



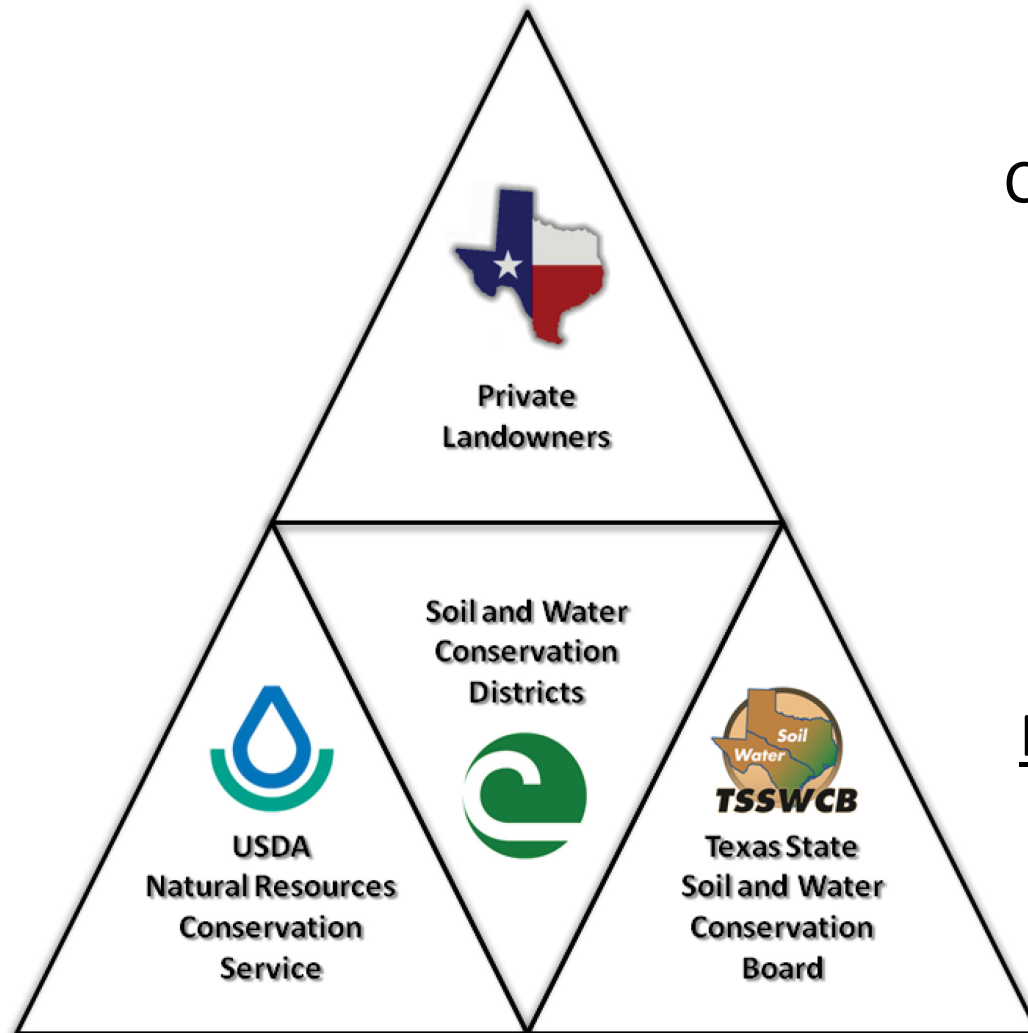
Water Supply Enhancement Program: Increasing Available Surface and Ground Water Through Brush Control

Aaron Wendt
Texas State Soil and Water Conservation Board

Water Conservation Advisory Council

October 22, 2014
Austin, TX

Texas Conservation Partnership



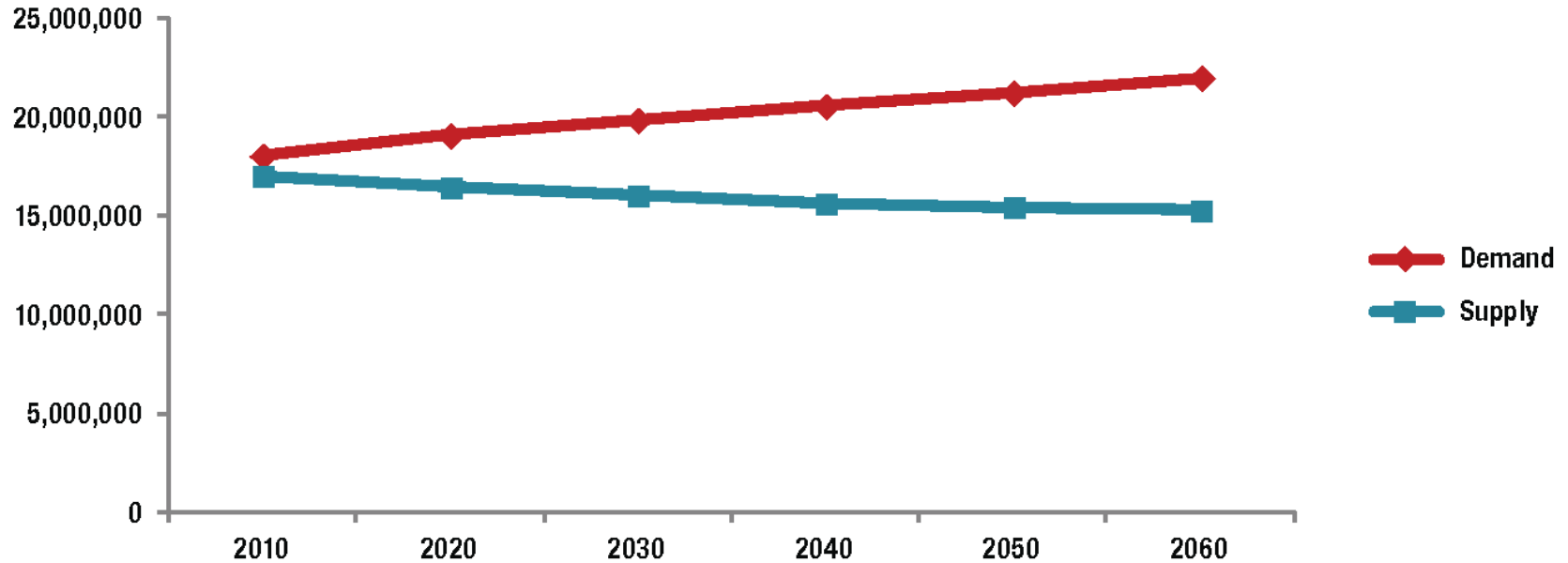
Providing
Conservation Assistance
to Private Landowners
for 75 Years

