



Regional Resource Stewardship Council

November 5/6, 2018
Knoxville, Tennessee



Joe Hoagland

Term 10 RRSC Members

RaeLynn Butler

Muscogee (Creek) Nation

Keith Carnahan

Meriwether Lewis Electric Cooperative

Robert Englert, Jr

Crouse Corporation

Ray Hardin

Decatur Utilities

Brock Hill

TN Dept. of Environment & Conservation

Richard Holland

Packaging Corporation of America

Donny Holland

KY Parks

Mark Iverson*

Bowling Green Municipal Utilities

Avis Kennedy

State of Tennessee

Kim Klinker

Klinker Management

Brad Kreps

Nature Conservancy

Tom Littlepage

Ala Dept. of Economic & Community Affairs

Gary Myers

State of Tennessee

Will Nelson**

Nelson Tractor Co.

Sen. Clay Scofield

Alabama Senate, District 9

Danette Scudder

TN Valley Public Power Association

Patricia Thomasson

Thomasson Company

Catherine Via

TN Farm Bureau Federation

Randy Wiggins

Cherokee County, NC

*RRSC Chair

** Administrative approval in process

New Members to the RRSC

1 New Member

- **Danette Scudder** – TN Valley Public Power Association
(day 2)

2 Renewed Members

- **Patricia Thomasson** - Thomasson Company -Mississippi
- **Randy Wiggins** - Cherokee County, NC

1 In Process

Will Nelson – Nelson Tractor - Georgia

Safety First



Building Emergency Plan

Introductions



- Name
- Organization
- Least Favorite Recreational Activity



Today's Meeting

Meeting Goals

- **Welcome recently renewed members to the 10th Term of the RRSC**
- **Update on programmatic agreements**
- **Water reliability in the region**
- **Archaeological collection management**
- **Update on TVA Natural Resources Stewardship and River Management activities**
- **Seek statement on how to best use results of TVA's Water Reliability Study**

Agenda – November 5, 2018

- | | | |
|--------------|--|--|
| 10 am | TVA Welcome | Joe Hoagland, Enterprise Relations and Innovation and Designated Federal Officer |
| 10:10 | Introductions and Agenda Review | Jo Anne Lavender, Facilitator |
| 10:20 | Programmatic Agreements | Brenda Brickhouse |
| 11:00 | Break | |
| 11:15 | Water Reliability Study | Gary Springston, Curt Jawdy, Amanda Turk |
| 11:55 | Stewardship of TVA Archaeological Collections | Erin Pritchard |
| 12:15 | Wrap up and adjourn | JoAnne |

Lunch to follow for Council

Agenda – November 6, 2018

- | | | |
|--------------|--|---------------------------|
| 8:30 | Welcome and Recap | JoAnne, Facilitator |
| 8:35 | Council Discussion / Form Advice | Cathy, JoAnne and Council |
| 9:25 | Prepare for Public Comment Period | |
| 9:30 | Public Comment Session | JoAnne |
| 10:30 | Break | |
| 10:45 | River Operations Update | Tom Barnett |
| 11:05 | Finalize Advice Statement | Council |
| 11:15 | Natural Resources Update | Bucky Edmondson |
| 11:30 | DFO Update | Amy Henry |
| 11:45 | Wrap Up | Amy |
| 12:00 | Adjourn | JoAnne |
- (lunch available for Council Members)

RRSC Meeting Facilitation

- DFO (or designee) will facilitate and ensure good order during all open discussions
- Only one person is permitted to comment at a time
- Please turn your name card on its side in order to be recognized by the Chair or facilitator when wanting to provide comment.

RRSC FACA Meeting Protocols – 10th Term

Agenda

- Joe Hoagland, Vice President, Enterprise Relations & Innovation is the Designated Federal Officer (DFO); Amy Henry, Senior Manager, Enterprise Relations & Innovation is the alternate DFO
- Agenda prepared and approved by the DFO in consultation with Council Chair, Mark Iverson
- Agenda distributed to Council and an outline is published in the Federal Register prior to each meeting
- Topics may be submitted to the DFO by any member of the Council, or non-members, including members of the public

Meeting Minutes

- DFO will ensure that minutes are prepared for each meeting, approved by the Chair, and made available to Council members and the public

Voting

- Any member of the Council may make a motion for a vote
- Quorum is 11 members
- Advice requires an affirmative vote of majority of Council members present
- Advice may include minority or dissenting views

Membership

- Balanced Membership
- Professional or personal qualifications to achieve the mission of regional resource stewardship
- Broad range of diverse views and interests, including recreational, environmental, industrial, business, consumer, educational and community leadership

Kendra Mansur, Office of the General Counsel

Council Advice Discussion

How can TVA best engage water utilities, industry, regulatory and other affected stakeholders in using the information from our water supply reliability study to enhance economic development and drought preparedness in the TVA region?



Programmatic Agreements: Natural and Cultural Resources

Brenda Brickhouse

November 5, 2018

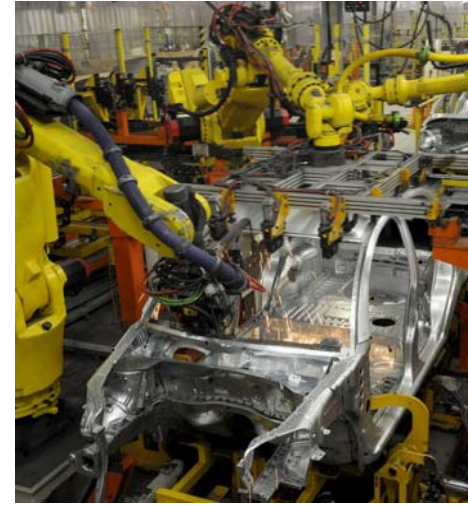
Alignment with TVA's Mission of Service



Energy



Environment



Economic
Development

Alignment

- National Environmental Policy Act
- Clean Water Act
- Executive Order / Wetlands
- Endangered Species Act
- Executive Order / Migratory Birds
- National Historic Preservation Act
- Archaeological Resources Protection Act

Landscape and Program Benefits



Common Actions Across Resources

- Natural resources managed on individual projects in isolation
- Interpretations, requirements and expectations vary across regulatory offices
- Project-specific consultations increasing yet yielding only incremental mitigation



Programmatic Agreements (PA) Can Provide a Solution

Multi-Pronged Programmatic Approach

- Refine compliance processes for comprehensive array of activities
- Determine impacts of actions on front-end
- Standardize protocols and consultation across jurisdictions
- Improve outreach and stakeholder engagement
- **Address conservation needs at landscape level and focus resources where most effective!**



Bat Programmatic Consultation

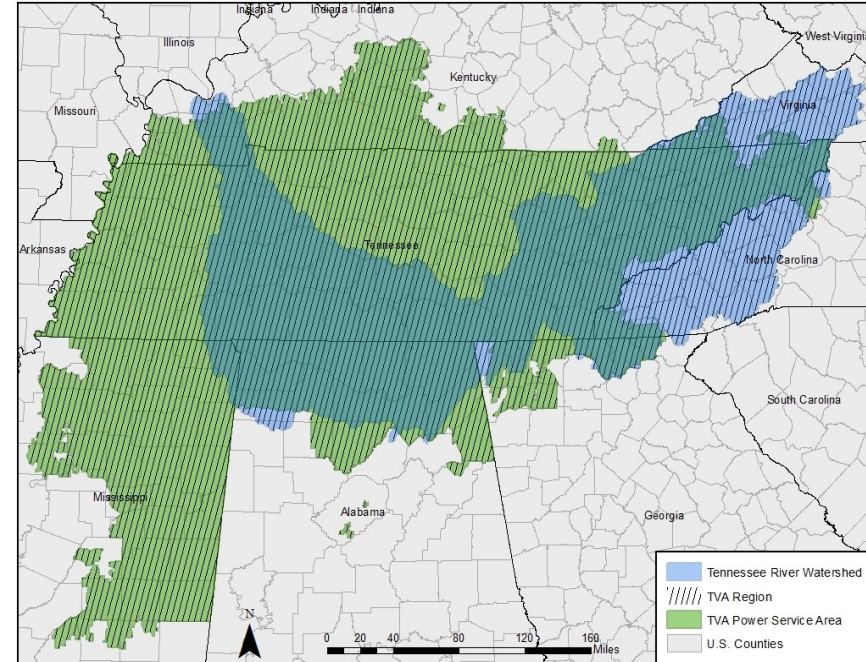
DRIVERS AND APPROACH

- Several federally-listed bats in Power Service Area
- Heightened concern re: white-nose syndrome
- Routine tree removal for projects, public safety, and reliability
- Consultation / mitigation requirements increasing
- Project-specific outcomes increasingly unpredictable



Actions Covered, Geographic Scope

- Biodiversity and Public Use
- Cultural Resources
- 26a Permitting
- Power Operations
- Transmission Construction and O&M
- Land Use and Disposal
- Property Conveyances
- Economic Development
- Solar Generation



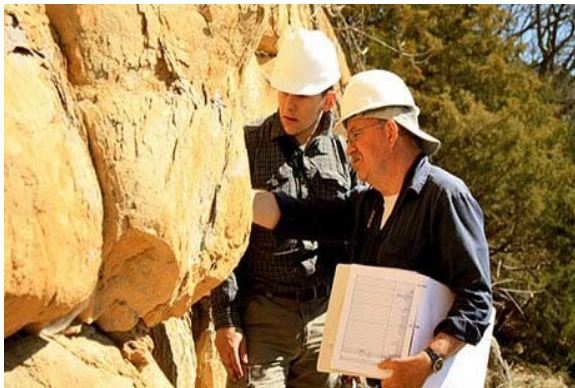
Includes 96 routine activities within these general TVA actions

Comparison with In-Lieu Fees

ILF Service Area	Estimated Per Acre Compensatory Mitigation Fee
Alabama	\$5,377
Arkansas	\$5,789
Connecticut	\$15,370
Georgia	\$6,200
Illinois	\$10,903
Indiana	\$10,609
Iowa	\$11,432
Kentucky	\$6,141
Maryland	\$10,503
Michigan	\$7,846
Mississippi	\$5,107
Missouri	\$6,200
New Jersey	\$17,251
New York	\$5,706
North Carolina	\$7,435
Ohio	\$8,904
Oklahoma	\$4,319
Pennsylvania	\$8,669
Tennessee	\$6,553
Vermont	\$6,106
Virginia	\$7,258
West Virginia	\$5,224

- “Take” for discrete amounts of suitable habitat
- Spatial / seasonal application for project specific impacts
- Conservation fees range \$0-\$1,000/acre
- Fund conservation projects led by TVA or other agencies
- 20-year agreement

Cultural Resources 106 PA



- 148 routine activities having little or no potential to impact historic properties
- Developed in consultation with:
 - Advisory Council on Historic Preservation
 - 18 federally-recognized Tribes
 - 7 State Historic Preservation Officers



Cultural Resources 106 PA

- Consultation with parties, including w/Tribes and SHPOs
- Internal dialogs with Business Units
- Follow-up with consulting parties fall/winter
- Target date for completion spring 2019



Anticipated Outcomes

- Landscape level conservation
- Focus resources where most effective
- Greater project planning predictability and consistency
- More efficient consultations
- **Meaningful work aligning with regional resource priorities!**



Potential Future Programmatic Endeavors

- Pollinators
- Birds



Questions?





Water Reliability in the Tennessee Valley

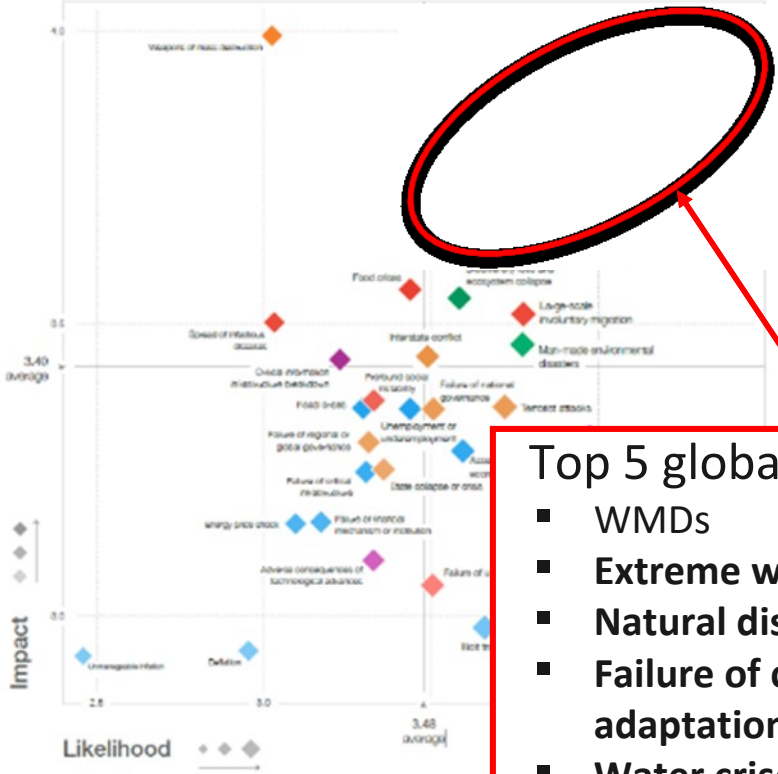
Gary Springston, Curt Jawdy and Amanda Turk

TVA's Water Supply Goal



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.

