North Central Texas Watershed Stakeholder Webinar

March 19, 2020

North Central Texas Council of Governments
Environment & Development

www.nctcog.org/WaterResources

Online Tool to Streamline Permittee Responsible Mitigation

North Central Texas Council of Governments
North Central Texas Watershed Stakeholder Meeting
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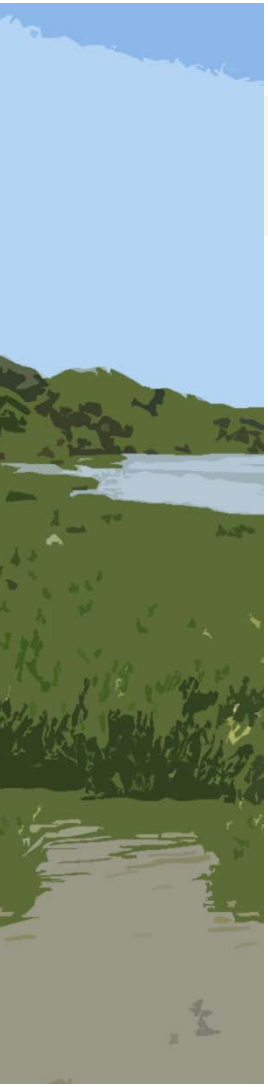
Council of Governments

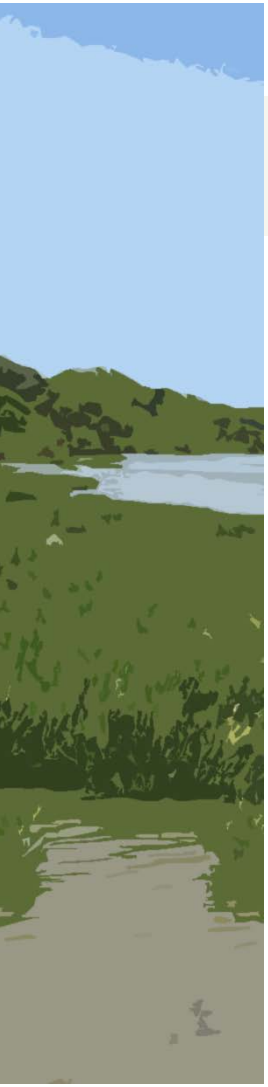
AUTHORITY FOR COMPENSATORY MITIGATION

- Mitigation for the discharge of dredge or fill material into Waters of the US
- Section 404 of the Clean Water Act
- 40 CFR Part 230 Compensatory Mitigation for Losses of Aquatic Resources; Final Rule
- Administered by US Army Corps of Engineers (USACE) Regulatory Division
- Not related to National Pollutant Discharge Elimination System program, which is authorized under Section 402 of the Clean Water Act



MITIGATION BANKING VS. PRM

- 2008 Final Rule identifies the preferred means for mitigating impacts as the purchase of credits from an established mitigation bank. Mitigation bank owner is responsible for maintaining the bank.
- Not all areas are served by a mitigation bank.
- Permit applicants may seek permission from USACE to conduct permittee responsible mitigation (PRM).
- PRM may be approved if it provides a greater ecological benefit than a mitigation bank or if no bank credits are available.
- The permittee is responsible for maintaining the site, and credits will not be sold to mitigate impacts beyond those created by the permittee. A PRM site is not a mitigation bank.



PRM Parties

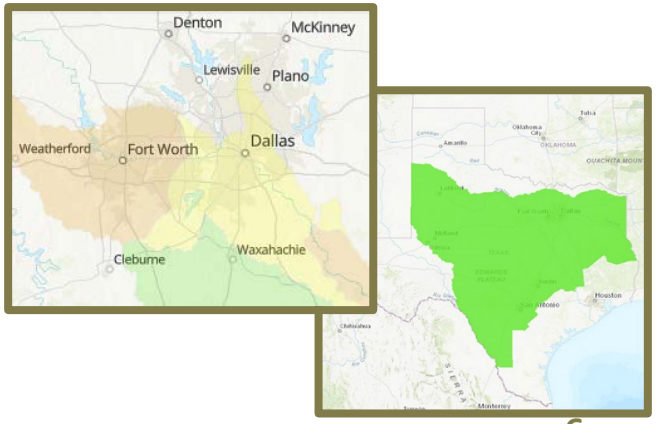
Willing landowner – agrees to allow restoration work; agrees to conservation easement if private property *or* develops integrated natural resources management plan if government property