LOCAL = 216 SWCDs

STATE = TSSWCB

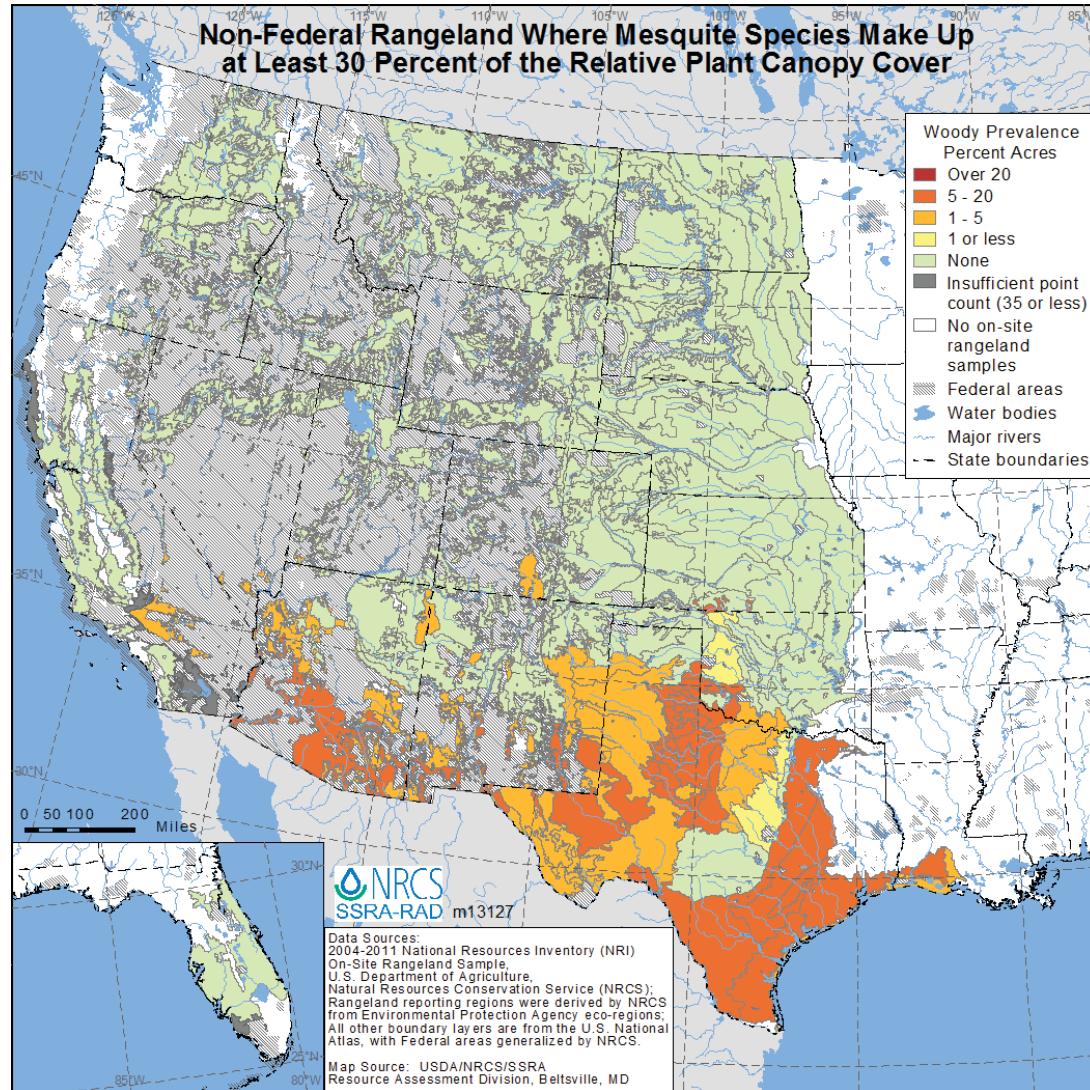
FEDERAL = USDA-NRCS

Projected Water Demand & Existing Supplies (ac-ft/yr)