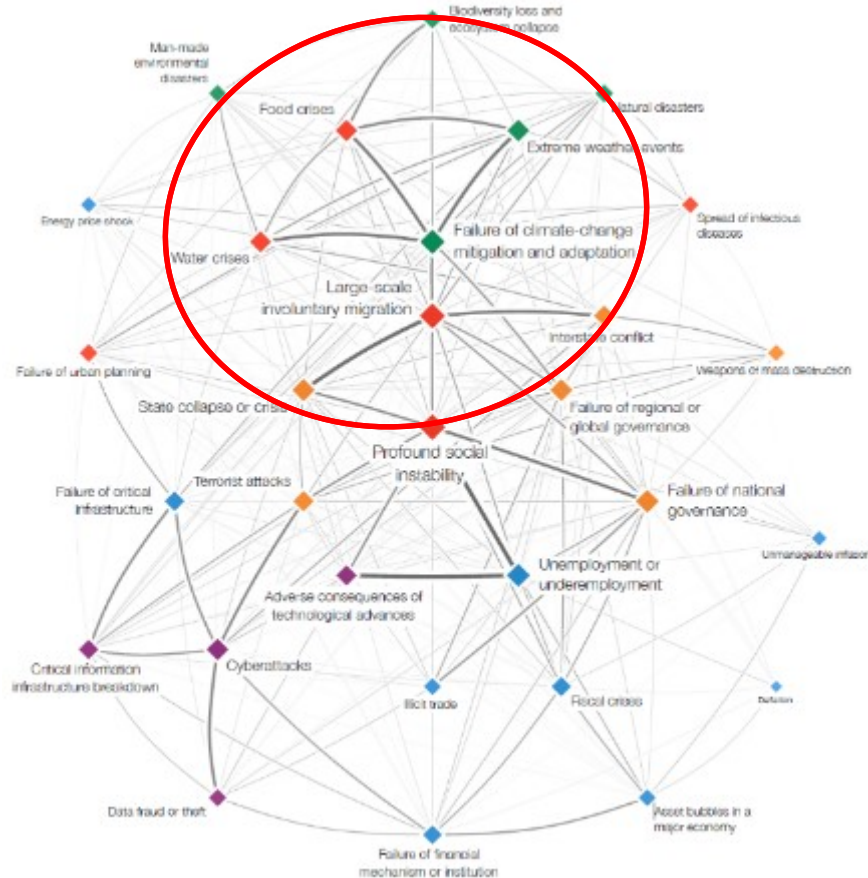
What Keeps Global Leaders Up at Night?



Top 5 global risks by impact:

- WMDs
- **Extreme weather events**
- **Natural disasters**
- **Failure of climate change adaptation**
- **Water crises**

World Economic Forum Risk Relationships



Water crisis:

A significant decline in the available quality and quantity of fresh water, resulting in harmful effects on human health and economic activity

The Importance of Water in the TN Valley

“The principal water problem in the early 21st century will be one of inadequate and uncertain supplies...”

- National Research Council

TN River System is the fifth largest in the US

Provides drinking water for 5.1 million people

Over 700 surface water intakes rely on TVA's reservoirs



Thermoelectric Cooling



Municipal Supply

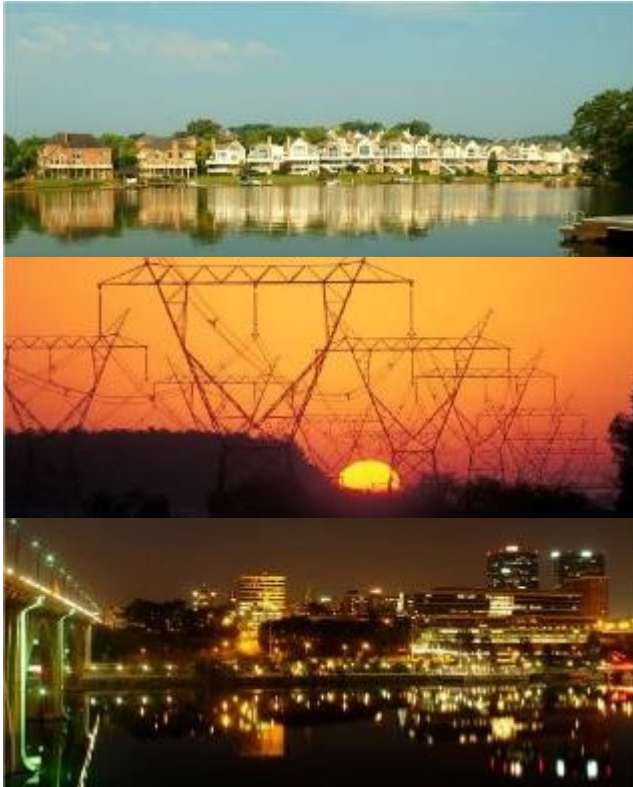


Industrial Supply



Irrigation

Why the Concern?



The **quality of life** in our region **depends upon ample water**.

Dependable water is as fundamental to the economic growth of the region as is dependable, low-cost electricity.

Water supply and water-quality issues, coupled with emerging water-use conflict over a fixed supply, will continue to increase across the southeast.

River Management Focus Areas

River Management is responsible for scheduling the day-to-day, integrated operation of the Tennessee River system and balancing the competing demands on the system and the overall value to the public.

Our integrated operations provide multiple benefits to the people of the Valley



Flood Damage Reduction



Power Generation



Water Supply



Navigation

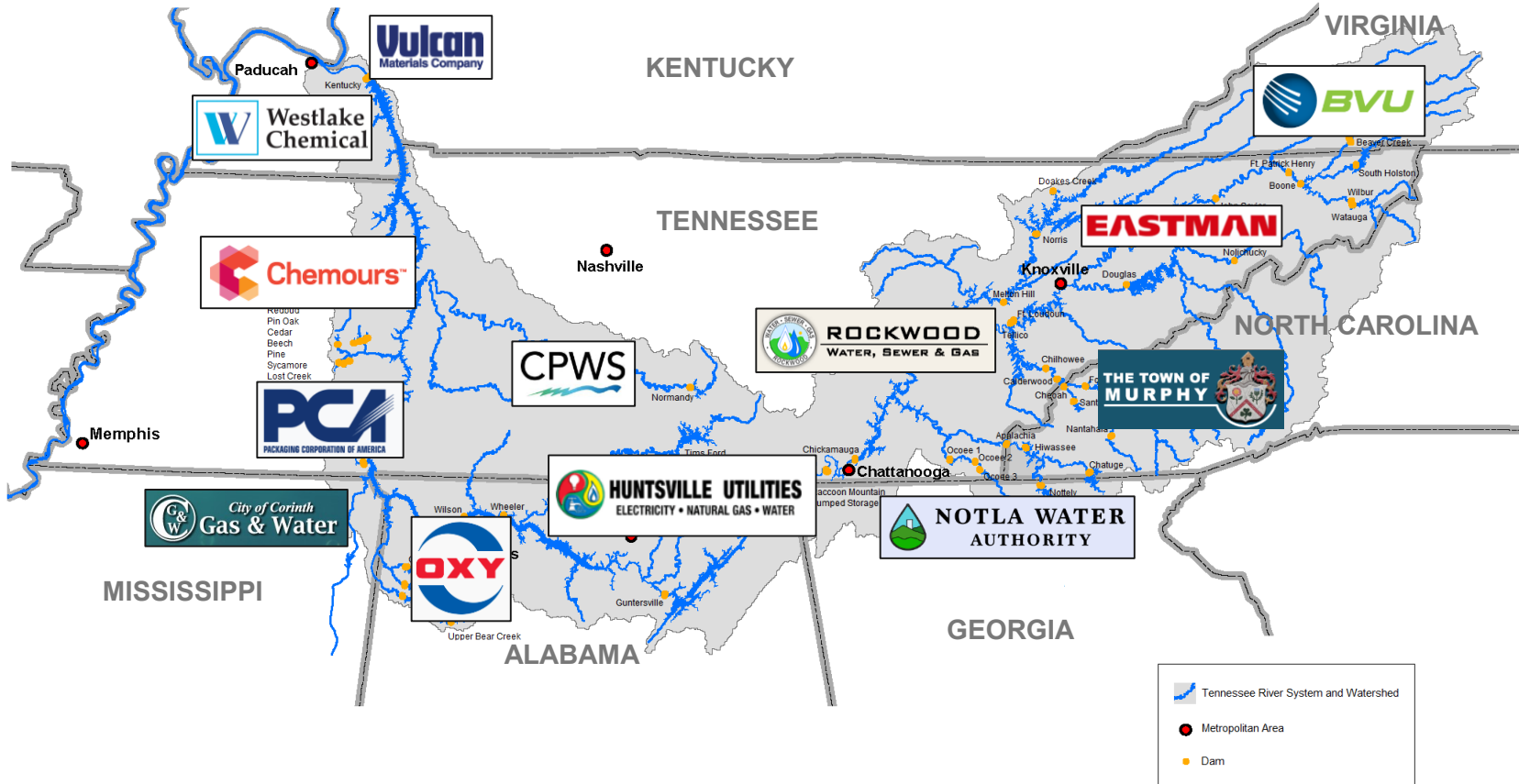


Water Quality

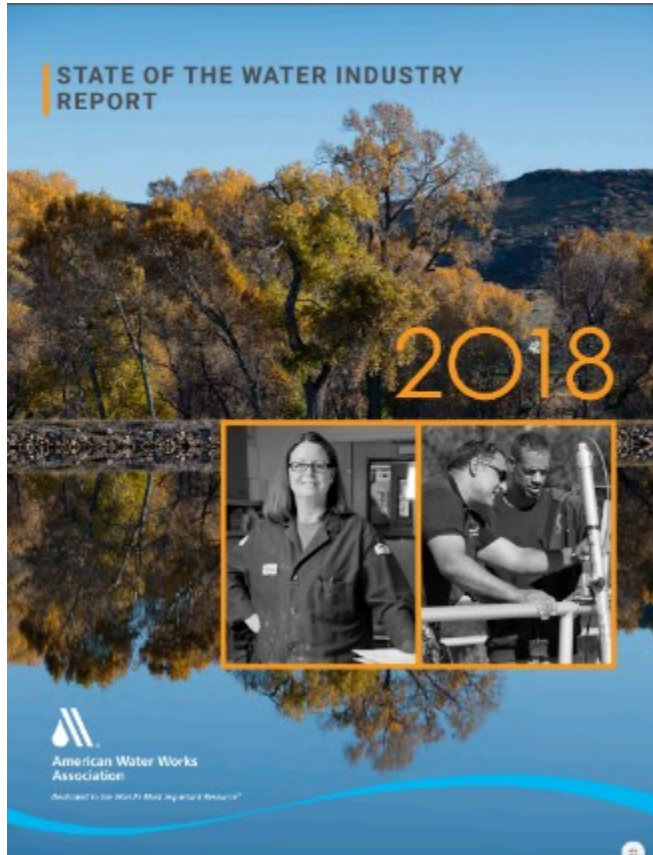


Recreation

Examples of Water Users We Serve



What Keeps Water Utilities up at Night?



The American Water Works Association annual “State of the Industry” report identified the **top 5 water utility risks**:

- Aging infrastructure
- Infrastructure financing
- **Public understanding the value of water services**
- **Long-term water supply availability**
- **Public understanding the value of water**

Economic Impacts of Water

Sector	Gallons/Job
Chemicals	2,100,000
Plastics	500,000
Pharmaceuticals	473,000
Paper Mills	280,000
Food Manufacturing	110,000
General Manufacturing	60,000-90,000

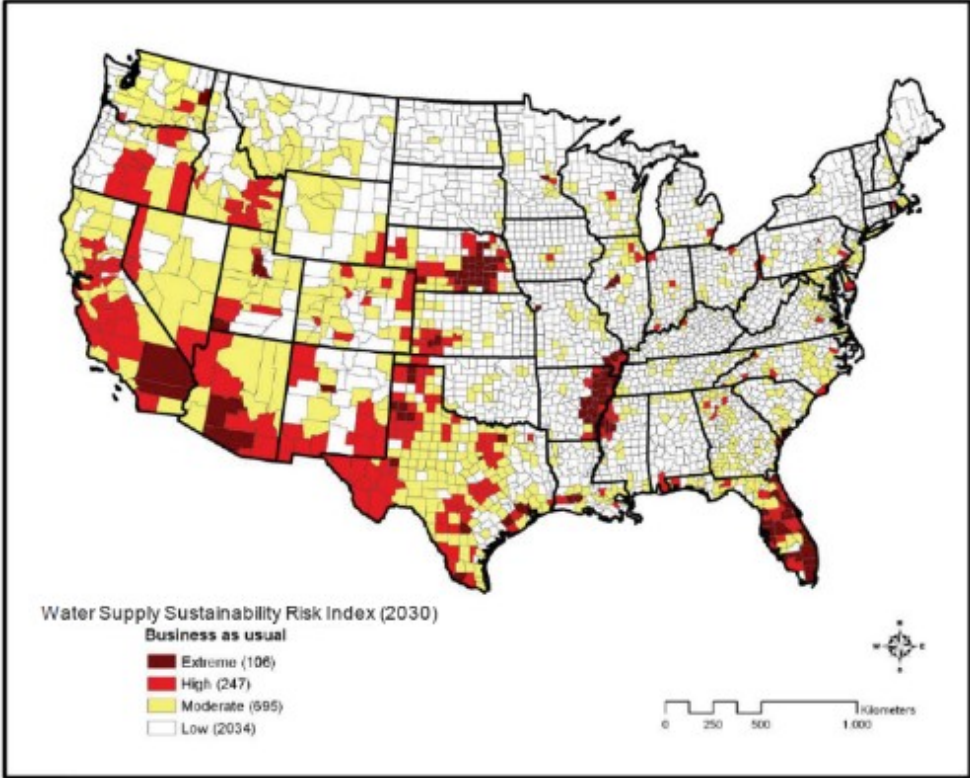


Given a single day of water disruption:

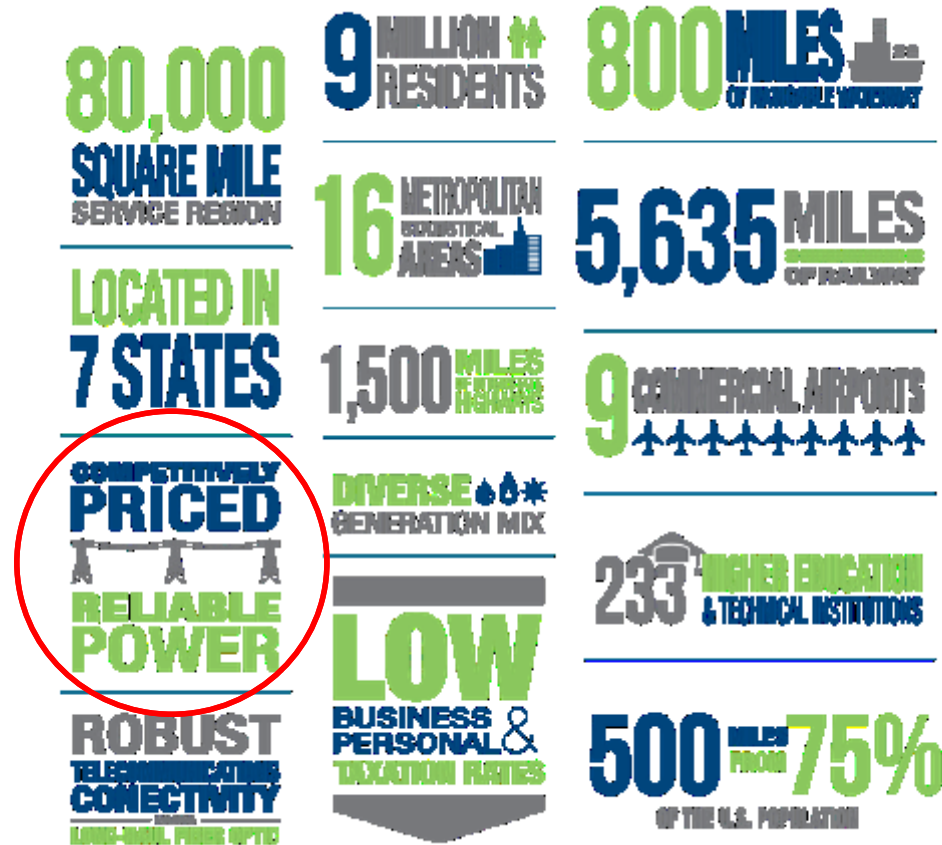
The average US business loses \$230 in sales *per employee*

Industries most reliant on water lose up to \$5,800 *per employee*

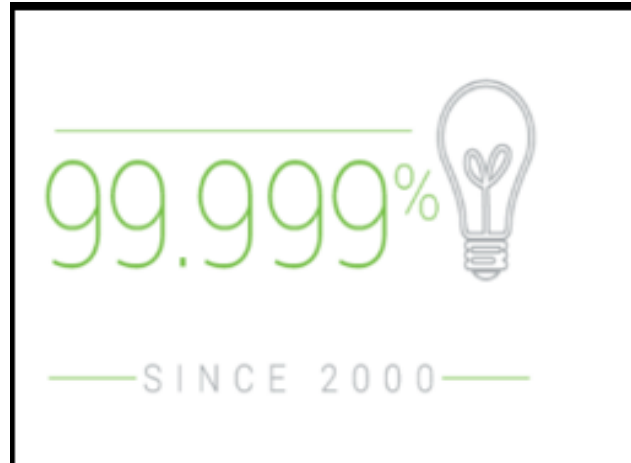
The Good News: The Valley's Water Reliability Risk is Comparatively Small



Regional Economic Development Advantages



Low Cost & Reliable Power Attracts Investment



Reliability

You can depend on TVA electricity to be there when you need it: since 2000, the TVA system has delivered 99.999 percent transmission reliability. Our robust network of 16,000 miles of transmission line and 487 substations and switchyards, is more than sufficient to supply our 80,000-square-mile service region.

By partnering with our local power companies and our directly served large industries and federal installations, we ensure that businesses receiving TVA power enjoy one of the most reliable and efficient power systems in the nation.

Reliable Water, Like Reliable Energy Attracts Investment

~100%



- Growing water supply issues worldwide have forced corporations to consider water as a key business factor
- Water supply must be considered over the life of a business investment
- 90% of water-intense industries have corporate water strategies
- Corporations providing sustainability reports have grown from less than 100 in 1999, to over 6,000 today

— Since 1939 —

<http://www.freepik.com>

How Many 9999999s?

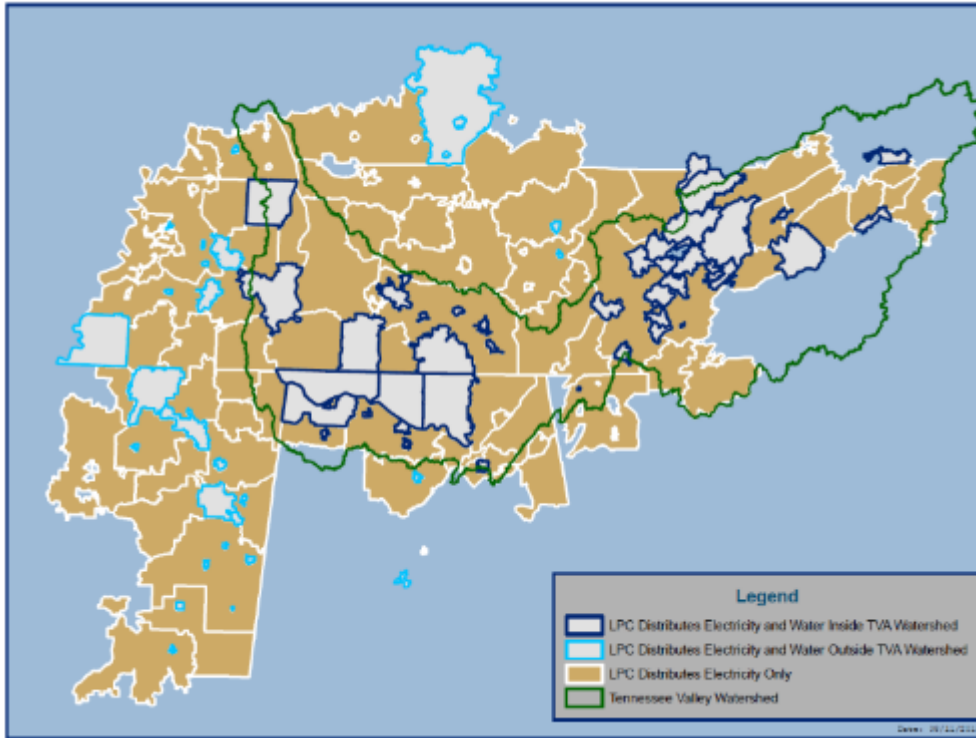
XXXXXX%



— Since 1939 —

- The TVA region provides very reliable water, but we haven't quantified just how reliable. Our study will:
- Determine the elevation at which each intake into a ***TVA-regulated*** water body dries up
- Determine the times that each intake would dry up
- Calculate statistics

Built-in Partnership

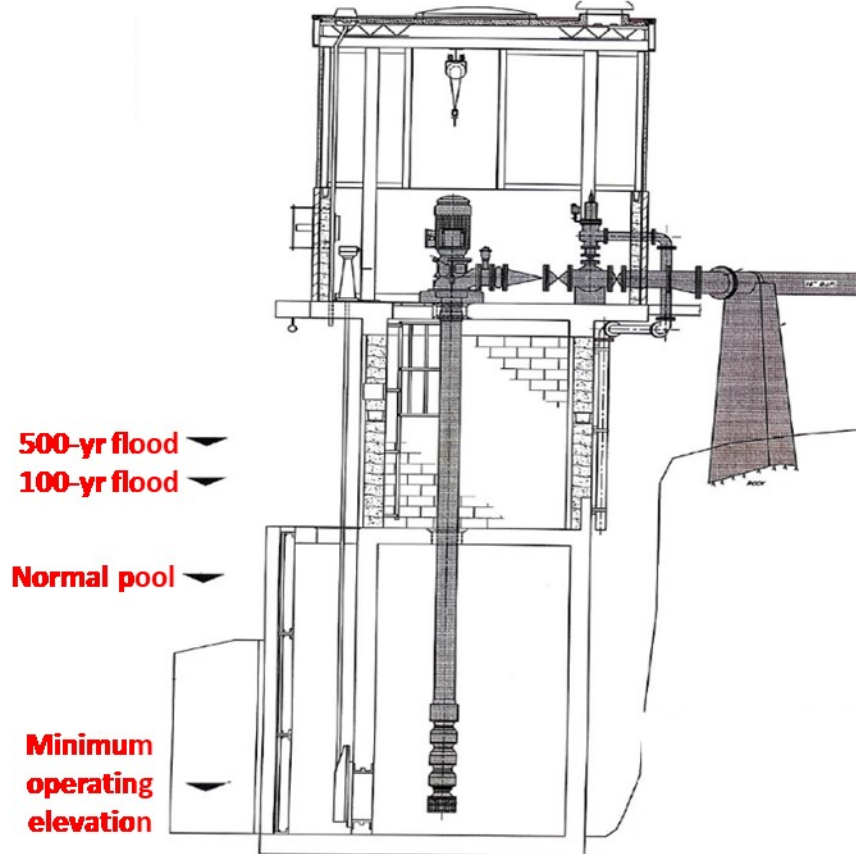


Some of our electricity distributors also distribute water

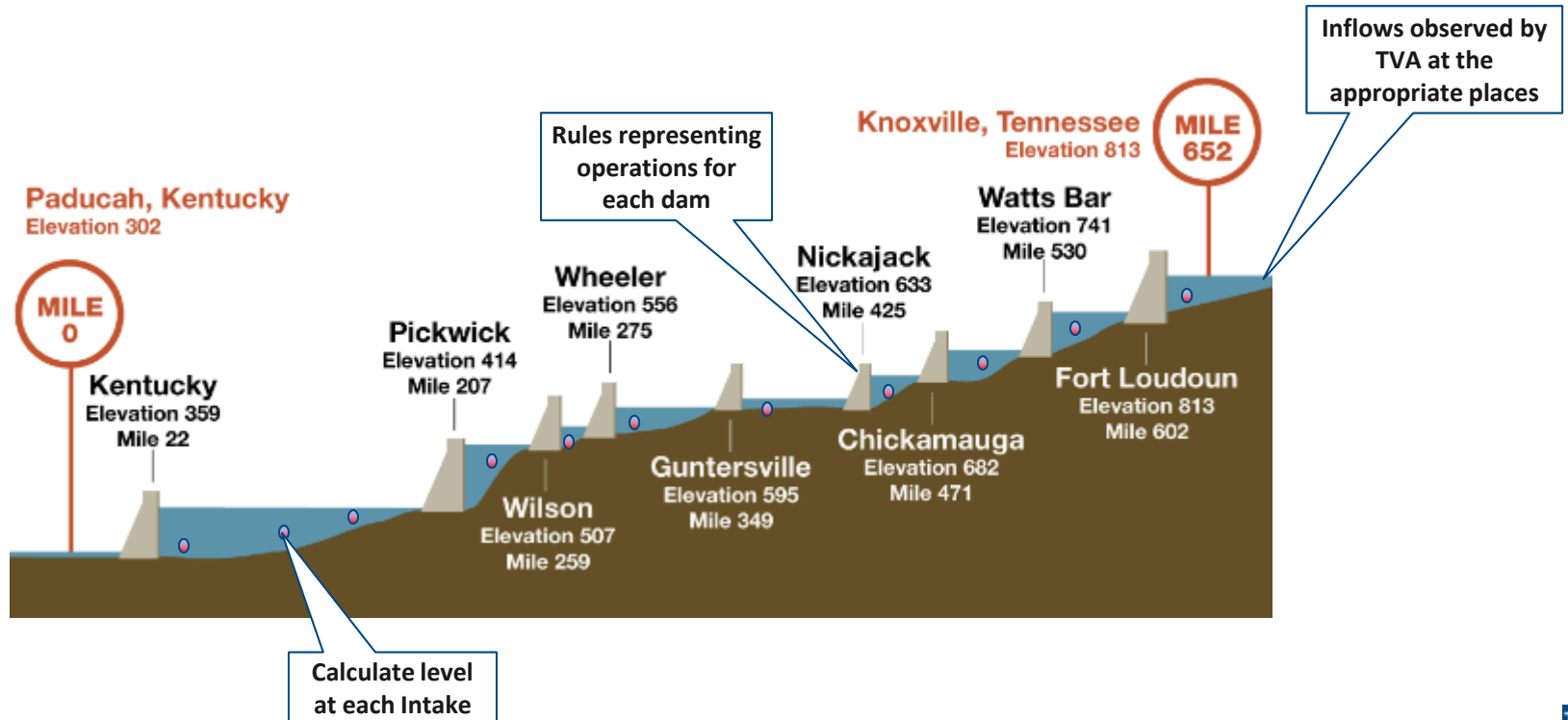
Map created by Darrell Jettison - BRG-RP3 - Kelly Jettison © GIS with data provided by Benchmark and Performance Analysts.



