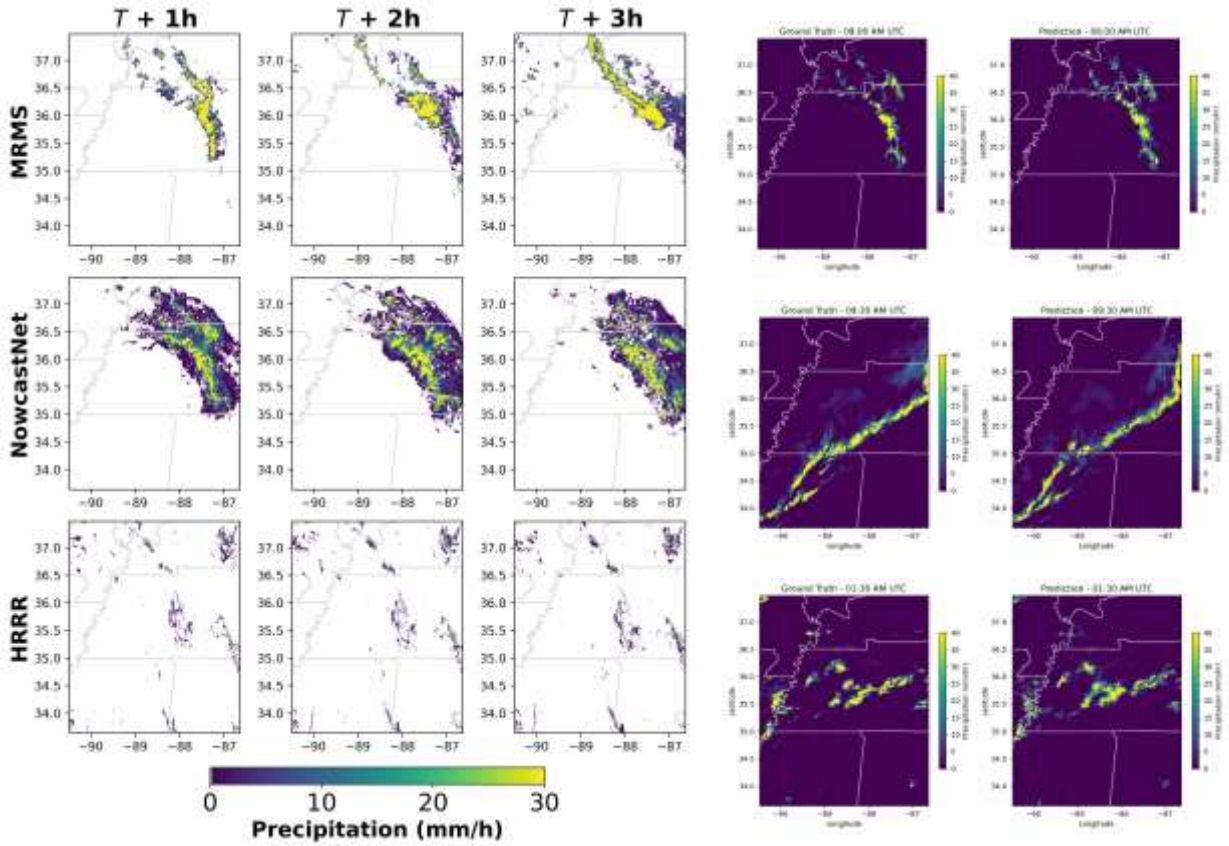
River Management – New Weather Prediction Tools

- More lead-time for actionable decision-making
- Improved accuracy
- Increased spatiotemporal resolution
- Ability to improve performance
- Increased update frequency





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Hibbs Island Reopening Event

- A berm was constructed between the left and right channel weirs to redirect all flow over the two weirs to protect the island, the functionality of the weirs, and ensure minimum flows and protection of aquatic habitat.
- A reopening event for Hibbs Island occurred on May 24 and was attended by several State and Local partners and representatives.
- The effort at Hibbs Island along with other river stewardship projects align with TVA's mission to serve the people of the Valley Region – helping the environment thrive and supporting the economy through activities such as ecotourism.