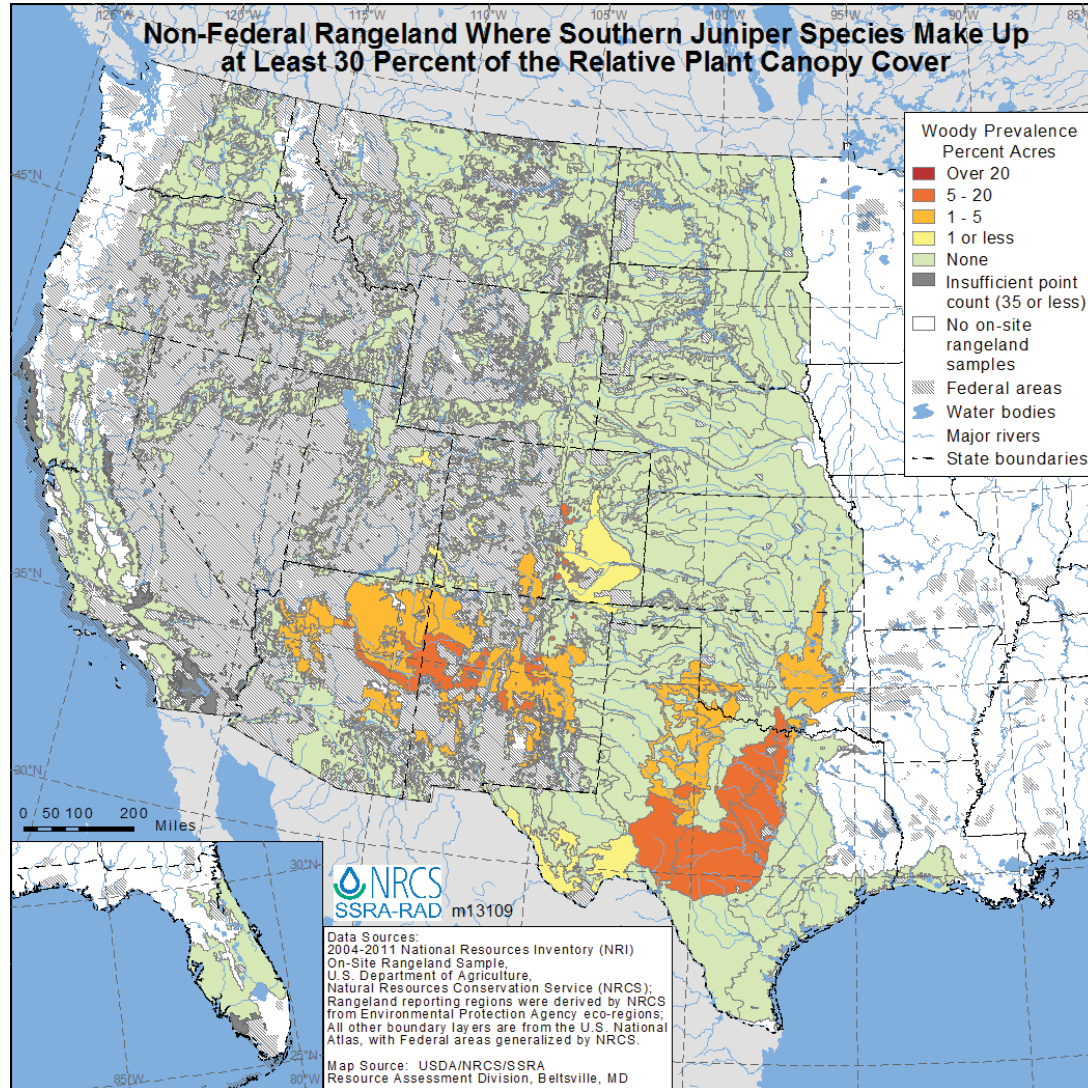
USDA NRCS NRI Rangeland Mesquite 30%



October 22, 2014

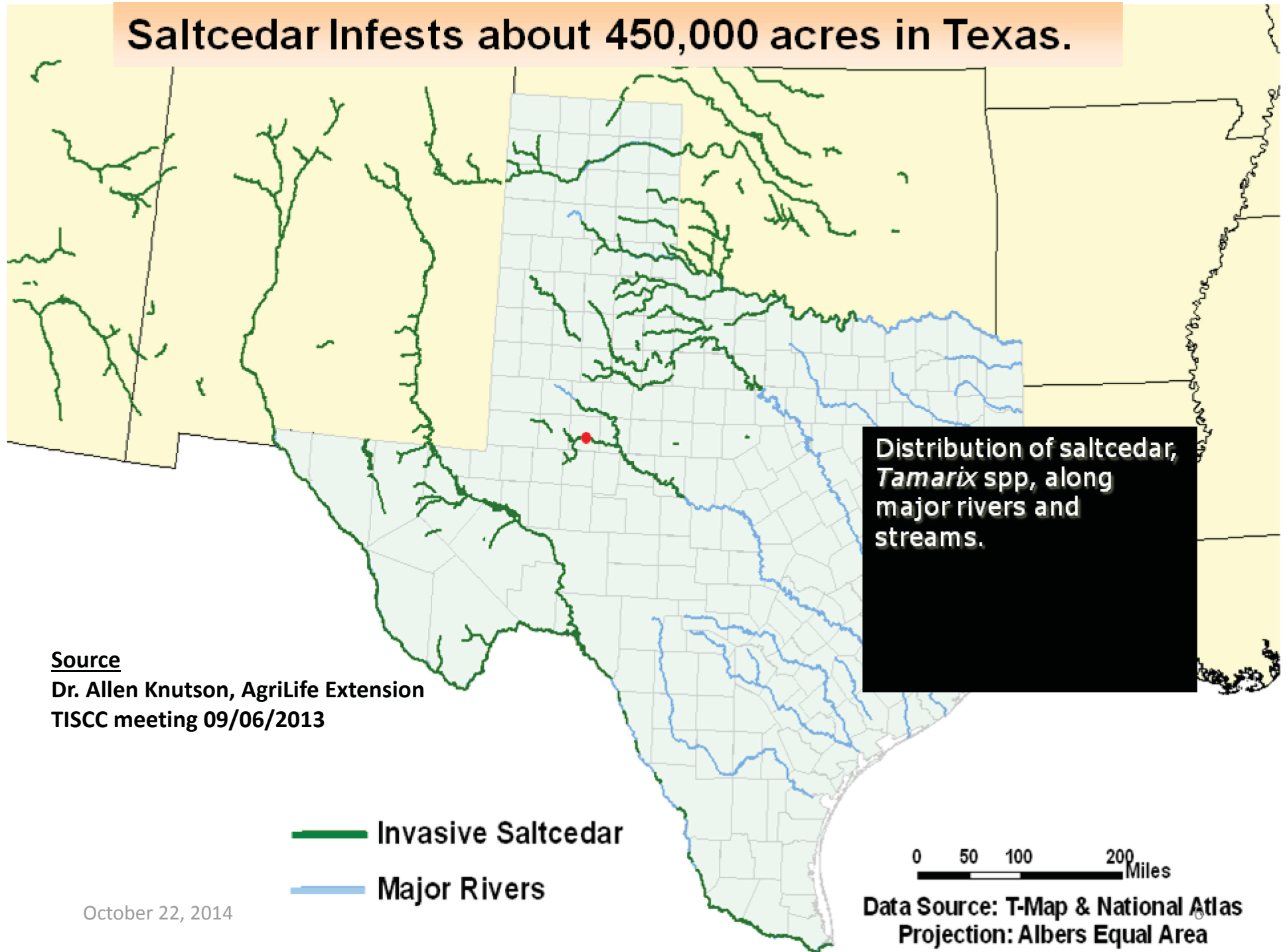


USDA NRCS NRI Rangeland Juniper 30%



October 22, 2014

Saltcedar Infests about 450,000 acres in Texas.



Source

Dr. Allen Knutson, AgriLife Extension
TISCC meeting 09/06/2013

October 22, 2014



Statutory Purpose of WSEP

- to increase available surface and ground water supplies through
 - the targeted control of noxious brush species that are detrimental to water conservation, and
 - the revegetation of land on which brush has been controlled



Ecosystem Services of Brush Control

- conserving water lost to evapotranspiration
- recharging groundwater
- enhancing spring and stream flows

- improve soil health
- restore native wildlife habitat by improving rangeland
- improve livestock grazing distribution
- aid in wildfire suppression through reduction of hazardous fuels
- protect water quality and reduce soil erosion
- manage invasive species.



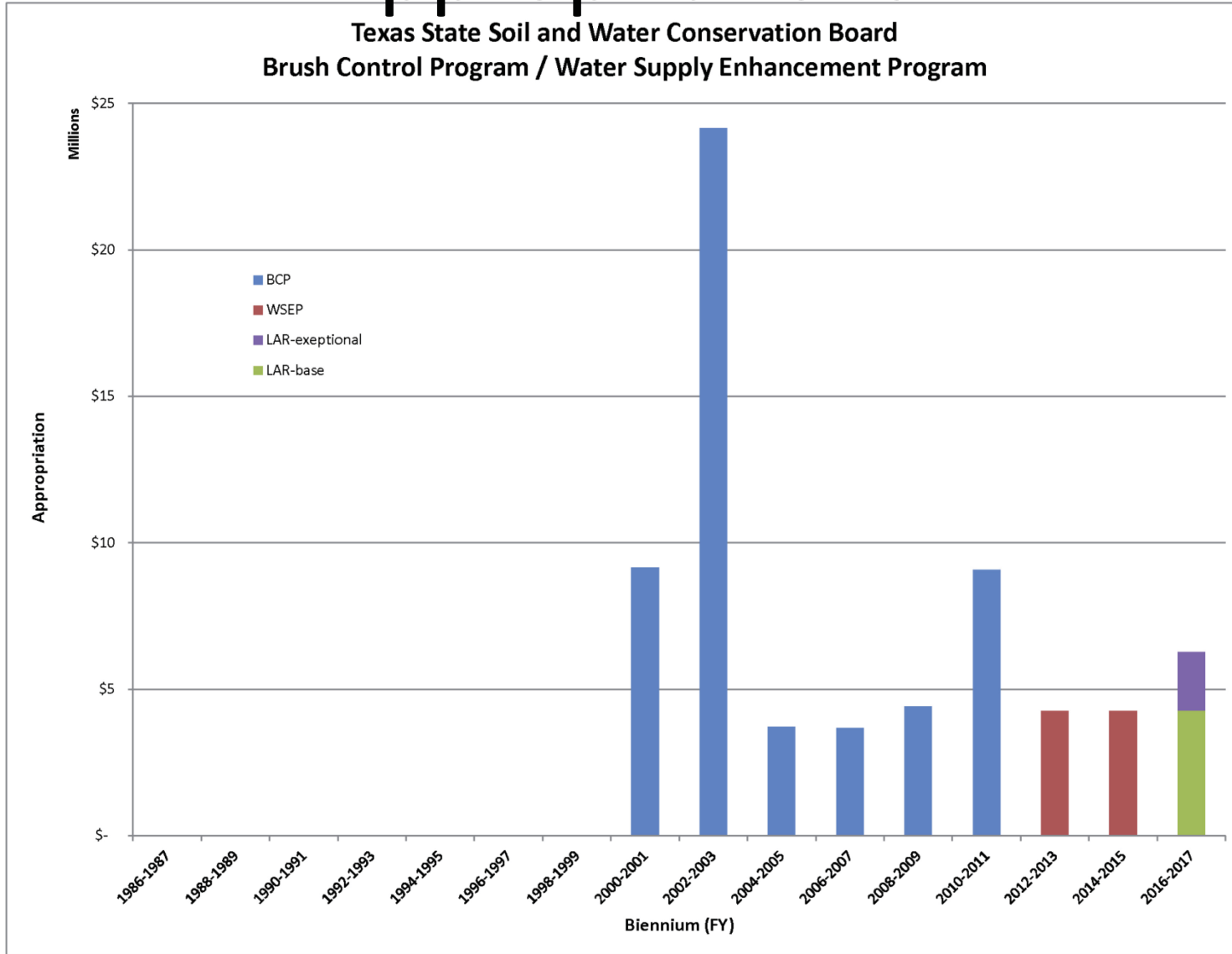
Program Background

- 69th Legislature in 1985 created the Texas Brush Control Program
 - Program was unfunded until 1999
- 76th Legislature in 1999 provided first appropriations to begin implementing the Program in FY2000
- Sunset review process in 2010-2011 - Sunset Advisory Commission adopted recommendations to address several issues identified with agency programs
 - Concluded that framework of Texas Brush Control Program was ineffective for meeting the State's critical water conservation needs
- 82nd Legislature, as a result of the Sunset Commission's recommendations, passed HB 1808 in 2011 which delineated changes to TSSWCB's programs
 - Established new program for agency, the Water Supply Enhancement Program (WSEP)



Appropriations

Texas State Soil and Water Conservation Board
Brush Control Program / Water Supply Enhancement Program





Implementing Sunset Changes

- Competitive grant process to rank projects and allocate funds
- Detailed criteria for prioritizing projects
- Feasibility study that includes a computer model to estimate projected water yield
- Follow-up brush treatment monitored through status reviews

- Established a Stakeholder Committee of Program Beneficiaries
- Established a Science Advisory Committee
- Hired consulting hydrologist

- Adopted revised Rules (2012) & amendments to Rules (2014)
- Adopted three Policies
- Adopted State Water Supply Enhancement Plan (2014)
- Internal Audit – fully compliant with Legislative directives