How Elevations were Compiled



Determining Each Intake's Reliability



Results: Good News & Bad News



Within the history of TVA, there have been no known droughts dry up any intakes on a ***TVA-controlled*** waterbody

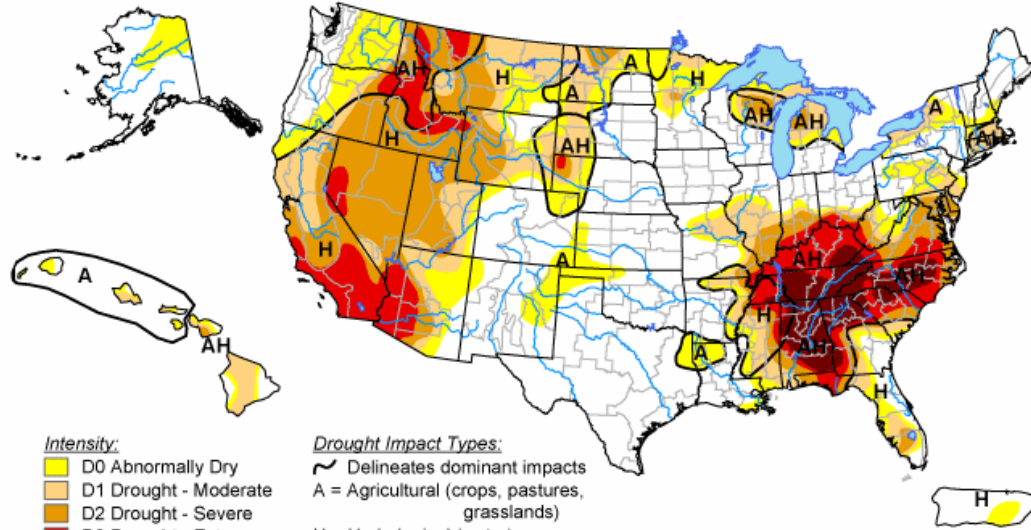
If you don't have any droughts to dry up an intake, then you can't ***calculate your reliability***



Our Most Recent Large Drought

U.S. Drought Monitor

October 16, 2007
Valid 8 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- ~ Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>



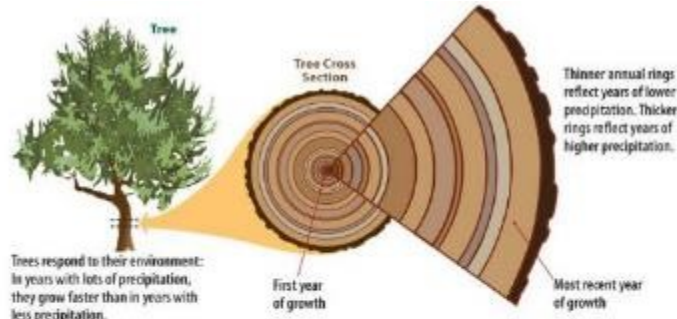
Released Thursday, October 18, 2007

Author: Mark Svoboda, National Drought Mitigation Center

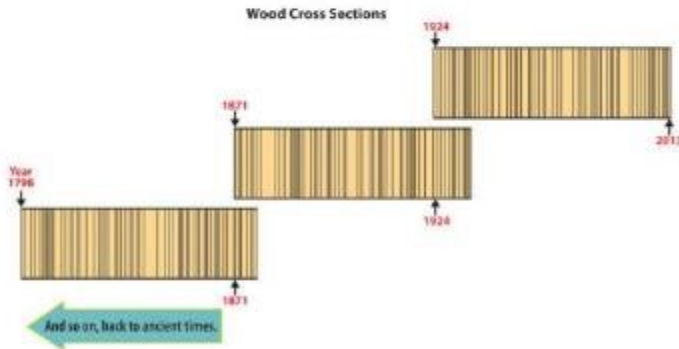
No intakes on a **TVA-controlled** waterbody went dry during the 2007 drought

<https://droughtmonitor.unl.edu/>

Looking for the Rarest Droughts

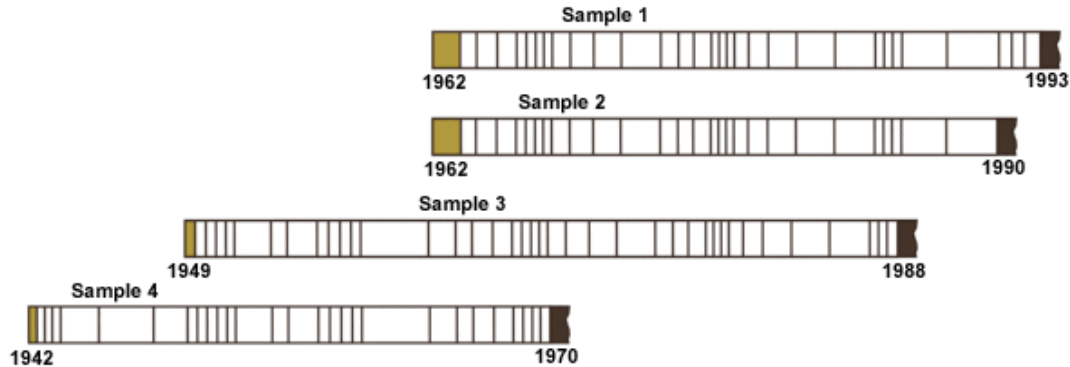
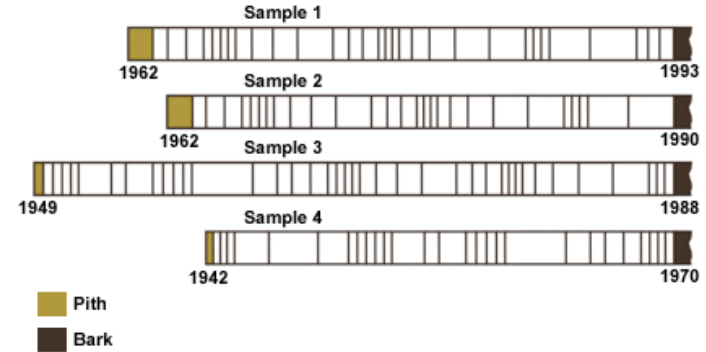


Scientists build tree-ring chronologies by starting with living trees and then finding progressively older specimens—including archaeological wood—whose outer rings overlap with the inner rings of more-recent specimens.



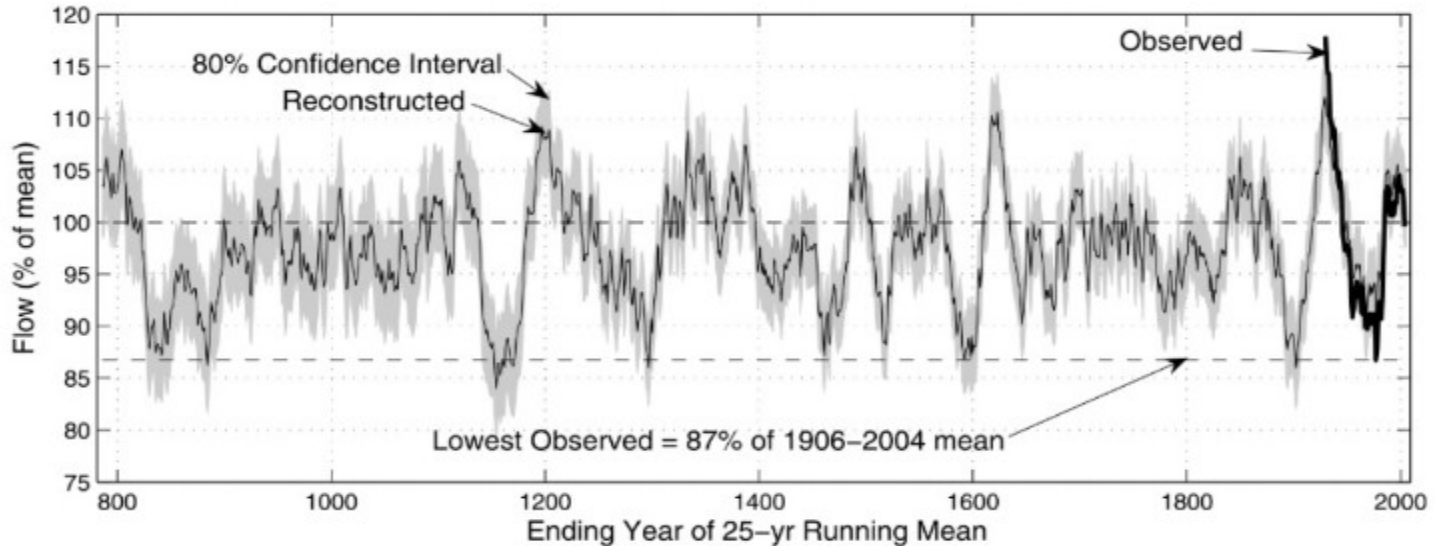
- TVA is embarking on a dendrochronology study using tree rings to quantify the largest droughts that have occurred in the region
- We will use a large set of very old trees to extend the drought record from 100 to ~600 years

How it works without Damaging Trees



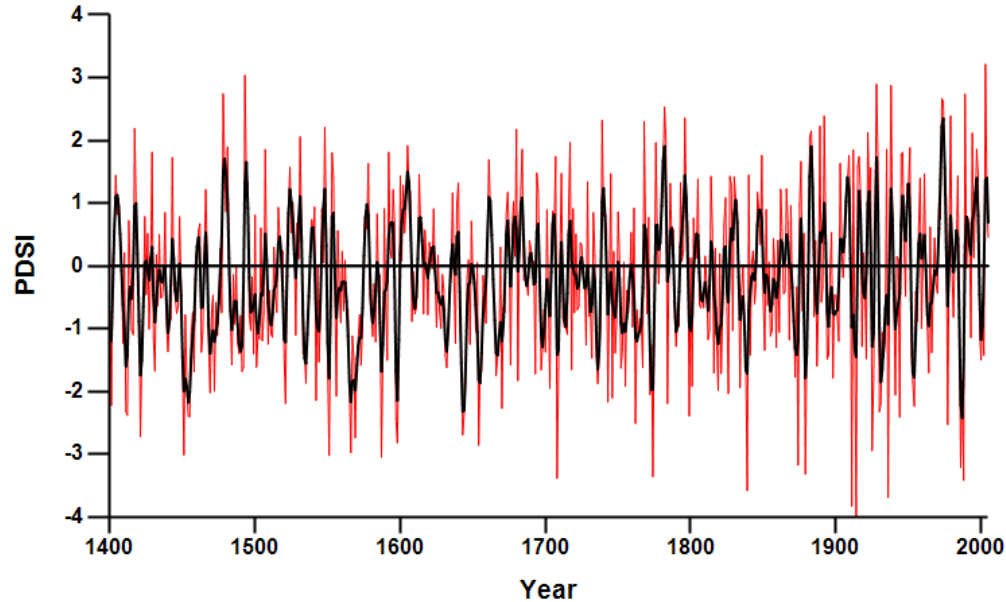
Example of Applied Dendro for the Colorado

MULTI-CENTURY RECONSTRUCTIONS OF COLORADO RIVER FLOW FROM TREE-RING WIDTHS



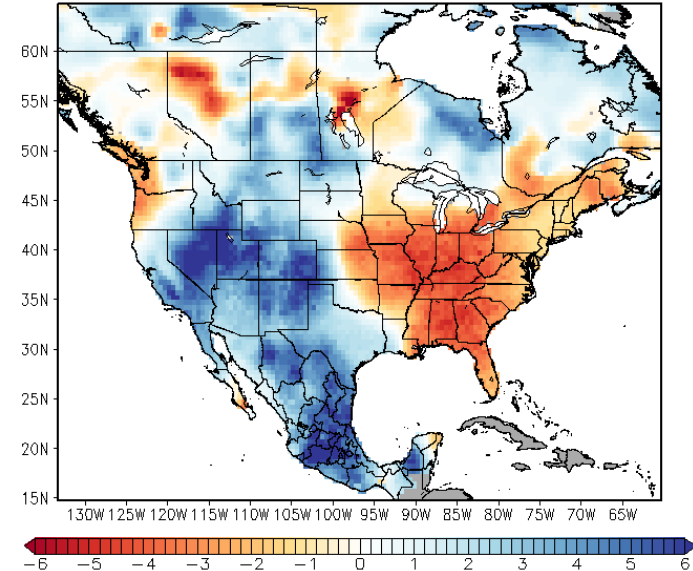
Example of Drought Reconstruction

Reconstructed JJA PDSI
1400 - 2005, 34.44°N - 37.38°N, 88.4°W - 80.77°W



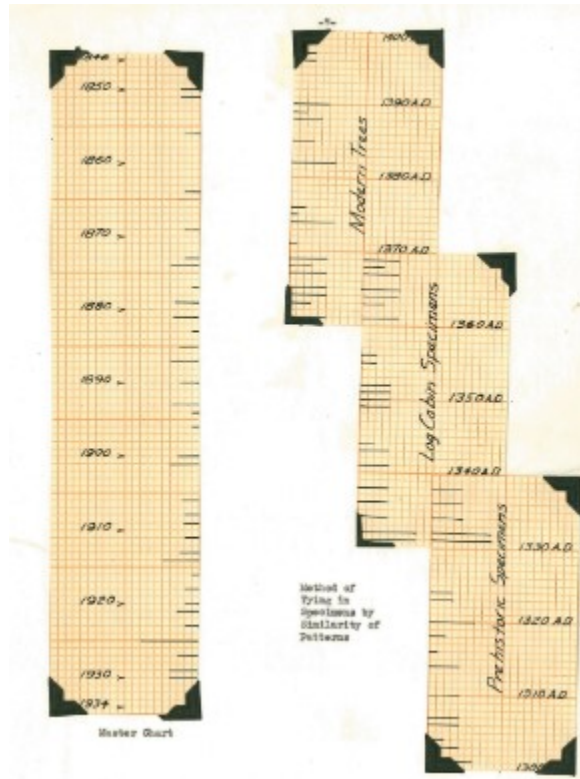
Reconstructed JJA PDSI

1914



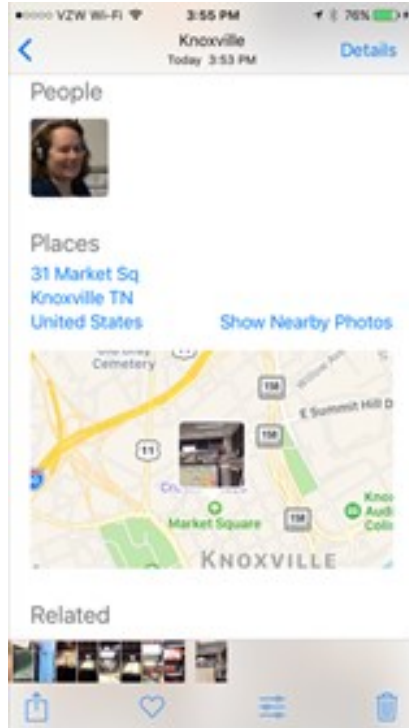
drought.memphis.edu

Interesting Find at the National Archives



- TVA sponsored groundbreaking dendrochronology work in the 1930s by Dr. Florence Hawley
- The samples are now held by UT