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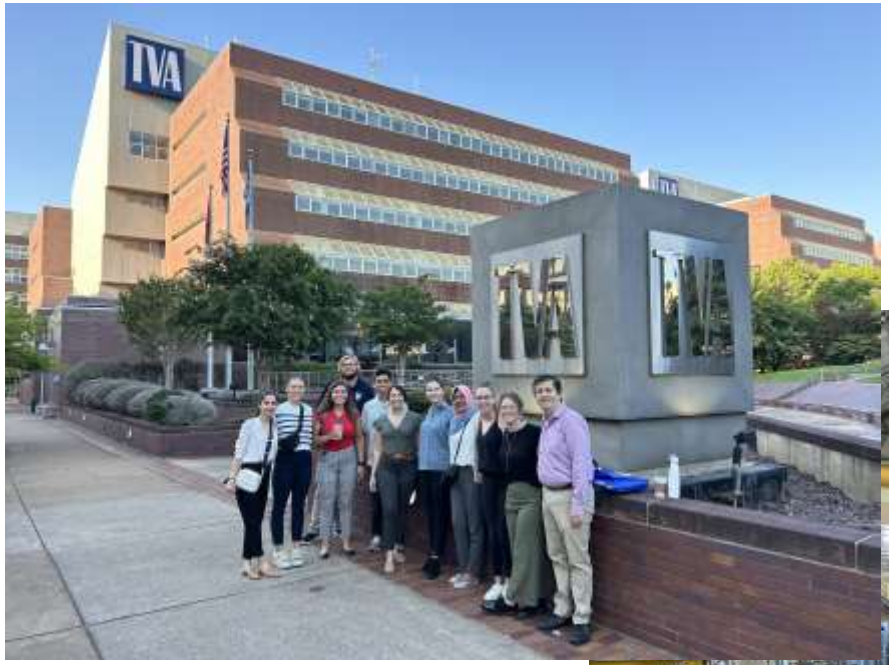
Hydrologic Information & Risk Analysis

Alabama NRT Students visit Chattanooga Office Complex, Nickajack, and Ocoee



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2024 Tennessee Partnering Meeting

River Management, TVA Police, Natural Resources, and Environment

Attended the biennial State of Tennessee Partnering Meeting to continue cooperation and communication between federal partners, state agencies, and key stakeholders for the purpose of achieving mutual water resource goals that enhance the quality of life for Tennesseans.

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Outreach and Stakeholder Engagement

Conducted numerous public and stakeholder briefings throughout the year including virtual and in-person River Forecast Center (RFC) tours

Continued strong presence and engagement on TVA's social media platforms, with millions of people reached

Preparing to host the Mekong River and Mississippi River Commissions for a leadership summit and interagency delegation of international visitors

Thus far in 2024, hosted 66 tours and briefings, reaching over 1,500 stakeholders

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Summary

Management of the Tennessee River for the benefit of Valley stakeholders is a statutory obligation set forth in the TVA Act and an integral component of TVA's enduring Mission.

Despite challenging weather and hydrologic conditions in 2024, we have seen success in key operating objectives while promoting navigation, drought management, historic flooding, water quality and supply, and hydroelectric generation.

In addition to operational success, we have focused on key assets that promote benefits to our stakeholders such as Wilson Lock wall and main chamber outage and asset recovery from Helene.

Stakeholder outreach and engagement, as well as leading efforts in climate resiliency through partnerships, has been another 2024 highlight.


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Reinterment and Protection Project

Paul Avery

November 19, 2024

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Native American Graves Protection and Repatriation Act (NAGPRA)

Federal law requires TVA to return Ancestral remains and associated funerary objects to the appropriate Tribes.

TVA has repatriated over 14,000 Ancestors

Now working to physically return them to the descendent communities

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Reinterment Commitment

Committed to Reinterment in 2007

Established interdisciplinary team in 2016

Executed MOA in 2020

Committed to three locations across the Tennessee Valley:

- West Tennessee
- East Tennessee
- North Alabama

Committed to returning Ancestors to original location when feasible.

Signed permanent easement with The Muscogee (Creek) Nation for reinterment in North Alabama

Archaeological Site Protection

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Archaeological Site Protection

TVA NAGPRA Team

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Team Effort

Tribal Partners

TVA Team

- Cultural Resources
- Construction Services
- Natural Resources
- TVA Police
- Dam Safety
- Facilities
- Transportation
- Communications

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Reinterment – North Alabama

Work to prepare Ancestors and objects ongoing

Currently working with MCN to finalize implementation steps:

- Communication Plan
- Data Management Plan
- Logistics
- Security
- Construction
- Restoration & Long-Term Management


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Finalize Advice Statement

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Closing Remarks

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2025 IRP Public Open Houses

Virtual Meetings

Oct 30 — After Business Hours
6:00pm Central

Nov 22 — During Lunch Hour
11:00am Central

Unable to make it to a virtual or in-person meeting?

- Visit TVA's IRP website at: www.tva.com/irp for registration information.
- Taped webinars will be available as well.

In-Person Meetings *at 6 PM Local Time*

Oct 28 — Antioch, TN
Southeast Community Center

Nov 4 — Oak Ridge, TN
East Tennessee Economic Council

Nov 7 — Hopkinsville, KY
The Bruce Center

Nov 12 — Huntsville, AL
Calhoun Community College

Nov 13 — Starkville, MS
The Gathering Starkville

Nov 14 — Memphis, TN
Museum of Science & History

Nov 20 — Rossville, GA
Rossville High School

Nov 21 — Chattanooga, TN
Kingdom Center

Dec 3 — Murphy, NC
Tri-County Community College

Dec 5 — Bristol, VA
Virginia High School

Public comment period runs from September 23 through December 11, 2024

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Adjourn

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Drive Safely!

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