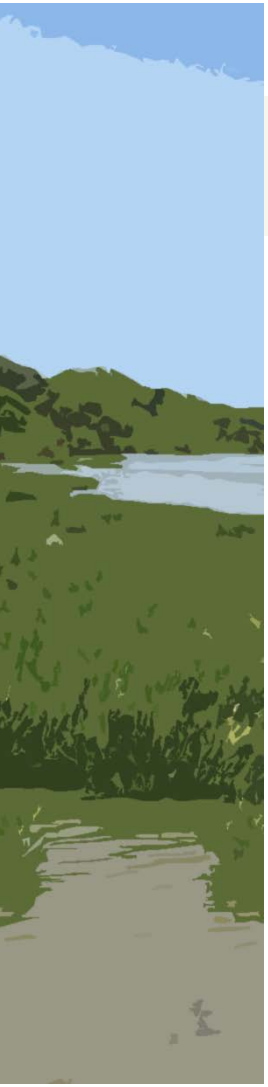
Permit applicant – has mitigation need; responsible for enhancing or restoring function of stream, wetland, or riparian area at PRM site; monitors site for at least 5 years; conducts adaptive management as needed

Third-party land trust – holds conservation easement in perpetuity

PRM Database

- Connects willing landowners and permit applicants
  - Landowners enter information about their property
  - Permit applicants enter mitigation needs and identify landowners who could be PRM partners
- Identifies Area of Applicable Use for impact location
- Covers area compatible with the US Army Corps of Engineers, Fort Worth District



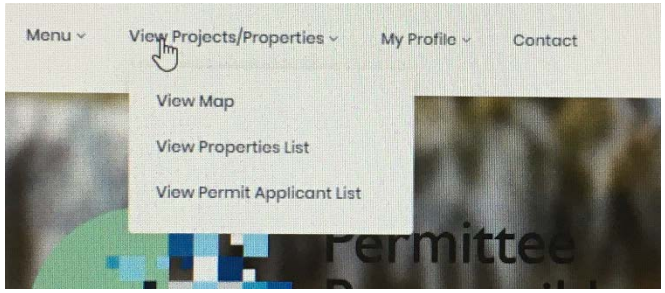


PRM Database Links

- Glossary
- USACE Regulatory In-lieu Fee and Bank Information Tracking System
- USACE pre-application meeting request form – permit applicants should submit this to seek permission to use PRM
- Land trusts and conservation easement information

PRM Database Demonstration

- http://prmd.nctcog.org/
- Note that users create a sign-in as a property owner or a permit applicant, but the same user can add locations for property available *and/or* for mitigation needs by clicking the "View Projects/Properties" dropdown and selecting "View Properties List" or "View Permit Applicant List"



NCTCOG photo illustration

CONTACTS

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Nonpoint Source Program

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

The goal of the grant program is to

- restore impaired waterbodies
- protect waterbodies

Voluntary Program

Achieve your water quality goals

Stakeholder Driven

Texas Nonpoint Source Program

Texas State Soil and Water Conservation Board

- Silviculture
- Agriculture

Texas Commission on Environmental Quality

- Urban – work that is not required under MS4 management plans
- Other – e.g., septic systems, riparian restoration