Stakeholder Committee

- Association of Texas Soil and Water Conservation Districts
 - Jule Richmond
- Texas and Southwestern Cattle Raisers Association
 - Jason Skaggs
- Texas Commission on Environmental Quality
 - vacant
- Texas Water Development Board
 - Dr. Robert Mace
- Texas Tech University
 - Dr. Ken Rainwater





Science Advisory Committee

- Texas Department of Agriculture
 - Dr. David Villarreal
- Texas Parks and Wildlife Department
 - vacant
- Texas Tech University
 - Dr. Ken Rainwater; Dr. Tom Arsuffi (alt)
- Texas Water Development Board
 - Dr. Ruben Solis
- Texas Institute for Applied Environmental Research at Tarleton State University
 - Dr. Larry Hauck
- USDA Agricultural Research Service
 - Dr. Daren Harmel
- US Geological Survey
 - Dr. George Ozuna; Dr. Ryan Banta (alt)





Consultation

- Required by Texas Agriculture Code §203.016
- Texas Water Development Board
 - effects on water quantity
- Texas Parks and Wildlife Department
 - effects on fish and wildlife
- Texas Department of Agriculture
 - effects on agriculture





Goals

- Recommended by Stakeholder Committee
- goals describe intended use of a water supply enhanced by the program and the populations that the program will benefit
- General Goals
 - Enhance domestic and municipal uses, including water for sustaining human life and the life of domestic animals, agricultural and industrial uses, commercial value, and environmental flows.
 - Enhance mining and recovery of minerals, power generation, navigation and recreation and pleasure, and other beneficial uses.
- Specific Goals
 - Implement project proposals that most enhance water quantity to the municipal water supplies most in need.
 - Direct program grant funds toward acreage within an established project that will yield the most water.



State Water Supply Enhancement Plan

- TSSWCB shall prepare and adopt the State Water Supply Enhancement Plan
 - State’s comprehensive strategy for managing brush in all areas of the state where brush is contributing to a substantial water conservation problem
 - programmatic guidance for the TSSWCB’s WSEP
- Adopted on July 28, 2014
 - updated and revised in order to continue implementing provisions of HB 1808
 - inclusive public comment process
- Must be updated at least every 2 years



State Water Supply Enhancement Plan

- goals describing the intended use of a water supply enhanced by the program and the populations that the program will target
- factors that must be considered in a feasibility study
- priority watersheds across the state for water supply enhancement and brush control
- eligible brush species detrimental to water conservation
- how WSEP interacts with State Water Plan and Regional Water Planning process
- competitive grant process
- proposal ranking criteria
- how the agency will allocate funding
- geospatial analysis methodology for prioritizing acreage for brush control
- technical assistance and financial incentives for landowners for developing and implementing resource management plans on enrolled acreage
- how success for the WSEP will be assessed and reported
- how overall water yield will be projected and tracked



Eligible Brush Species

- Target species are those brush species that consume water to a degree that is detrimental to water conservation
- Eligible Species:
 - mesquite (*Prosopis spp.*)
 - juniper (*Juniperus spp.*)
 - saltcedar (*Tamarix spp.*)
- Other species of interest conditionally eligible:
 - huisache (*Acacia smallii*)
 - Carrizo cane (*Arundo donax*)



Feasibility Studies

- funds will only be allocated for brush control cost-share to projects that have a completed feasibility study that includes a site-specific computer-modeled water yield developed by a person with appropriate expertise
- to be eligible for cost-share funds, the feasibility study must demonstrate increases in post-treatment water yield as compared to the pre-treatment conditions
- recommended that for all new feasibility studies the SWAT model be used, or alternatively the EDYS model
 - Soil and Water Assessment Tool: public domain model jointly developed over 25 years by USDA Agricultural Research Service and Texas A&M AgriLife Research
 - Ecological Dynamics Simulation model: developed by McLendon and Childress

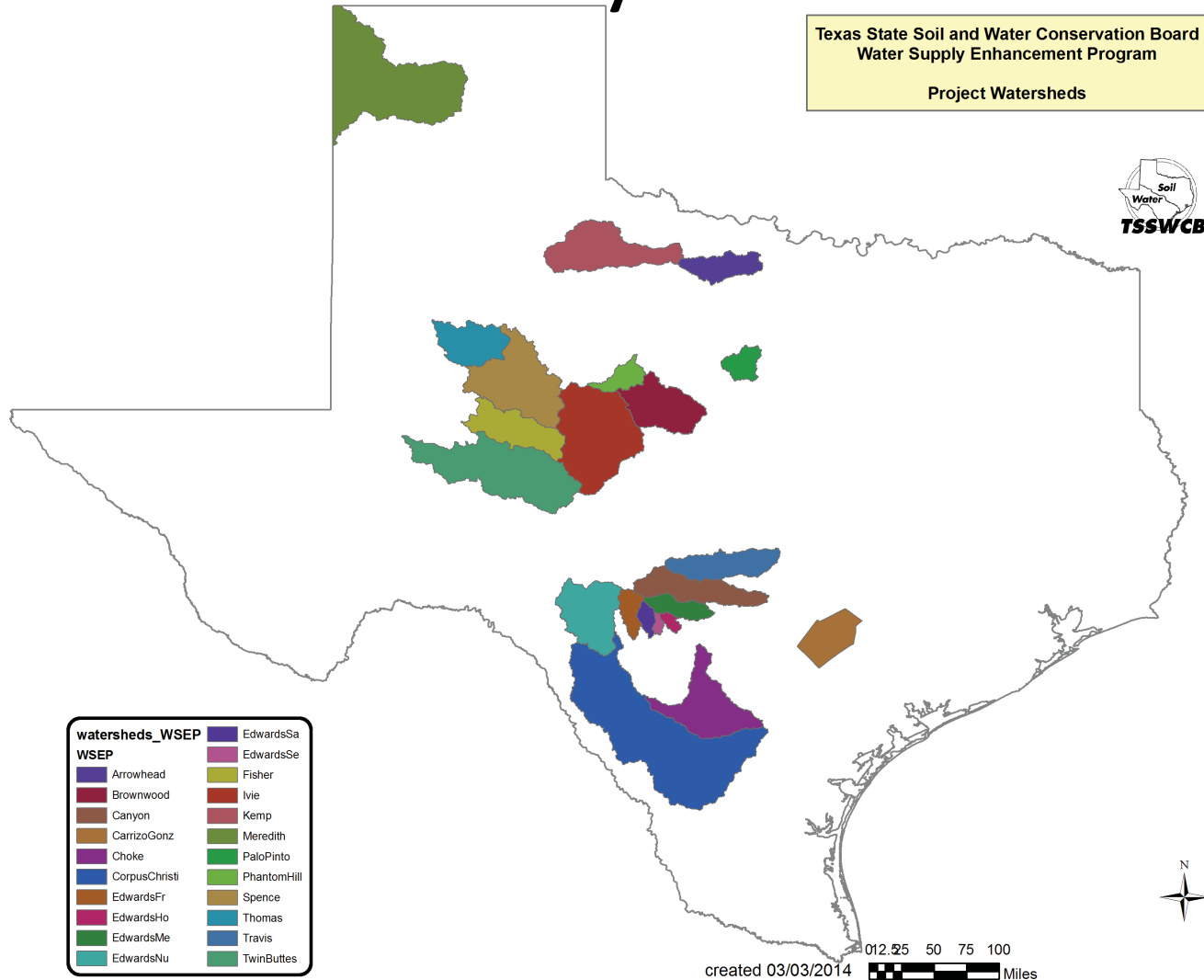


Feasibility Studies

- HB 1808 requires TSSWCB to establish a process for locating a person with expertise in hydrology, water resources, or another technical area pertinent to the evaluation of water supply to conduct a Feasibility Study using a water yield model
- Applications for funding to complete a new Feasibility Study will be referred to the Science Advisory Committee for review
- period for calibration for all new feasibility studies is defined as 1995-2010
- treatment scenarios for brush control to be simulated with the model must at least include the removal of 100% of treatable brush within the watershed of interest
 - treatable brush is unique to each watershed and varies based on factors such as slope, brush density, proximity to waterbodies, and endangered species habitat