Citizen Science



- Cedars are the tree of choice, both for drought sensitivity and rot resistance
- TVA will soon sponsor a citizen-science initiative to photograph and geotag the oldest cedars in the Valley
- TVA's dendro and reliability work is being led by our next generation of women in science

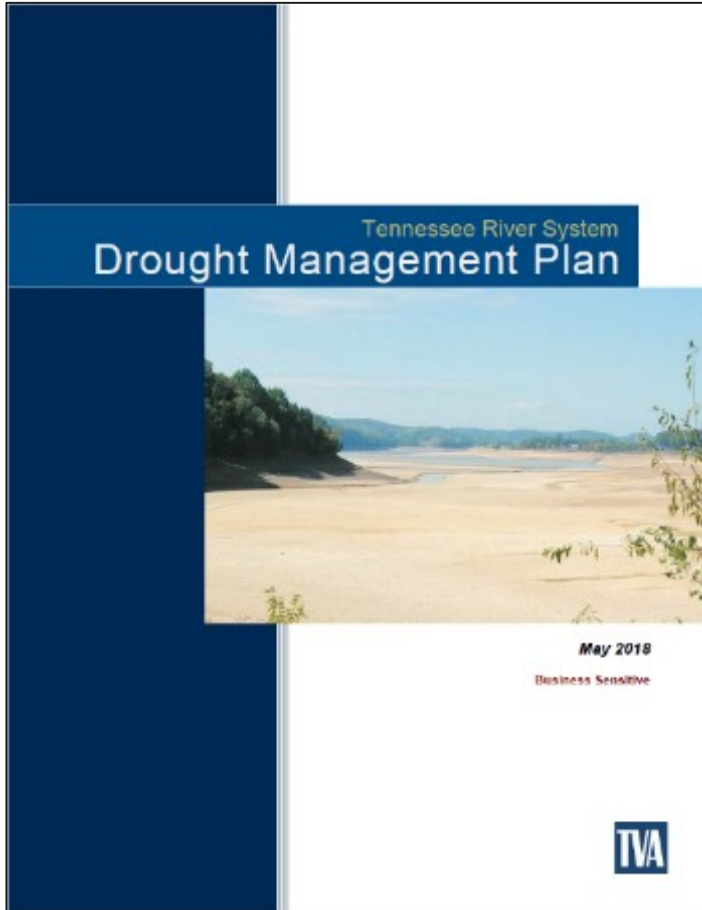


Pulling it All Together

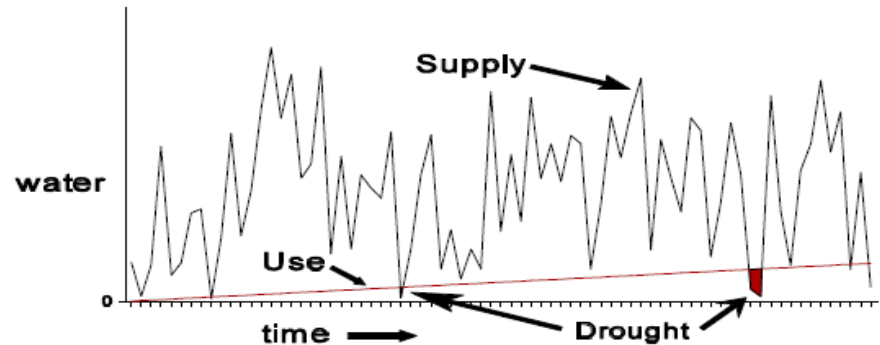
- Once the dendro is complete, then TVA will use the reconstructed inflows in the reservoir operating model
- Statistics for % time dry will be calculated
- Discussions with stakeholders can begin
- Further reliability improvements or additional water uses can be considered



Drought Management



- TVA has an agency drought management plan
- It focuses mostly on collaborative decision making, but is not very prescriptive



Reservoir Operating Policy

Navigation



Recreation



Water Quality



Water Supply



Flood-Damage
Reduction



Power
Generation

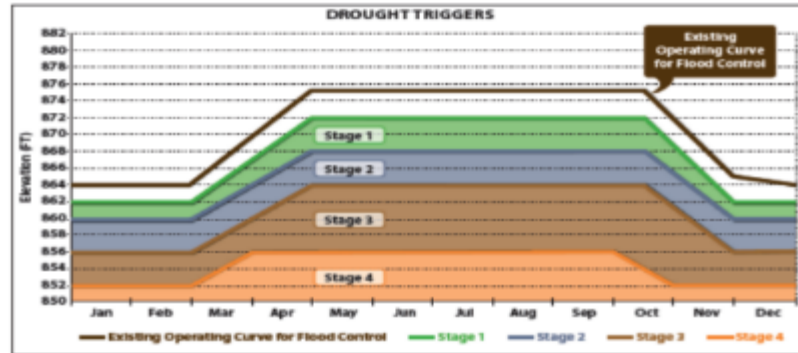


Operations dictated by

- **minimum-flows**
- **reservoir elevations**

These goals conflict during a drought

Case Study on the Duck River



DROUGHT TRIGGERS			
STAGE 1	STAGE 2	STAGE 3	STAGE 4
Drought Monitoring	Drought Alert	Drought Warning	Drought Emergency
<ul style="list-style-type: none"> Initiate Drought Monitoring 	<ul style="list-style-type: none"> Alert Drought Committee Initiate Public Awareness 	<ul style="list-style-type: none"> 10 cfs / week reduction of Shelbyville target (down to 120 cfs) 10% reduction of public water use 	<ul style="list-style-type: none"> 10 cfs / week reduction of Shelbyville target (down to 80 cfs) 20% reduction of public water use

A drought preparedness study goes beyond a simple determination of future resource conflicts; it serves as a motivator for conflict resolution. Without knowing your status quo future, you lack a basis for motivation. After all, if you don't know where you're going, why plan any changes?

--Richard Punnett (Corps of Engineers)

The tradeoffs between minimum ecological releases, and storing water for future use are being modelled.



Questions



Stewardship of TVA's Archaeological Collections

Erin Pritchard

November 5, 2018

History of TVA Archaeology

- TVA involved in archaeology since 1933
- Archaeological excavation work was part of New Deal initiatives
- Resulted in accumulation of very large archaeological collection
- No long term plan or permanent curation standards



Archaeological Site Management at TVA



- Recorded 11,500 archaeological sites across seven states with approximately 30-35% of land inventoried
- Responsible for the identification, management and protection of archaeological sites on all TVA
- Resources include Native American and early European sites
- Review approximately 1500 projects each year for impacts to sites

Relevant Laws and Regulations

- National Historic Preservation Act of 1966 (NHPA)
- Archaeological Resource Protection Act of 1979 (ARPA)
- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)
- 36CFR79: Curation of Federally-Owned and Administered Archaeological Collections
- National Environmental Policy Act of 1969
- Executive Order 13287 - Preserve America (2003)
- White House Memorandum Dated April 29, 1994 - Government-to-Government Relations with Native American Tribal Governments
- Executive Order 13175 - Consultation and Coordination with Indian Tribal Governments (2000)
- American Indian Religious Freedom Act of 1978

Native American Graves Protection and Repatriation Program

- NAGPRA provides for the protection of Native American cultural items, and establishes a process for the authorized removal of human remains, funerary objects, sacred objects, and objects of cultural patrimony from sites located on lands owned or controlled by the Federal Government and subsequent return of these cultural items to federally recognized Indian Tribes.
- TVA has a significant amount of NAGPRA cultural items curated in several museums in the southeast that were excavated prior to 1990. We are working closely with the Universities, museums and Tribes to return these remains and funerary objects to the appropriate Tribes.

Curation of Federally-Owned and Administered Archaeological Collections

- Responsibility for Federal Collections
- Procedures and guidelines to manage and preserve collections
- Recommendations for developing contracts with repositories for curatorial services
- Standards to determine when a repository is appropriate
- Guidelines for collections access, loan and use

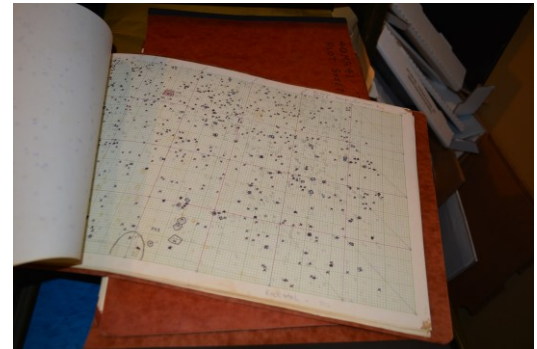
Previous Conditions at Alabama



Curation Improvement Initiative



Current Conditions at UT



McClung Museum of Natural History and Culture



- Houses TVA Collections
- Native American Exhibit with TVA artifacts
- Active research on TVA collections
- Beginning NAGPRA Repatriation in FY19

Path Forward

University of Alabama

- Completion of NAGPRA repatriation
- Complete legacy collections improvement project
- Complete other collections improvement projects

University of Tennessee

- Prioritize curation needs
- Initiate Repatriation of NAGPRA items this fiscal year

Review other Repositories

Collections Consolidation

Questions?



Wrap up and Adjourn

- Field trips bus location
- Breakfast at your hotel



Lunch Break

Meeting Adjourned for Today

Meeting will reconvene tomorrow, 11/6, at 8:30 AM



Regional Resource Stewardship Council

November 6, 2018
Knoxville, Tennessee

A black and white photograph of the word "welcome" written in a cursive script on a wooden plank background. The image is framed by a white border and a black outer border.

welcome

Agenda – November 6, 2018

- | | | |
|--------------|--|---------------------|
| 8:30 | Welcome and Recap | JoAnne, Facilitator |
| 8:35 | Council Discussion / Form Advice | Council |
| 9:25 | Prepare for Public Comment Period | |
| 9:30 | Public Comment Session | JoAnne |
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| 11:30 | DFO Update | Amy Henry |
| 11:45 | Wrap Up | Amy |
| 12:00 | Adjourn | JoAnne |
- (lunch available for Council Members)

Day 1 Recap

- Programmatic agreements
- Water reliability study
- Cultural collection management



RRSC Discussion

Council Advice Discussion

How can TVA best engage water utilities, industry, regulatory and other affected stakeholders in using the information from our water supply reliability study to enhance economic development and drought preparedness in the TVA region?



Break

Prepare for Public Comment Period

Public Comment Period

- **Public participation is appreciated**
- **This is a listening session; responses are typically not provided**



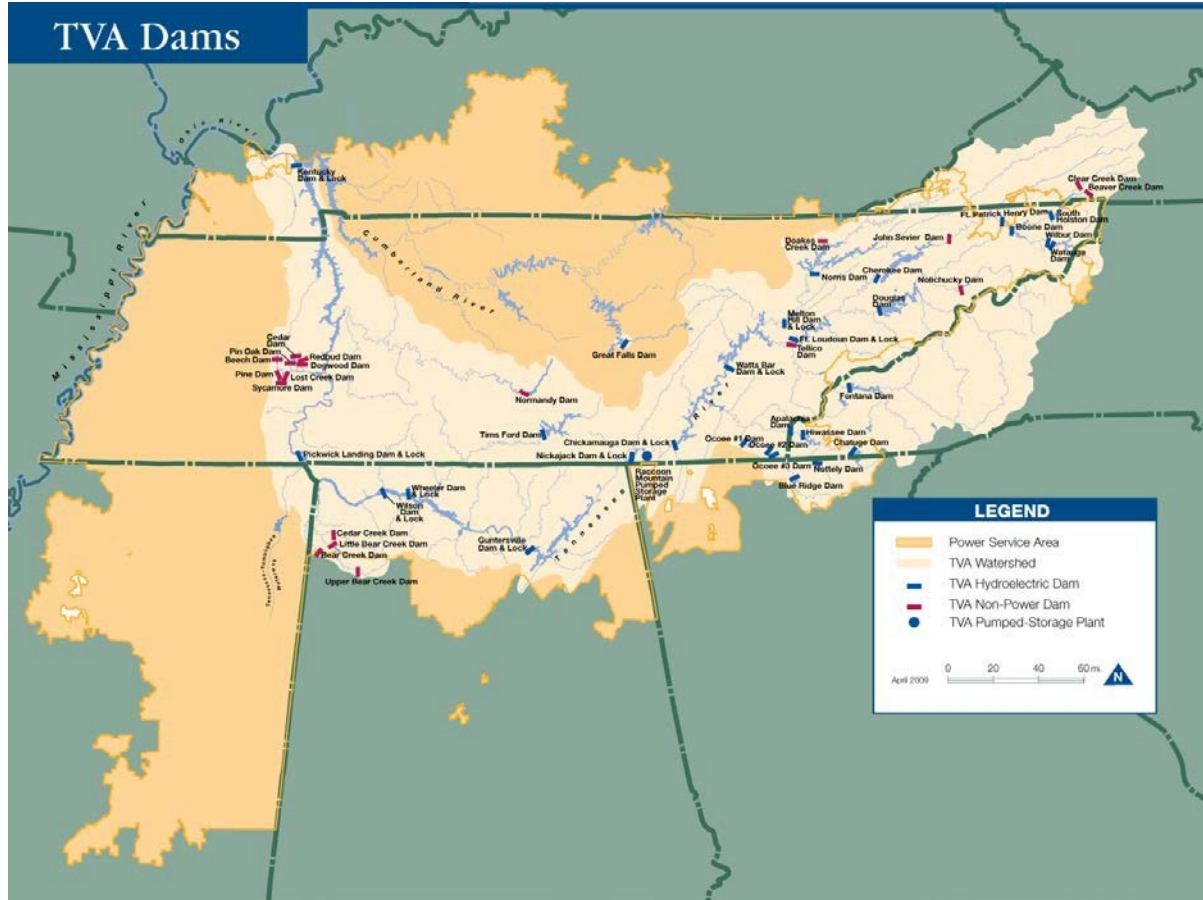


River Management Updates

Tom Barnett

General Manager, River Management

Tennessee River System and Watershed



River Management Focus Areas

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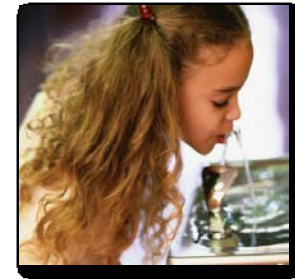
Our integrated operations provide multiple benefits to the people of the Valley