Watershed Protection Plans

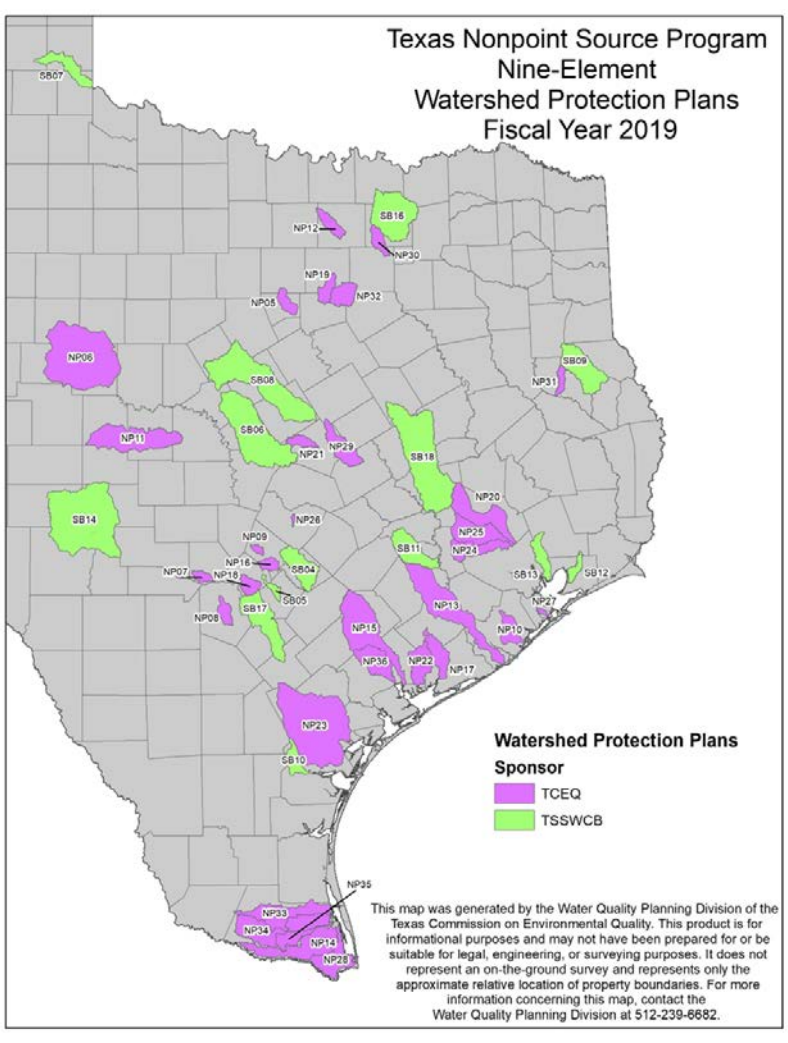
A voluntary, comprehensive planning document that is developed with stakeholder input

Provides management measures to reduce nonpoint source pollution

Texas Watershed Protection Plans

Meets the Nine Elements listed in EPA's *Handbook for Developing Watershed Plans*

- 23 accepted in Texas
- 15 in development by TCEQ in 2019


Texas Nonpoint Source Program
Nine-Element
Watershed Protection Plans
Fiscal Year 2019
SB07
SB16
NP12
NP30
NP19
NP32
NP05
NP06
SB08
SB09
NP31
SB06
NP11
NP21
NP29
SB18
NP20
SB14
NP26
NP25
NP09
SB11
NP24
NP16
NP07
NP18
SB04
SB13
SB12
SB05
NP27
SB17
NP13
NP08
NP15
NP10
NP36
NP22
NP17
NP23
SB10
Watershed Protection Plans
Sponsor
TCEQ
TSSWCB
NP35
NP33
NP34
NP14
NP28
This map was generated by the Water Quality Planning Division of the Texas Commission on Environmental Quality. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Water Quality Planning Division at 512-239-6682.

Project Types

Implementation of the Texas Nonpoint Source Management Program

Development of Watershed Protection Plans

Implementation of Watershed Protection Plans

Implementation of the Nonpoint Source Management Program

Projects in areas without watershed protection plans

Data collection

Education programs

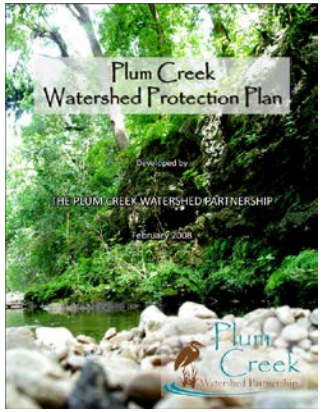
Development of Watershed Protection Plans