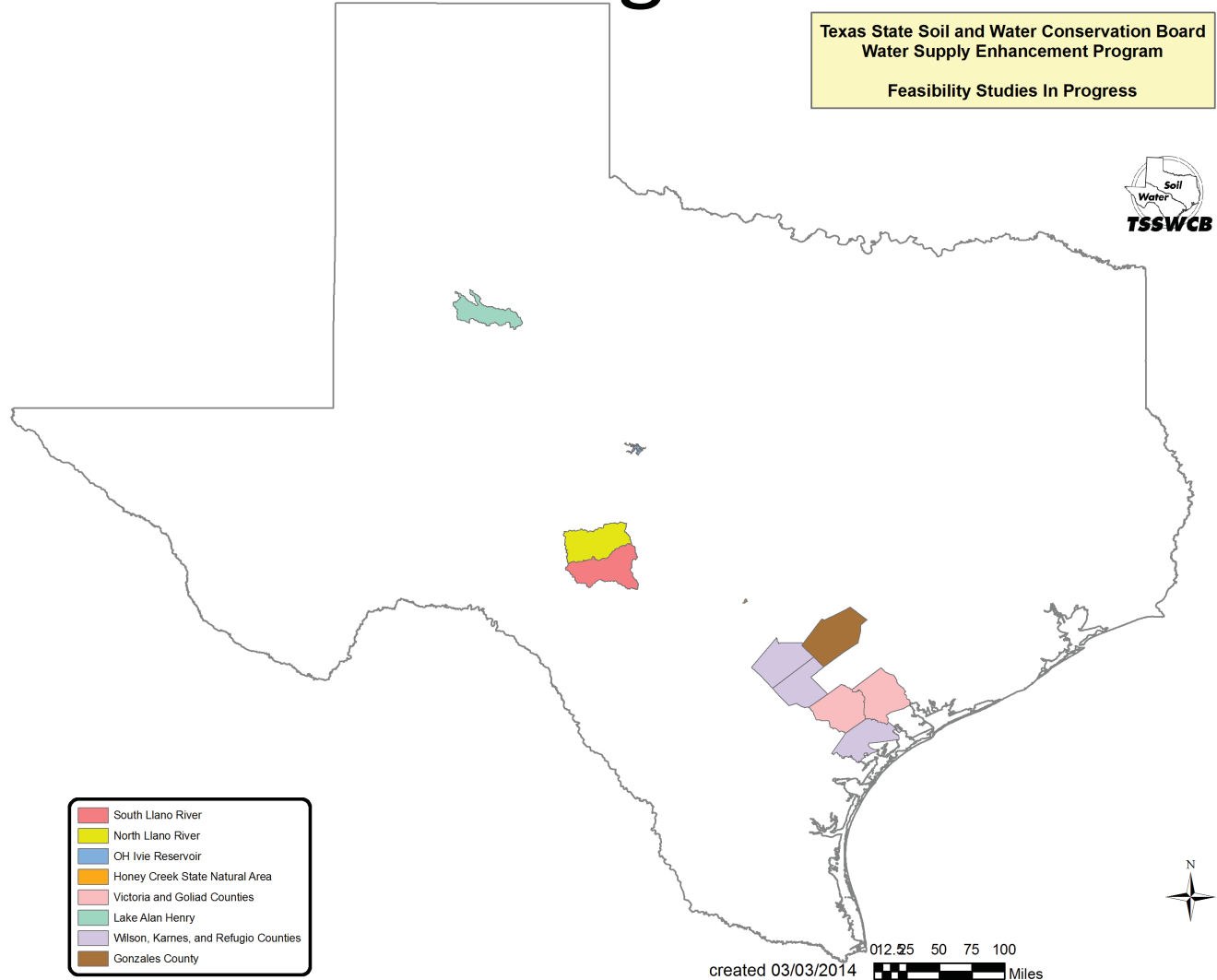


Completed Feasibility Studies





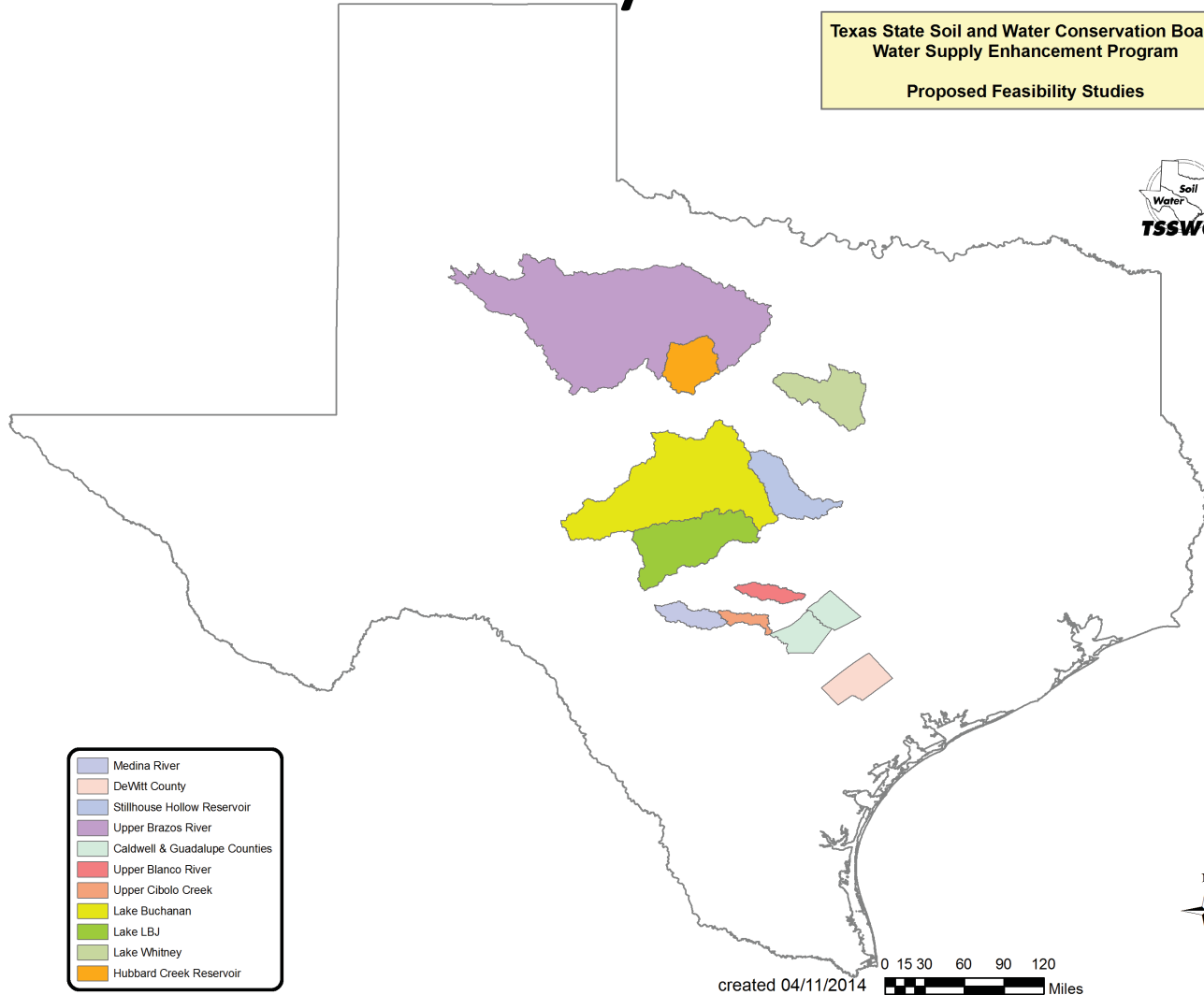
Feasibility Studies In Progress





Proposed Feasibility Studies

Texas State Soil and Water Conservation Board
Water Supply Enhancement Program
Proposed Feasibility Studies



- Medina River
- DeWitt County
- Stillhouse Hollow Reservoir
- Upper Brazos River
- Caldwell & Guadalupe Counties
- Upper Blanco River
- Upper Cibolo Creek
- Lake Buchanan
- Lake LBJ
- Lake Whitney
- Hubbard Creek Reservoir