Flood Damage Reduction



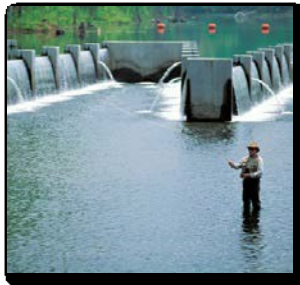
Power Generation



Water Supply



Navigation



Water Quality



Recreation

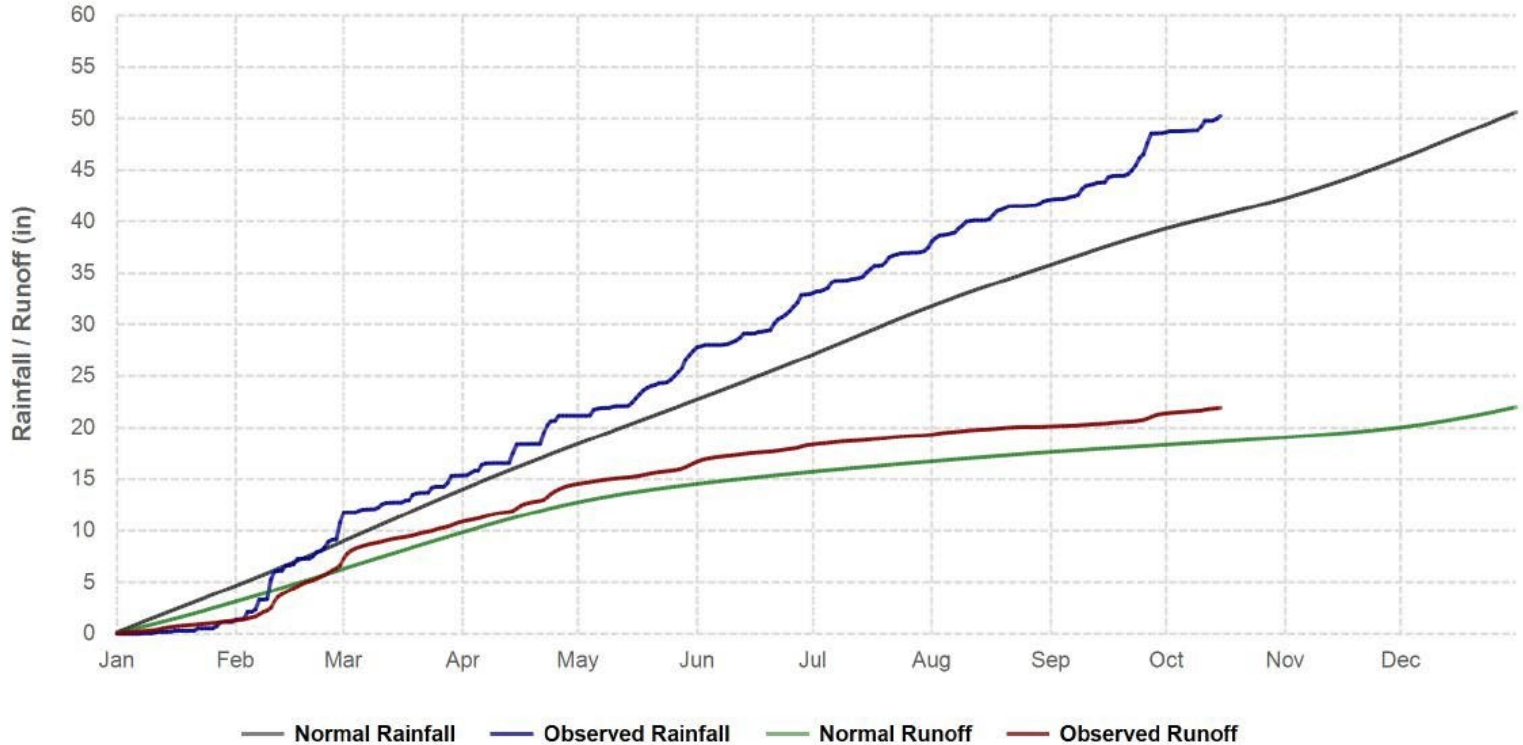
Flood Control



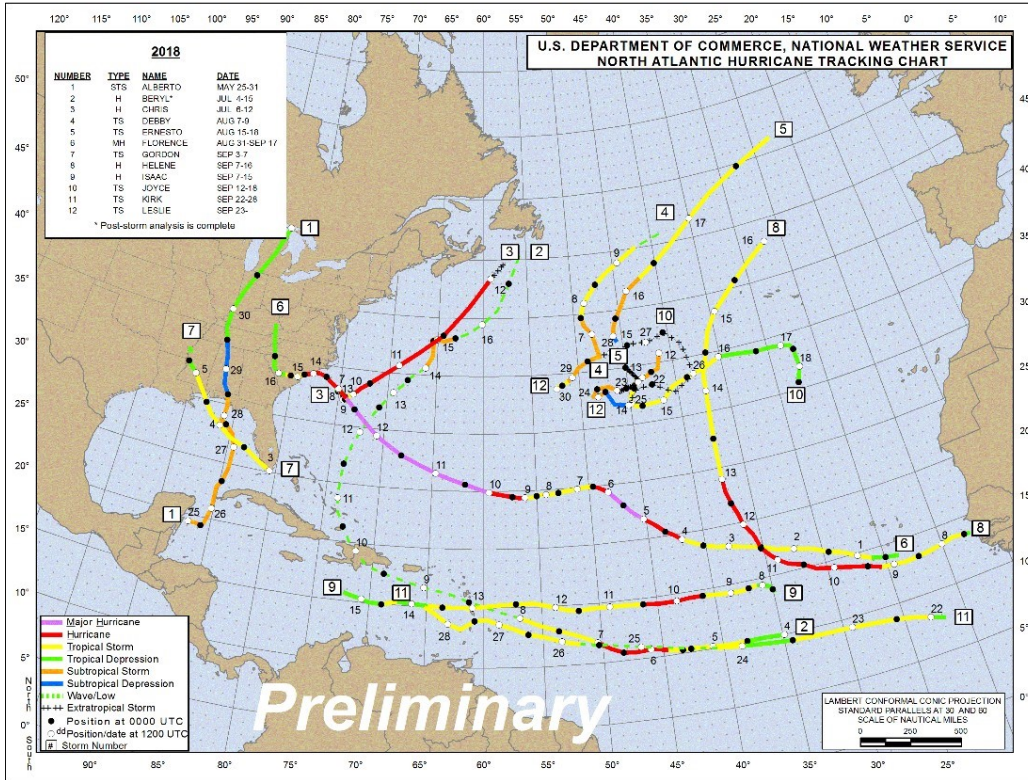
- Use tributary dams to store water during flood to reduce downstream flooding
- TVA's River Forecast Center issues flood forecasts for major areas along the Tennessee River through partnerships with the National Weather Service
- Release water at non-flood rate once levels below dams have receded
- Annual average flood damages averted are \$250 million (\$6.9 billion to date)
- Additional \$17M averted on the Ohio and Mississippi Rivers

Rainfall and Runoff

Rainfall - Runoff Cumulative CYTD 2018



2018 Atlantic Hurricane Season



- Tropical Depression Alberto – Memorial Day weekend
- Tropical Depression Florence – mid September
- Tropical Depression Michael – early October

2018 Notable Tributary Spill



Spilling at Fontana
Ahead of Hurricane
Florence



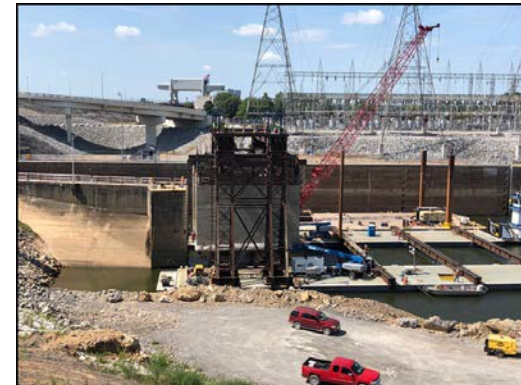
Cherokee Spilling for
the First Time Since
1994



Record Spill at Chatuge
Associated with Hurricane Alberto

Navigation - Kentucky Lock FY18 Highlights

- Awarded the \$55M Downstream Lock Excavation contract before the end of September
- Awarded the \$4M Site, Demolition, and Utilities contract in January
- Significant progress in the \$66M Downstream Cofferdam contract – including 2 out of 10 shell sets



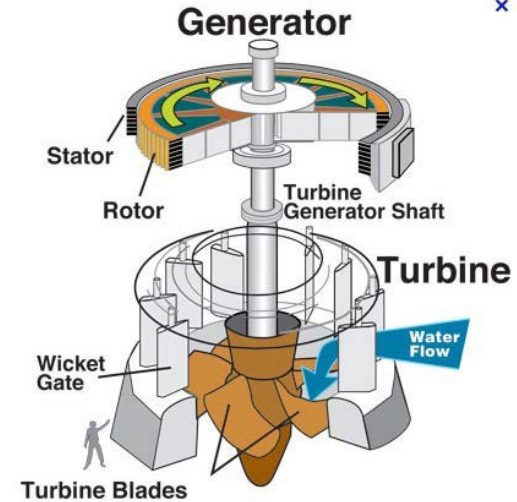
Navigation - Chickamauga Lock FY18 Highlights

- Completed ~80% of the Lock Excavation contract
- Awarded the \$240M Lock Chamber contract in September
- Developed Post Authorization Change Report - \$758M cost estimate exceeds original \$481M authorization



Power

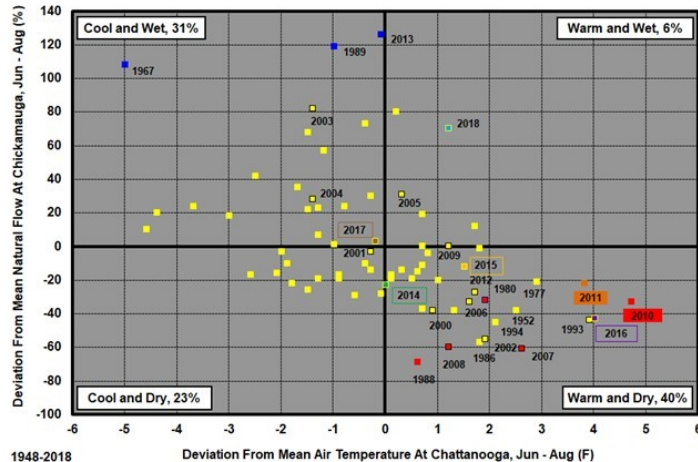
- 3,538 MW Conv. generating capacity (109 Units)
- 1,653 MW Pump-storage capacity (4 units)
- Peaking power demand
- Rapid Dispatch and Flexibility
- ~ 10% of TVA's energy portfolio
- Low O&M Costs
- Used to displace more expensive fuels
- Water temperature support at thermal generating plants



Water Quality / Power – Summer 2018 Hydrothermal Highlights

River & Climate Conditions

- High flow, 1.5°F above average air temperature
- High flow used up cold water in storage
- No severe hydrothermal challenges
- BFN brushed up against its downstream temperature limit in late July



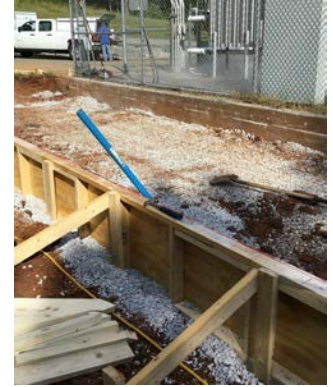
Hydrothermal Forecasting

- Delft 3D models implemented in FEWS for all nuclear plants, running in parallel with existing models
- Model performance appears to be good for WBN and SQN, still calibrating BFN
- Additional interactions to tweak solar radiation absorption were added to FEWS because of BFN issues (model was consistently cool)
- Enhanced spatial graphics added to FEWS for D3D model
- 3 coal models were upgraded to Ce-Qual-W2 version 4.0
 - Kingston, Bull Run and Cumberland models were all upgraded
 - Implemented first sloped reach Ce-Qual model for Norris tailwater to Clinton

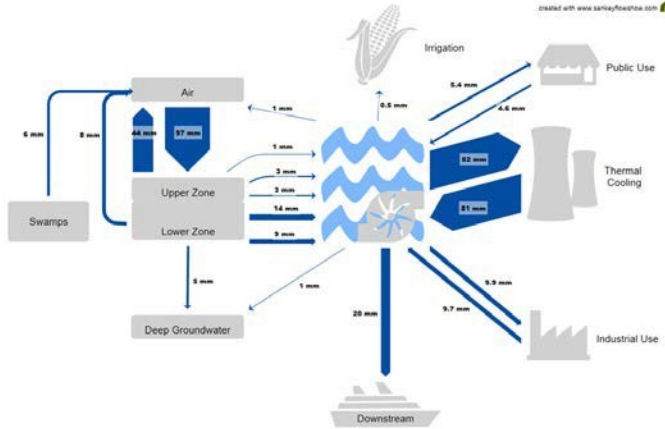
Water Quality - 2018 Aeration Highlights

- Watts Bar Hydro – Completed diffuser line construction project; installed a new power feed from the lock to the LOX pad.
- Hiwassee Hydro - Completed diffuser line construction project.
- Cherokee Hydro - Initiated diffuser line construction project.
- Douglas Hydro – Completed Design phase and initiated Implementation phase of the LOX pad upgrade project; completed major surface water mixer maintenance.
- Purchased replacement work boats for diffuser line construction.