Monitoring

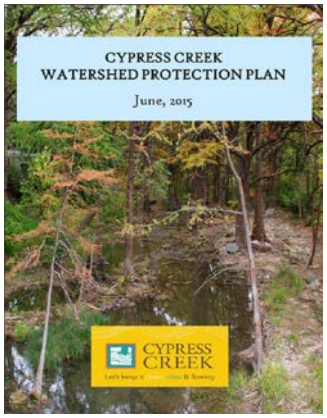
Modeling

Stakeholder coordination

Writing of the plan



Restoration

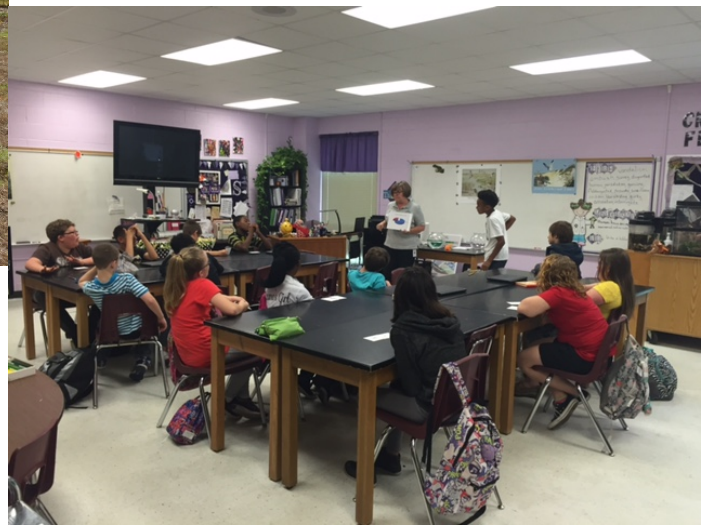


Protection

Implementation of Watershed Protection Plans

Best Management Practices

Education and Outreach



Targeted Areas

Proposals prioritizing implementation activities within targeted areas will have a higher priority over proposals that do not address strategic targeting.

NEW!

Funding for Projects

TCEQ awards approximately $2.5 million Clean Water Act Section 319(h) funds annually

Project Funds are 60% Federal/40% Match

Project Costs Range approximately $50,000-$700,000 (federal)

Matching Funds for Projects

Sources can include:

- Cash
- Salaries
- In-kind
- Volunteer hours
- Lab analysis
- CRP Monitoring

Questions about match?

We can help!

Building Partnerships

State agencies

Counties

Cities

River Authorities

Public Universities

Nonprofit Organizations

Councils of Governments

319(h) Application Process and Grant Cycle

Competitive application process opens online in early summer.

Announcement posted to the Nonpoint Source listserv. (Don’t forget to sign up!)

Approximately 12 months from proposal to project kick off.

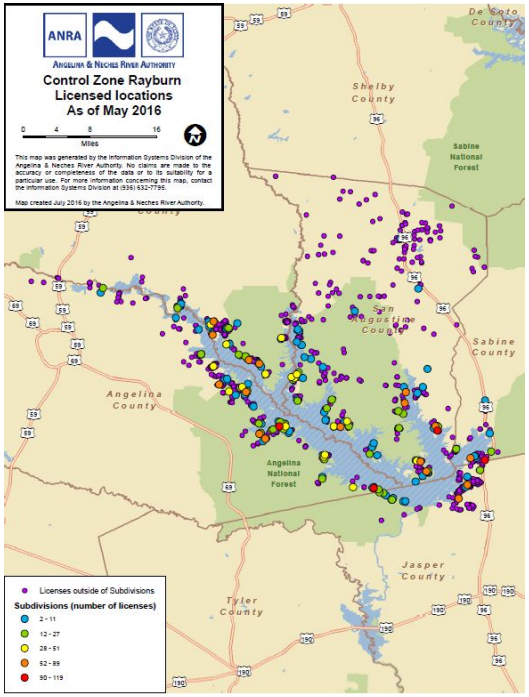
Examples of Implementing Watershed Protection Plans

Low Impact Development and Riparian Education

in the Geronimo Creek watershed

Examples of Implementing Watershed Protection Plans

Septic system repair/replacement and database creation for Lake Sam Rayburn



Examples of Implementing Watershed Protection Plans

Pet waste stations and riparian enhancement on Upper Cibolo Creek

Education and Outreach

Stakeholder involvement through:

- Trainings and workshops
- Publications
- Public Service Announcements
- Events

How does the Nonpoint Source Program benefit you?

Mobilization of stakeholders to implement local priorities

Expands funding opportunities

Water quality improvements/restoration

Water quality protection

More information about the Texas Nonpoint Source Program

- www.tceq.texas.gov/waterquality/nonpoint-source
- nps@tceq.texas.gov

Don’t forget to sign up for the TCEQ Nonpoint Source listserv to receive information about upcoming grant opportunities!

Water Quality and Wildlife Conservation

NORTH CENTRAL TEXAS WATERSHED STAKEHOLDER MEETING - NCTCOG

ERIK ORSAK, ARLINGTON TEXAS ECOLOGICAL SERVICES OFFICE, USFWS

MARCH 19, 2020

Congress determined that threatened and endangered species **“have “esthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people.”**

. . (and economic value)

Endangered species = in danger of extinction throughout all or a significant portion of its range.