Competitive Grant and Ranking Index

- competitive grant process to rank project proposals and allocate funds
- proposals must relate to a water conservation need, based on information in the State Water Plan as adopted by TWDB
- Feasibility Study must have been completed for the watershed
- proposals are prioritized for each funding cycle, giving priority to projects that balance the most critical water conservation need of municipal WUGs with the highest projected water yield from brush control
- evaluation criteria established by Stakeholder Committee
 - public water supplies expected to be benefited by the project
 - firm yield enhancement to municipal water supplies
 - Water User Groups relying on the water supplies
 - percent of enhanced water supply used by Water User Groups
 - population of Water User Group
- Ranking Index is calculated that gives a measure of the water yield increased per capita user for each proposal

$$RI = \textit{Reliance on source} \times \frac{\textit{Yield Benefit}}{\textit{Population}}$$



Criteria for Prioritizing Projects

- need for conservation of water resources within the watershed, based on the State Water Plan as adopted by TWDB
- projected water yield of project, based on soil; slope; land use; types and distribution of brush; and proximity of brush to rivers, streams, and channels (and aquifer recharge features)
- method the project may use to control brush
- cost-sharing rates within the project
- location and size of the project
- budget of the project
- implementation schedule of the project
- administrative capacities of TSSWCB and SWCD that will manage the project
- scientific research on the effects of brush removal on water supply
- any other criteria relevant to assure the WSEP can be most effectively, efficiently, and economically implemented



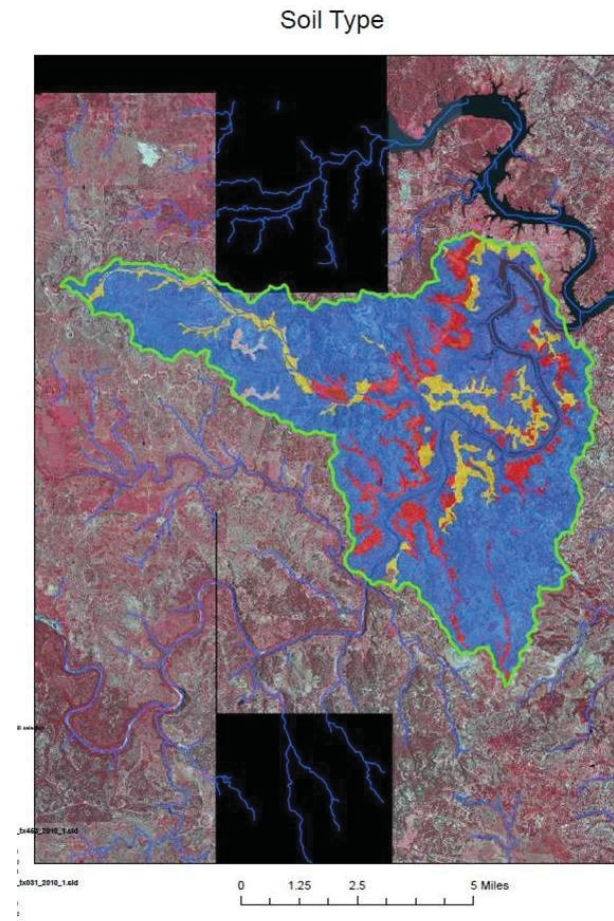
Cost-Share Allocations

Watershed / Target	FY2014	FY2015
Edwards Aquifer - Frio River (UNF2)	\$ 50,000	\$ 50,000
Edwards Aquifer - Sabinal River	\$ 30,000	\$ -
Edwards Aquifer - Medina River	\$ 125,000	\$ -
Edwards Aquifer - Frio River (BSR1 & BSR2)	\$ 138,600	\$ -
Edwards Aquifer - Frio River (AR)	\$ 154,120	\$ -
Lake Brownwood	\$ 210,000	\$ 210,000
Edwards Aquifer - Nueces River (UNF2)	\$ 150,000	\$ 150,000
Lake Travis / Pedernales River	\$ 150,000	\$ -
Lake Arrowhead (SWCD560)	\$ 150,000	\$ -
Carrizo-Wilcox Aquifer	\$ 57,500	\$ 57,500
Lake Arrowhead (SWCD542)	\$ 100,000	\$ 100,000
Upper Guadalupe River / Lake Nimitz	\$ 100,000	\$ 100,000
Lake Arrowhead (SWCD559)	\$ 33,510	\$ 5,340
Twin Buttes Reservoir (SWCD247)	\$ -	\$ 100,000
Lake Kemp	\$ -	\$ 100,000
Twin Buttes Reservoir (SWCD248)	\$ -	\$ 113,750
Twin Buttes Reservoir (SWCD234)	\$ -	\$ 150,000
Upper Guadalupe River / Canyon Lake	\$ -	\$ 150,000
E.V. Spence Reservoir	\$ -	\$ 150,000
	\$ 1,448,730	\$ 1,436,590



Prioritizing Acreage

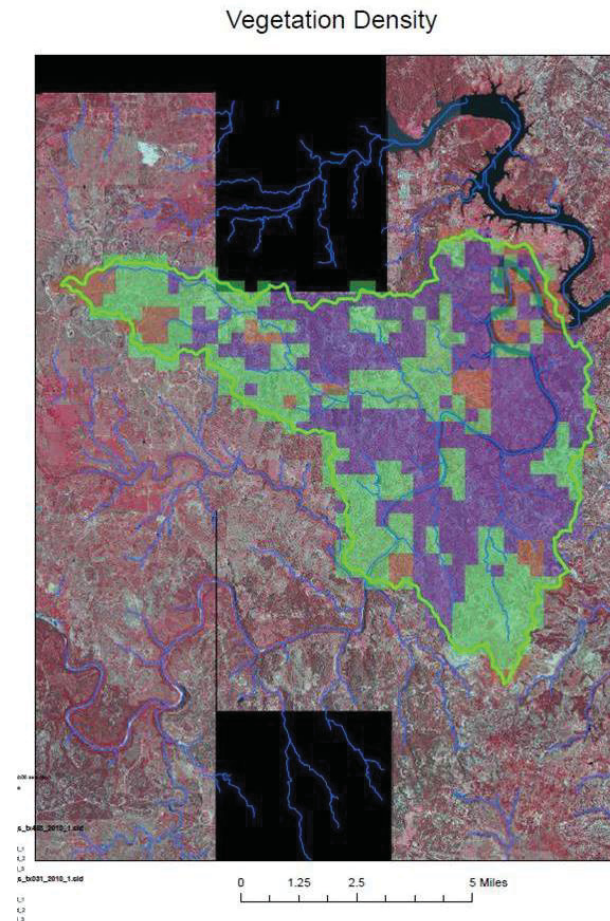
- to maximize the positive impacts of brush control on water supply enhancement
- to maximize the effective and efficient use of allocated funds
- geospatial analysis will be performed
- to delineate and prioritize eligible acres that have highest potential to yield water within the project watershed





Prioritizing Acreage

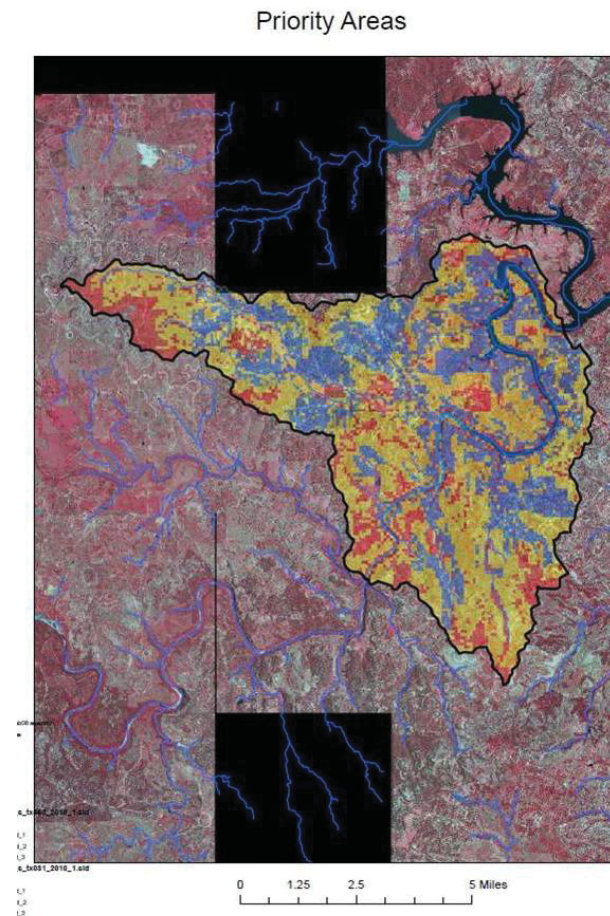
- factors that will be assessed
 - Soil Type – relative to runoff potential or recharge
 - Slope – sufficiently steep to affect runoff potential or recharge but not impair method of brush control
 - Vegetation Density – type and density of treatable brush in area
 - Proximity to Waterbodies – riparian areas and other hydrologically sensitive areas critical to streamflow and aquifer recharge
 - Proximity to Watershed Outlet
- automatically excluded areas
 - areas that are designated as project habitat or endangered species habitat
 - slopes greater than 16%