ROS Indicator ~99.5%



Water Supply – TN Valley Water Balance



Why?

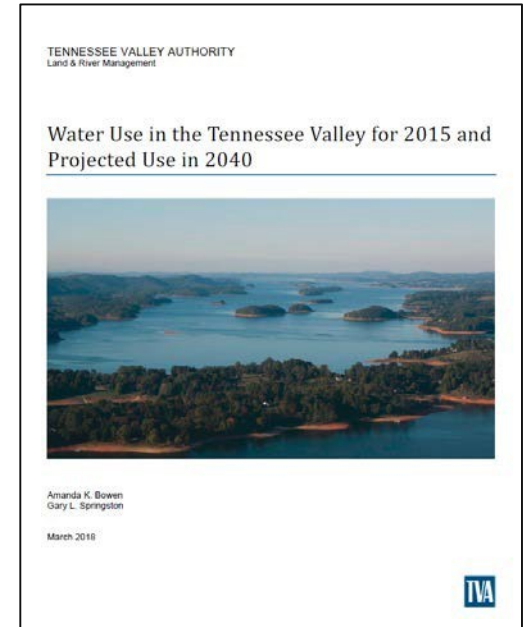
The TN H2O plan is beginning to explore the overall picture for water in the state

What?

An overall water balance for the TN Valley was created

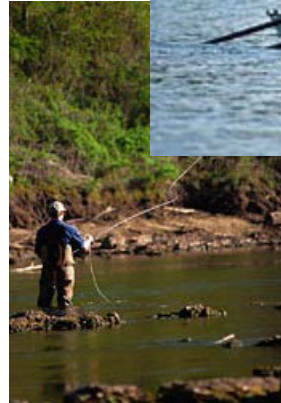
How?

Combining the water withdrawal and return data from the latest TVA report, along with the hydrologic data from calibration of TVA's new hydrology model



Recreation

- 230 Commercial Marinas
- 260 Campgrounds
- Drawdown restricted June 1 – Labor to provide higher summer lake levels
- Numerous tailwater releases to support trout fishing, whitewater rafting and drift-boating
- Economic Boost
- Stakeholder Involvement
- Special flows and elevations to support community events (>200)
- Ocoee Contract



Dam Safety Support – Flood Hazard Analyses

Why?

TVA Dam Safety has improved processes such that investments are prioritized by risk.

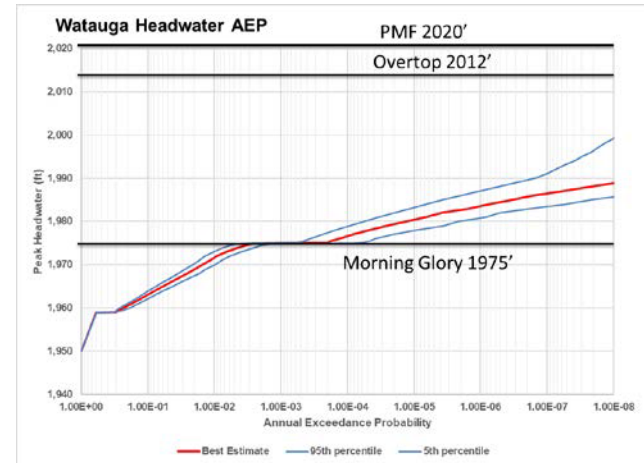
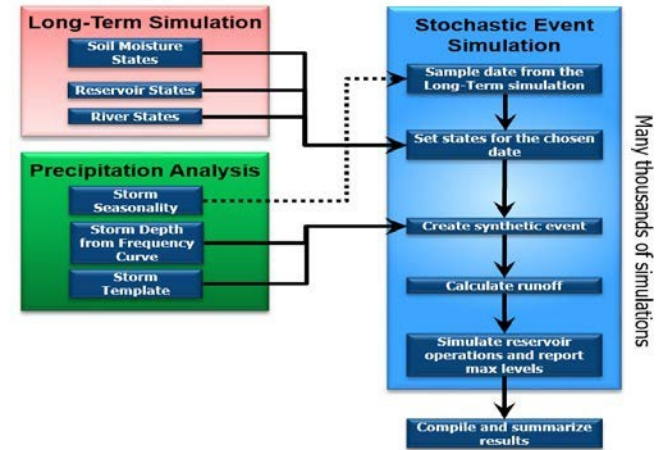
Much of the risk is driven by the *likelihood* of floods

What?

15 studies calculating flood likelihood to extreme levels have been performed.

How?

Utilizing a combined statistical, meteorological, hydrological and decision modelling system running on a high performance computer.



Dam Safety Support – Dambreak Consequence Analyses

Why?

TVA Dam Safety has improved processes such that investments are prioritized by risk.

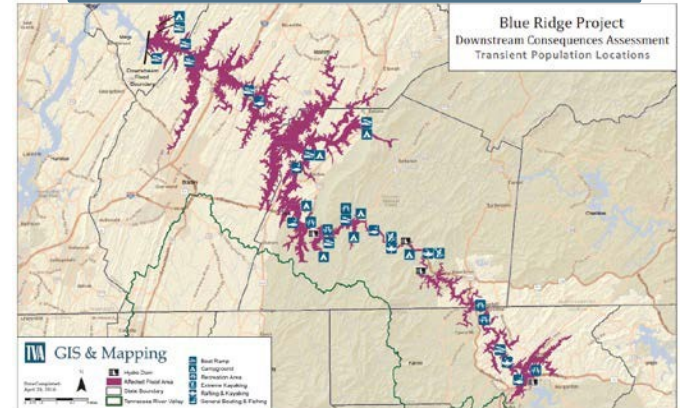
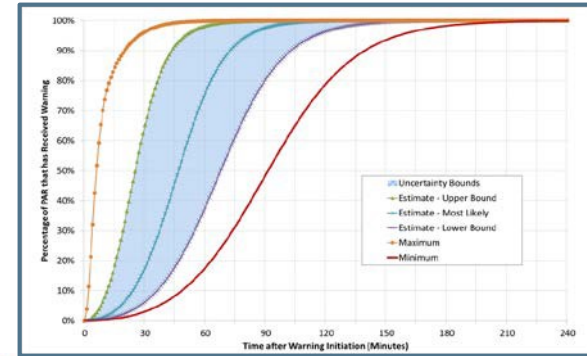
Much of the risk is driven by the *consequences* of unlikely hypothetical dambreaks

What?

18 studies calculating dambreak consequences have been performed.

How?

Utilizing GIS representations of population, hydraulic models of floodwaves and impact models of evacuation.



Stakeholder Outreach

- Tennessee Valley Water Partnership
- Direct stakeholder outreach to Trout Unlimited during long term hydro unit outages
- Conducted 69 educational tours of the River Forecast Center, including over 500 visitors
- Participation in community outreach programs, STEM, Robotics, Sequoyah Community Day, etc.
- Coordination of operations for the completion of the Olmsted Lock and Dam on the Ohio River
- Hundreds of media interviews across the Valley
- Over 1M Facebook Impressions from Hurricane Florence updates, averaging 60k+ users per day
- Enhanced coordination with external partners like Eastman, TN Valley Farmers, Navigation Industry, Ocoee Rafting, etc.



Social Media

Tennessee Valley Authority
Published by Hootsuite [?] · September 12 · 🌐

We're getting ready for Florence! To create flood storage we are now spilling excess water at Ft. Loudoun, Chickamauga, Nickajack, Guntersville, and Pickwick on the main stem Tennessee River. We are also spilling at Cherokee, Ft. Patrick Henry, and Apalachia. Other dams are releasing water using their generating turbines or low-level sluice gates. It's the first time since 1994 we've had to use the spillways at Cherokee.



278,485
People Reached

9,901
Engagements

56,264
Clicks

Boost Post

Tennessee Valley Authority
Published by Hootsuite [?] · September 12 · 🌐

Water levels at all TVA lakes are now being lowered faster than normal to create flood storage as we anticipate heavy rainfall from #Florence. When the remnants of the storm arrives, the plan is to reduce releases from the tributary reservoirs to minimize downstream impacts.



Hurricane Florence
Wednesday September 12, 2018
11 AM EDT Advisory 53
NWS National Hurricane Center

Current information: x
Center location: 29.8 N 71.2 W
Maximum sustained wind 130 mph
Movement NW at 15 mph

Forecast positions:
● Tropical Cyclone ○ Possible Potential TC
Sustained winds: D < 39 mph
S 39-73 mph H 74-110 mph M > 110 mph

Potential track area: Day 1-3 Day 4-5
Watches: Hurricane Trap. Strm
Warnings: Hurricane Trap Strm
Current wind extent: Hurricane Trap Strm

107,635
People Reached

2,891
Engagements

15,649
Clicks

Boost Post

River Management Tweets are typically above the national average engagement rate on Twitter

TVA TN Valley Authority @TVANews · May 30
Fontana Lake is currently four feet above normal summer pool level because of heavy rainfall in the area. We are releasing water through the spillway tunnel to bring the reservoir back down to normal summer pool.
pic.twitter.com/J2Sr304Gez
View Tweet activity

15,654 Impressions; 1,381 Engagements;
8.8% Engagement rate
(national average between 0.09% - 0.33%)

Calendar year-to-date posts about River Management on Facebook has reached about 1.9M people

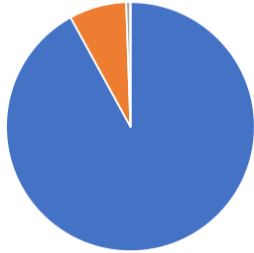
Hydro Facility Tours

- Hosted tours across the Tennessee Valley
 - Norris
 - Chickamauga
 - Wilson
 - Kentucky
 - Guntersville
 - Raccoon Mountain
- 22 tours
- About 500 people



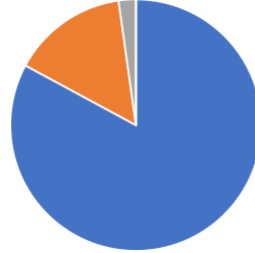
Hydro Facility Tours - Feedback

How likely are you to recommend the tour to others?



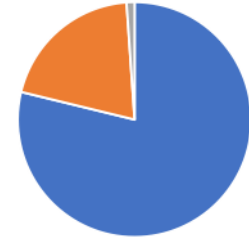
■ Very likely ■ Somewhat likely ■ Not very likely ■ Not at all likely

How likely would you be to visit other TVA facilities?



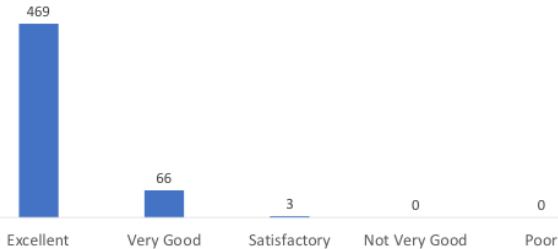
■ Very likely ■ Somewhat likely ■ Not very likely ■ Not at all likely

Did your visit today help you better understand how TVA serves the Tennessee Valley?

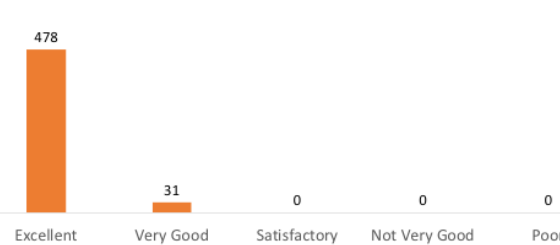


■ I learned a lot
■ I know more than when I started
■ I know about the same

Please rate your experience with us:



Please rate your tour guides' effort in telling you about TVA and the dam?





Questions?



Finalize Sentiment Statement

Council Advice Discussion

How can TVA best engage water utilities, industry, regulatory and other affected stakeholders to use the information from our water supply reliability work to enhance economic development and drought preparedness in the region?