Threatened – likely to become endangered in the foreseeable future.

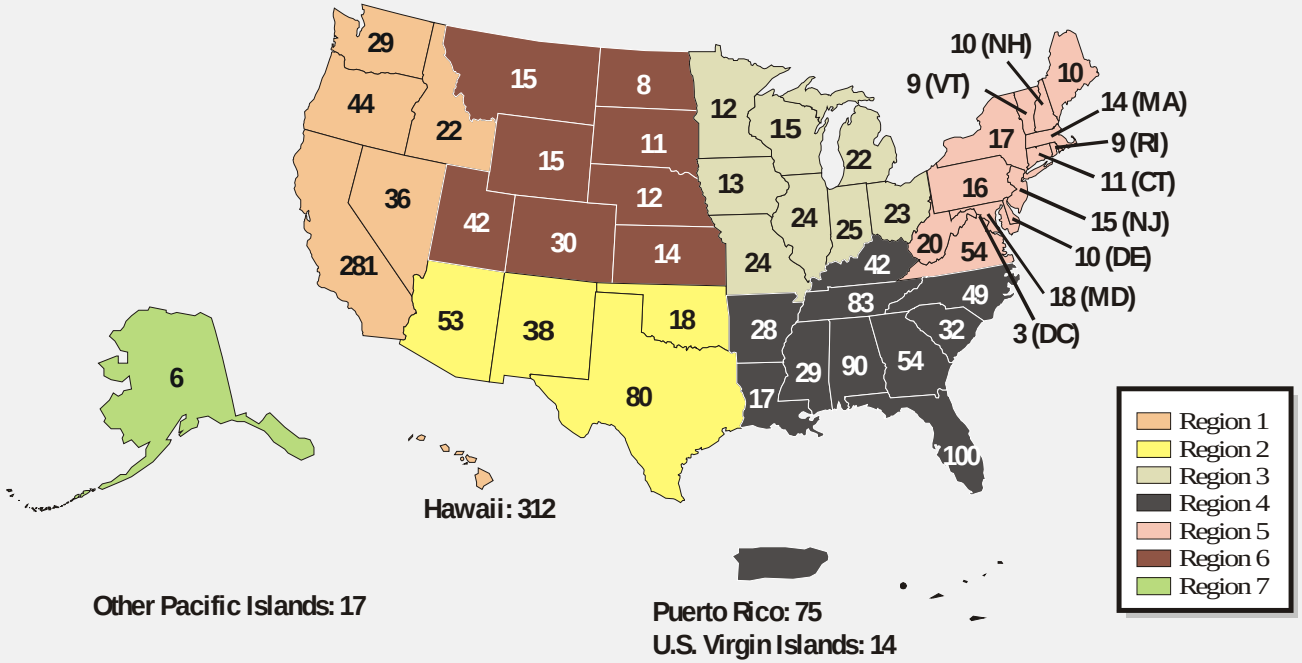
Louisiana Pine Snake – proposed Threatened in 2016

Endangered Species Act of 1973

Purpose: To conserve endangered and threatened species and the ecosystems on which they depend

Species Hot Spots

- Currently 1661 endangered and threatened species in U.S. (943 plants, 718 animals)
- Texas ranks 6th for most species listed (1st is Hawaii)
- Reflects diverse habitat across 10 ecoregions from High Plains in west Texas to Pineywoods of east Texas; Coastal marshes, etc.
- **Over half of 718 animals listed as threatened or endangered in U.S. are aquatic dependent**



UR = Status Under Review

Focal Species in North Texas

Endangered

- whooping crane 1967
- red-cockaded woodpecker 1970
- interior least tern 1985
- American burying beetle 1989
- golden-cheeked warbler 1990
- smalleye shiner 2014
- sharpnose shiner 2014

Threatened

- piping plover 1985
- geocarpon minimum 1987
- Arkansas River shiner 1998
- Neches River rose-mallow 2013
- red knot 2014

Candidate & Species of Concern with Status Review Pending

- lesser prairie-chicken UR (listed as threatened in 2014; overturned in court 2015)
- Louisiana pine snake 2016 (proposed threatened, R4 lead)
- peppered chub UR (FY18)
- monarch butterflies UR (FY20, R3 lead)
- east Texas mussels UR (FY20; LA pigtoe, TX heelsplitter)
- Texas kangaroo rat UR (FY20)
- Texas screwstem (FY23)
- western chicken turtle (FY24)