Prioritizing Acreage

- two ranking systems based on site characteristics and their impacts on goal of project
 - manage brush for aquifer infiltration enhancement
 - manage brush for surface water enhancement
- compiled analysis results in four brush control priority zones for each watershed
 - highest yielding areas (blue)
 - medium yielding areas (yellow)
 - lowest yielding areas (red)
 - areas not eligible





Example: Aquifer Infiltration Enhancement

Manage Brush for Infiltration Enhancement

Characteristic	Criteria	Ranking
Brush density	> 30% canopy coverage	1
	> 10% and < 30% canopy coverage	2
	< 10% canopy coverage	3
Hydrologic Soil Type	HSG A	1
	HSG B	2
	HSG C	3
	HSG D	4
Slope of Area	0 to 7.4%	1
	7.5 to 16%	2
	16 to 24%	3
	>24%	4
Proximity to Stream Channel	.25 to .50 miles from channel	1
	.51 to .75 miles from channel	2
	>.75 miles from channel	3
Proximity to Outlet	1 st 3 rd of the subbasin	1
	2 nd 3 rd of the subbasin	2
	Last 3 rd of the subbasin	3



Landowner Plans

- Site-specific 10-year resource management plan for implementation of brush control and sound range management practices
- Plan must include
 - brush control or other water supply enhancement activities
 - follow-up brush control
 - requirement to limit average brush coverage to not more than 5% (target species)
 - periodic dates throughout course of plan when TSSWCB will inspect the status of brush control
- SWCDs responsible for developing and approving plans
- Designed to achieve a level of brush control necessary to
 - increase watershed yield,
 - meet landowner goals, and
 - address wildlife considerations
- Best available management and technology as described in USDA NRCS Field Office Technical Guide
- Essential practices utilized in all WSE plans
 - Brush Management
 - Prescribed Grazing
 - Upland Wildlife Management



Status Reviews and Follow-up Treatment

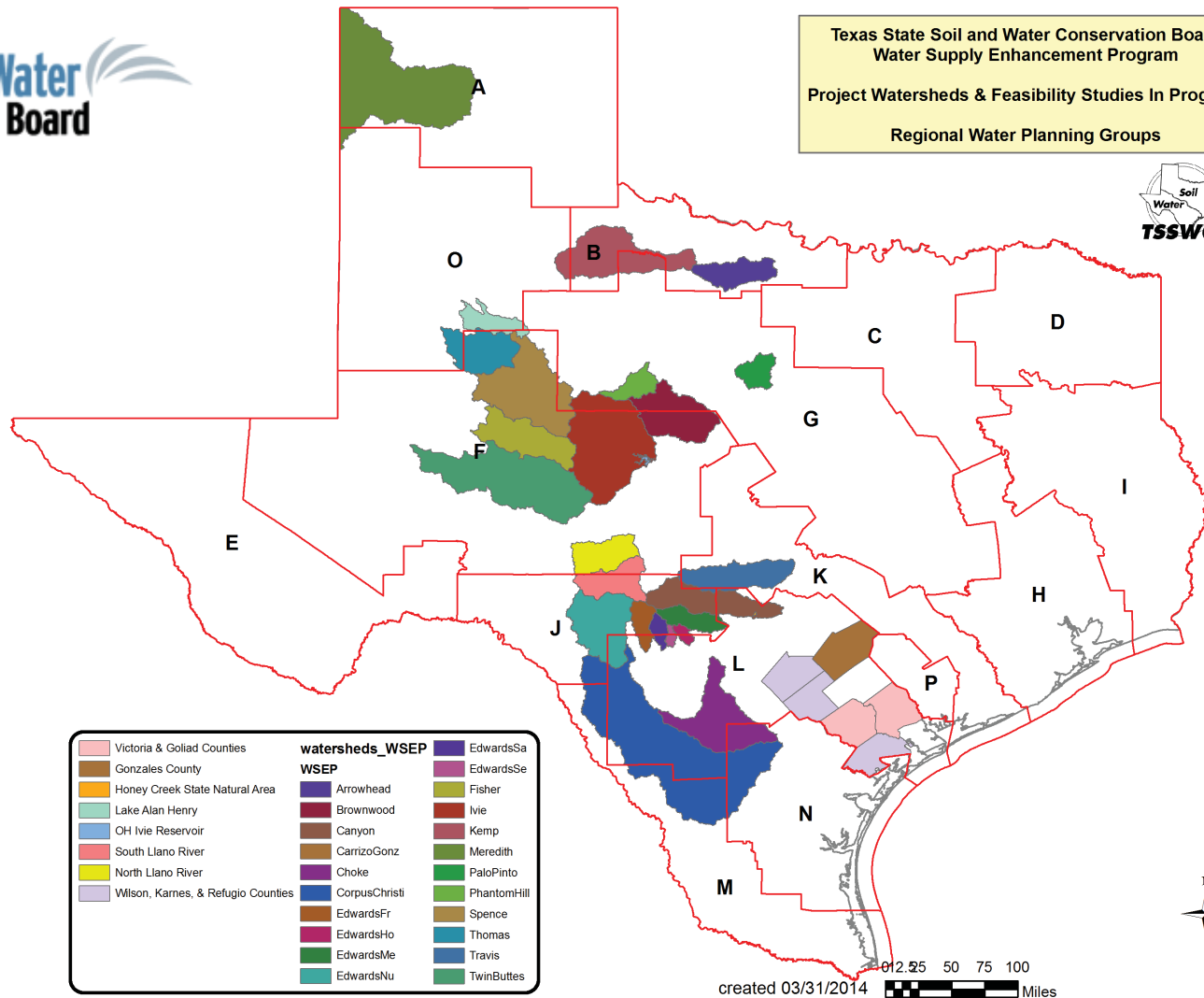
- Status Reviews
 - 1st within 3-5 years after initial treatment to determine if canopy is >5% (target species only)
 - 2nd performed 8-9 years after initial treatment
- Follow-up Treatment
 - mesquite, saltcedar, mixed
 - 3 years after initial treatment, if canopy >5%
 - juniper
 - 8 years after initial treatment, if canopy >5%