TVA Natural Resources Update

November 6, 2018

Bucky Edmondson, Natural Resources

Natural Resources Focus Areas

**Reservoir
Lands
Planning**

**Section 26a
& Land Use
Agreements**

**Public Land
Protection**

**Land &
Habitat
Stewardship**

**Nuisance &
Invasive
Species
Management**

**Cultural
Resource
Management**

**Water
Resource
Stewardship**

Recreation

Ecotourism

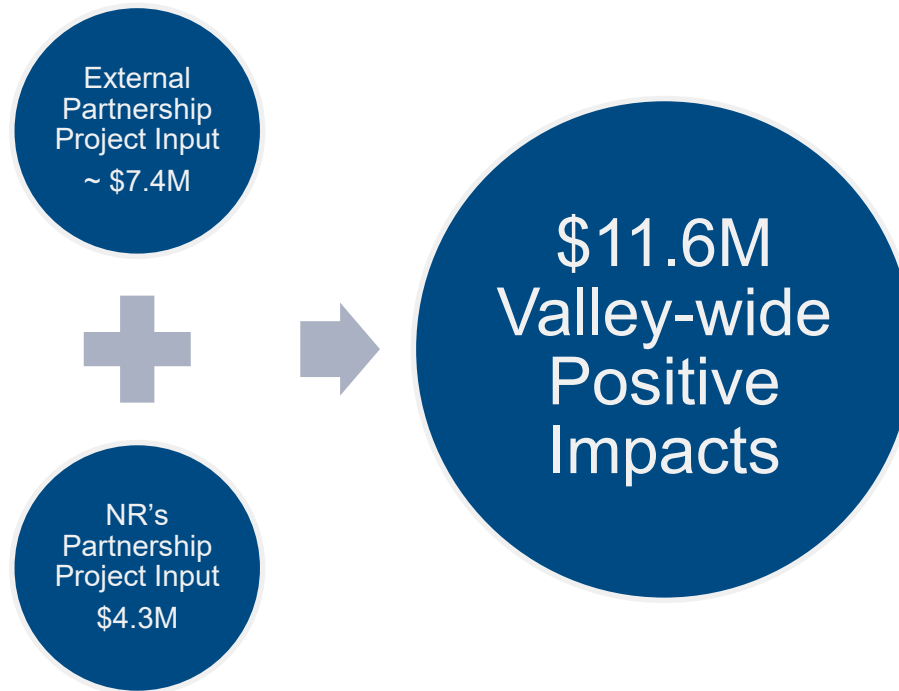
**Public
Outreach &
Information**

FY18 Year End Summary

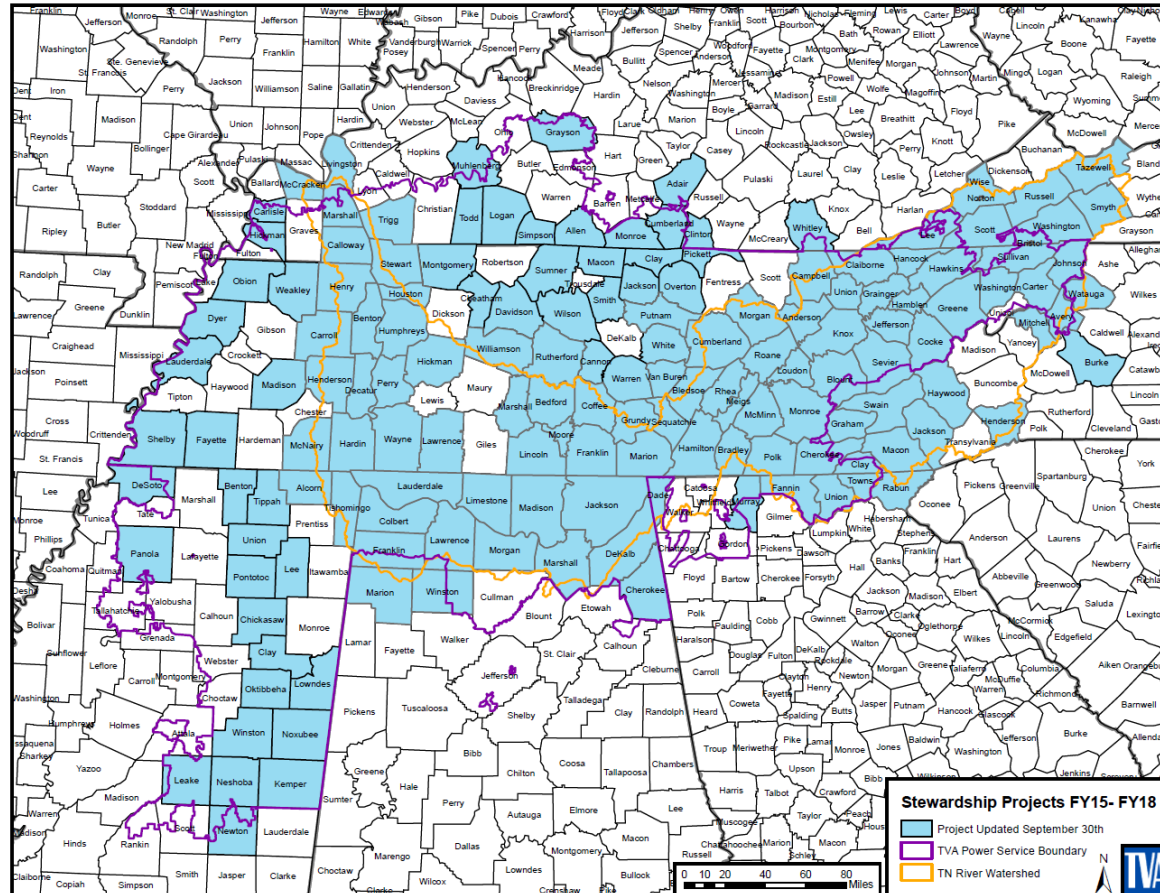
- 347 stewardship projects implemented in 108 counties
- 121 recreation projects to expand opportunities and increase tourism
- 45 cleanups in 40 counties supported to result in 140 tons removed from lakes and public lands
- 10,500 children engaged through environmental education programs including TVA Science Kids World Water Monitoring program
- 1,500 26a permits issued and 30 land use actions implemented to support lake access and economic development



Power of Partnerships in FY18



Counties Reached Through Stewardship Efforts



Natural Resources Plan Update

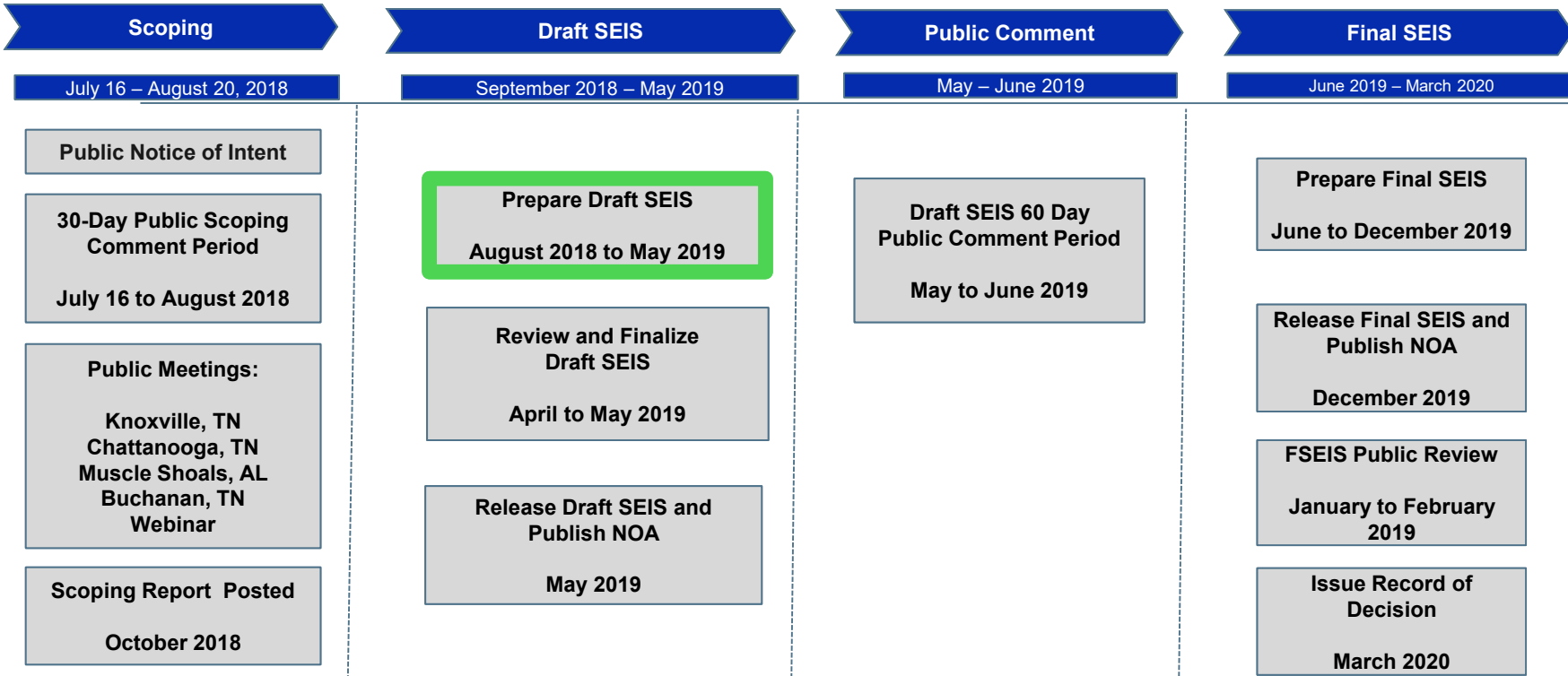
Completed public scoping period and scoping report

- Hosted 4 public open houses and a webinar
- Used web and social media platforms to inform and solicit comments
- Received 29 comments related to:



Aquatic Vegetation	River operations	Prescribed fire
Silver Carp	Trails	Economic development
Nuisance and invasive plants	Recreation partnerships	Boundary marking
Section 26a applications	Dispersed recreation	Violations and encroachments
Land use	Ecotourism	Preserving public lands
Reservoir lands planning	Shoreline erosion	Public outreach
Forest and habitat management		

2020 NRP Update Schedule

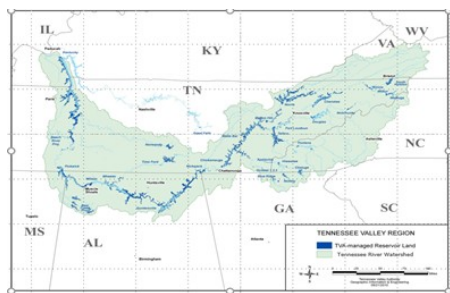


Please note the schedule is subject to change.

Public Land Protection Policy

The TVA Board approved the Public Land Protection Policy on August 22, 2018 reinforcing TVA's commitment to protect public and resources on the TVA reservoir system. These public lands and resources are what helps make the Tennessee Valley an attractive place to live, work, and play.

The Public Land Protection Policy complements the TVA Land Policy which describes the importance of TVA public land and TVA's intention to manage it wisely for present and future generations.



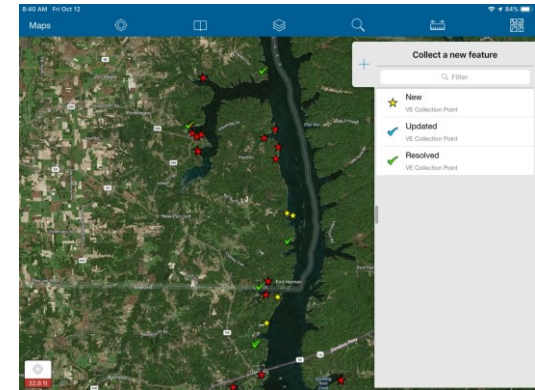
Public Land Protection Policy Advice

RRSC provided valuable input on:

- | | |
|--------------------------------|-----------------------|
| • Overall strategy | • Public engagement |
| • Incorporate technology tools | • Regulatory guidance |

Specifically we:

- Expand efforts in outreach
- Violation and encroachment resolution and prevention tools
- Continue boundary marking and assessments on a strategic schedule incorporating GIS aspects
- Benchmark other agencies which manage public lands



Asset Maintenance and Inventory

FY18 Accomplishments

- 1,585 parcels assessed on 25 reservoirs
- 1,435 parcels assessed had no assets
- 2,952 assets collected/assessed on the remaining 150 parcels
- Developed the Natural Resource Maintenance and Inventory guideline

FY19 Goals

- Assess 2,353 parcels on 24 reservoirs
- Utilize FY18 assessment data to determine future improvement projects



Floating Cabin Program

- Phase 1 Rules effective October 1, 2018
- Draft Phase 2 Rules to be published this Fall
 - Electrical, wastewater, flotation, compliance fees and mooring
 - Permitting, rebuilds, size criteria, locations, transfers, etc.
- Stakeholder Review Team consensus except on:
 - Compliance fees and structure conversions (enclosing open spaces)



Trout Partnership

- Partnered with the US Fish and Wildlife Service, Tennessee Wildlife Resources Agency and Georgia Department of Natural Resources
- Renewed a three year contract to fund the operations of three national fish hatcheries: Erin, Dale Hollow and Chattahoochee
- Stocked approximately 1 million trout in 21 TVA reservoirs and tailwaters





DFO Briefing

Amy Henry, Senior Manager, Enterprise Relations and Innovation
Designated Federal Officer Alternate

TVA UPDATE

- Board approved \$5.5 B budget
 - Reduced debt by \$1.6 B in 5 years
- Executive Management changes
- 2018 Economic Development
 - 54,000 jobs created or retained
 - \$10.2 B in capital investment
- IRP 2019
- Facebook solar

The infographic features a central circular diagram with 'LOCAL POWER COMPANY' and the 'TVA' logo at its core. Surrounding this center are various energy sources and consumer categories, each represented by an icon and a label. On the left side, in red circles, are 'ELECTRIC VEHICLES', 'MANUFACTURING', 'PUBLIC FACILITIES', 'HOSPITALS', 'CITIES', and 'HOMES/HOMEOWNERS'. On the right side, in green circles, are 'NUCLEAR', 'NATURAL GAS', 'HYDROPOWER', 'BIOMASS', 'COAL', 'SOLAR', and 'WIND'. Dotted lines connect the central power company to the consumer categories, and dashed lines connect the power company to the energy sources. The entire graphic is set against a dark blue background.

Powering OUR Future

CLICK TO LEARN MORE ABOUT THE
2019 INTEGRATED RESOURCE PLAN



Wrap Up and Adjourn



Thank you and please travel safely!