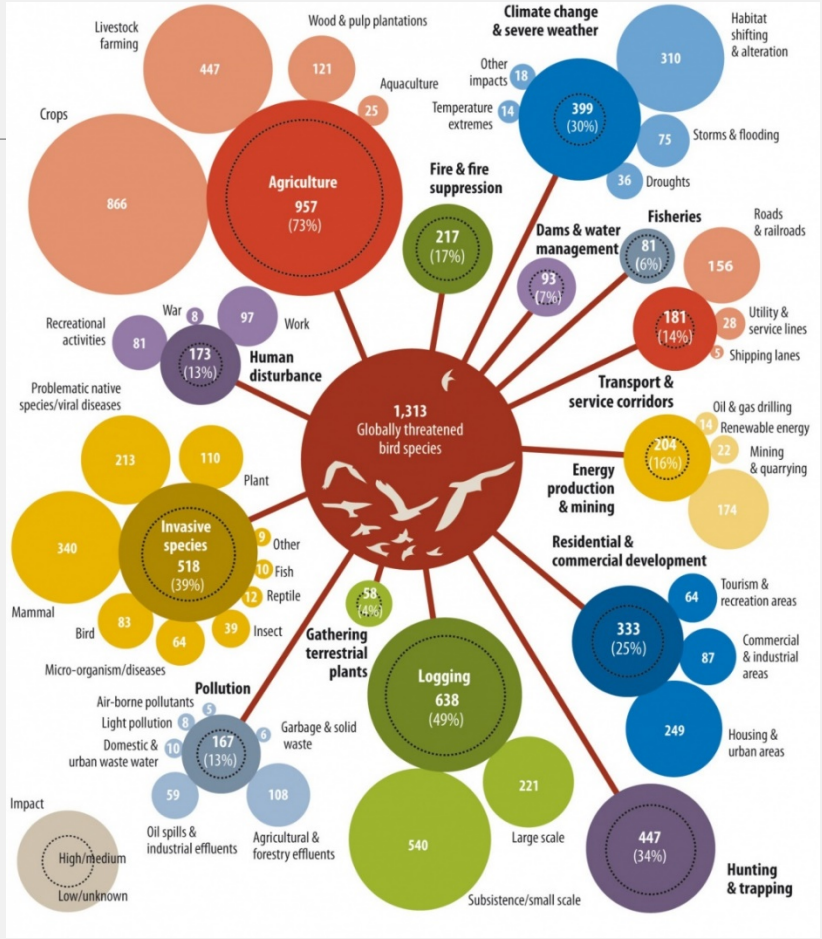
Species Removed

- Texas emerald dragonfly 2020 petition withdrawn
- Rough-stemmed aster 2020 petition withdrawn
- black-capped vireo 2018 delisted

Threats to Endangered Species

- Habitat Modification (e.g., fire suppression)
- Habitat Destruction
- Pollution
- Invasive Species
- Climate Change

- Exploitation/Overharvest
- Hunting, Poaching, Illegal Trade



The Anthro-Eco Relationship

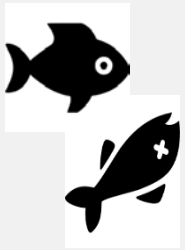
1. Changes to Land Use

- Industrial / Commercial
- Agriculture
- Urban
- Residential

2. ↑Stressors

- Contaminants
- Nutrients
- Erosion/Sediments
- Altered Hydrology
- Habitat Loss/ Degradation
- Climate Change/ Weather Extremes

3. Loss of Biodiversity



4. Changes to Ecology (Community Structure)

- Algae
- Inverts
- Fish
- Mussels

- With population growth and development comes an increase in changes to land use, increased competition for resources (↑ demand for drinking water supply, ↑ wastewater discharges)
- Stream function and health (4) are a reflection of stressors (2) from various land uses within the watershed (1).
- **Remaining populations of rare species often found in relatively undisturbed watersheds with fewer stressors**