Regional Water Planning

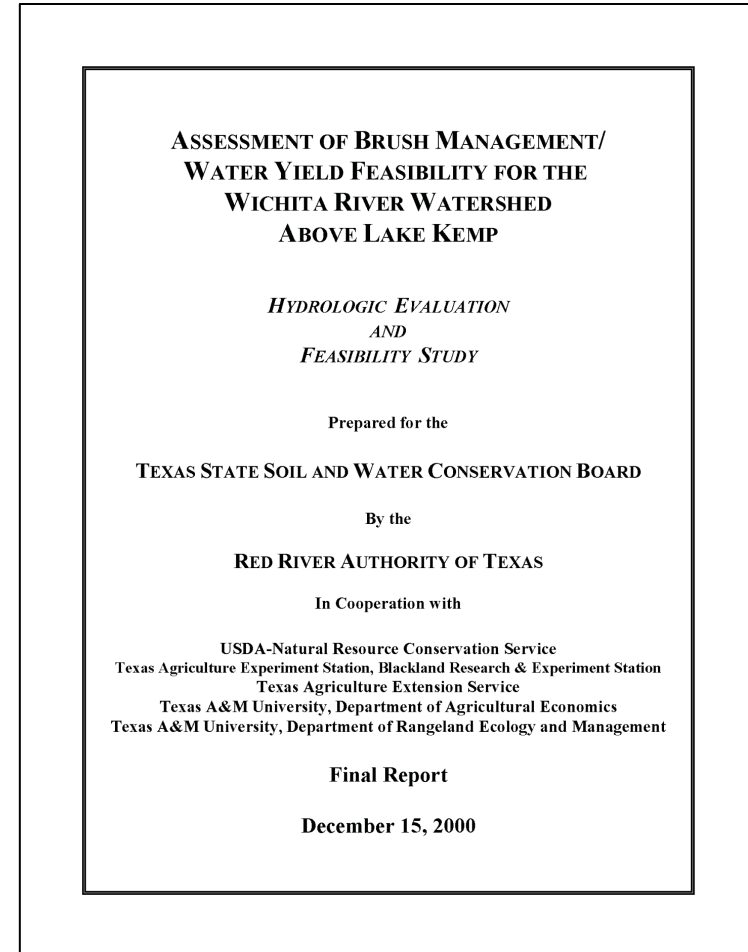


Texas State Soil and Water Conservation Board
 Water Supply Enhancement Program
 Project Watersheds & Feasibility Studies In Progress
 Regional Water Planning Groups



Wichita River abv Lake Kemp Feasibility Study

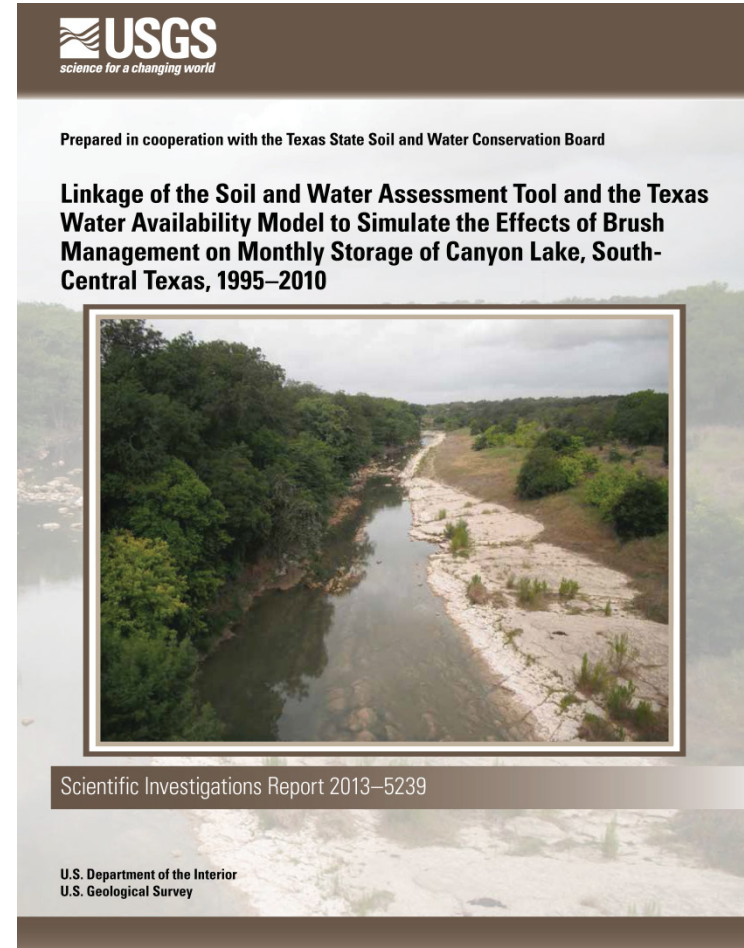
- Published in 2000 by RRA
- SWAT, 48 subbasins
- Brush treatment goal
 - 833,413 ac
 - 64% of watershed
- Total annual water yield
 - 152,004 ac-ft
- Total cost for 10 year implementation
 - \$43,395,225
- Brush treated 2000-2014
 - 854 ac





SWAT-WAM Results

- Linkage between published Guadalupe River SWAT model created for brush control Feasibility Study and the TCEQ-authorized Guadalupe River Water Availability Model
- Quantification of brush management water yields during periods lacking abundant rainfall, defined as when lake storage below 25th percentile
- Brush control in the watershed increases lake levels during times of lowest quartile precipitation (i.e., drought-like conditions)
 - 110 ac-ft (20% brush)
 - 1,080 ac-ft (80% brush)



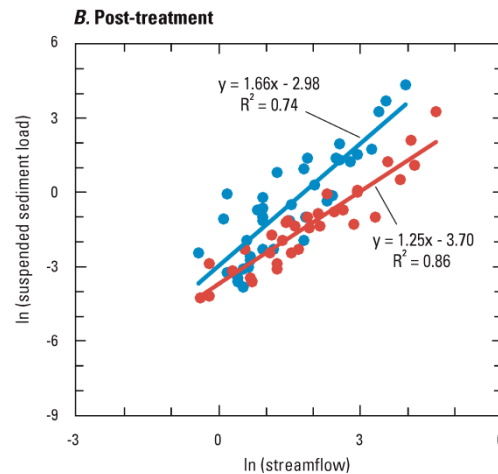


Soil Erosion Potential

- TSSWCB is the lead state agency responsible for preventing and abating agricultural and silvicultural nonpoint sources of water pollution and the agency's WSEP is designed to reinforce that mission
- Feasibility studies – modeled simulations of brush control by replacing target brush with native grass rangeland
- USDA NRCS Practice Standard – brush management restores desired vegetative cover to control erosion and reduce sediment – expect slight to moderate decrease in sheet and rill soil erosion
- USGS Honey Creek study – suspended sediment data

USGS Honey Creek Sediment

- During post-treatment period, relation between suspended-sediment loads and streamflow did exhibit statistically significant difference
- data indicate that for same streamflow, suspended-sediment loads from treatment watershed were generally less than suspended-sediment loads from reference watershed during post-treatment period



October 22, 2014

USGS
science for a changing world

In cooperation with the U.S. Department of Agriculture Natural Resources Conservation Service, the Edwards Region Grazing Lands Conservation Initiative, the Texas State Soil and Water Conservation Board, the San Antonio River Authority, the Edwards Aquifer Authority, Texas Parks and Wildlife, the Guadalupe Blanco River Authority, and the San Antonio Water System

Effects of Brush Management on the Hydrologic Budget and Water Quality In and Adjacent to Honey Creek State Natural Area, Comal County, Texas, 2001–10

Scientific Investigations Report 2011–5226

U.S. Department of the Interior
U.S. Geological Survey

37



WSEP Results

- FY2013
 - 20,219 ac of brush management in 13 project areas
 - landowners received \$1,309,370 in cost-share
 - based on feasibility studies, projected to increase water yield by 4,548 ac-ft/yr
- FY2014 (draft)
 - 6,215 ac of brush management in 7 project areas
 - landowners received \$844,666 in cost-share
 - based on feasibility studies, projected to increase water yield by 3,103 ac-ft/yr



OTHER PROGRAMS

- Texas Nonpoint Source Management Program
 - Total Maximum Daily Loads
 - Watershed Protection Plans
 - Recreational Use Attainability Analyses
 - Texas Watershed Stewards
 - Texas Well Owner Network
 - Lone Star Healthy Streams
- Water Quality Management Plan Program
- Flood Control Programs
- Texas Invasive Species Coordinating Committee.



Aaron Wendt
Natural Resources Specialist

Texas State Soil and Water Conservation Board

PO Box 658
Temple, TX 76503

(254) 773-2250 ext 232 v
(254) 773-3311 f
(254) 231-6349 c
awendt@tsswcb.texas.gov

<http://www.tsswcb.texas.gov/>

*Authorization for use or reproduction of any original material contained in this presentation is freely granted.
TSSWCB would appreciate acknowledgement.*