Transforming Ecosystems

- Chemical contaminants are pervasive and diverse (Gilliom et al. 2007; Loos et al. 2009; ORD 2011).
- There are more than 80,000 chemicals registered for use in global commerce today (ORD 2011)
- in the U.S., pesticides or their degradates were detected in each of over 1000 streams analyzed for contaminants (Gilliom et al. 2007).
- there are over 1300 "Superfund" Sites in the U.S. (http://www.epa.gov/superfund/sites/npl/status.htm) and 287 active NRDAR cases (NRDAR 2015) where contaminant cleanup and restoration are being implemented.
- Chemical contaminants, including metals, pesticides, nutrients, PCBs, and PAHs, have reduced biodiversity in many ecosystems (Clements et al. 2000; McMahon et al. 2012; Beketov et al. 2013).
- These biodiversity losses often result in reduced environmental health, ecosystem functions, and ecosystem services (Carpenter et al. 1998; Carlisle and Clements 2003; McMahon et al. 2012; Halstead et al. 2014), the latter of which are ecosystem functions that provide benefits to humans (Dobson et al. 2006;Cardinale et al. 2012).

Source: Rohr *et al.* 2016

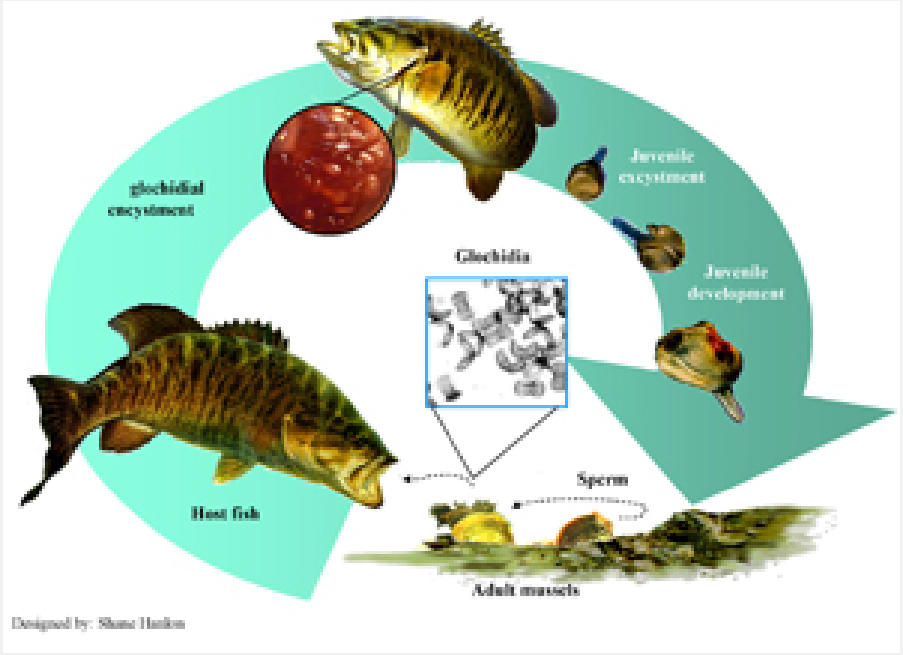
"We are trying to balance human needs/activities with water quality, water quantity, and wildlife protection goals."

Case Study: Freshwater mussels

- North America and Texas are rich in mussels
- At ~297 species of freshwater mussels, the U.S. has highest diversity of Unionid mussels worldwide
- In the U.S., 21 species have gone extinct and ~91 federally protected
- Texas has ~52 species of freshwater mussels; most river basins in east Texas have over 25 species
- 11 mussels in Texas are currently under review or have been proposed for listing by the FWS
- The Texas hornshell was listed as endangered in 2018
- Austin ESFO completed status review of 6 Central Texas Mussels; awaiting action at headquarters (includes Texas fawnsfoot, Texas pimpleback, Guadalupe orb, Texas fatmucket, Guadalupe fatmucket, and false spike)
- Draft East Texas Mussel SSA is currently out for peer and partner review, with a RTM scheduled for late April

Freshwater mussel life history

- Males release sperm into the water column, which is taken in by females through a siphon to fertilize eggs
- Females brood developing eggs and embryos (early glochidia) in gill pouches
- Released glochidia encyst to the gills, face, or fins of the host fish
- After development, juveniles are released from the host
- Juveniles must settle on appropriate substrate
- Mussels are filter feeders (help clean water)
- Sedentary, benthic dwelling organisms; generally long-lived and slow-growing (estimates for TH 4-10 yrs; 20-40 yrs for LP)



Louisiana pigtoe
Pleurobema riddellii

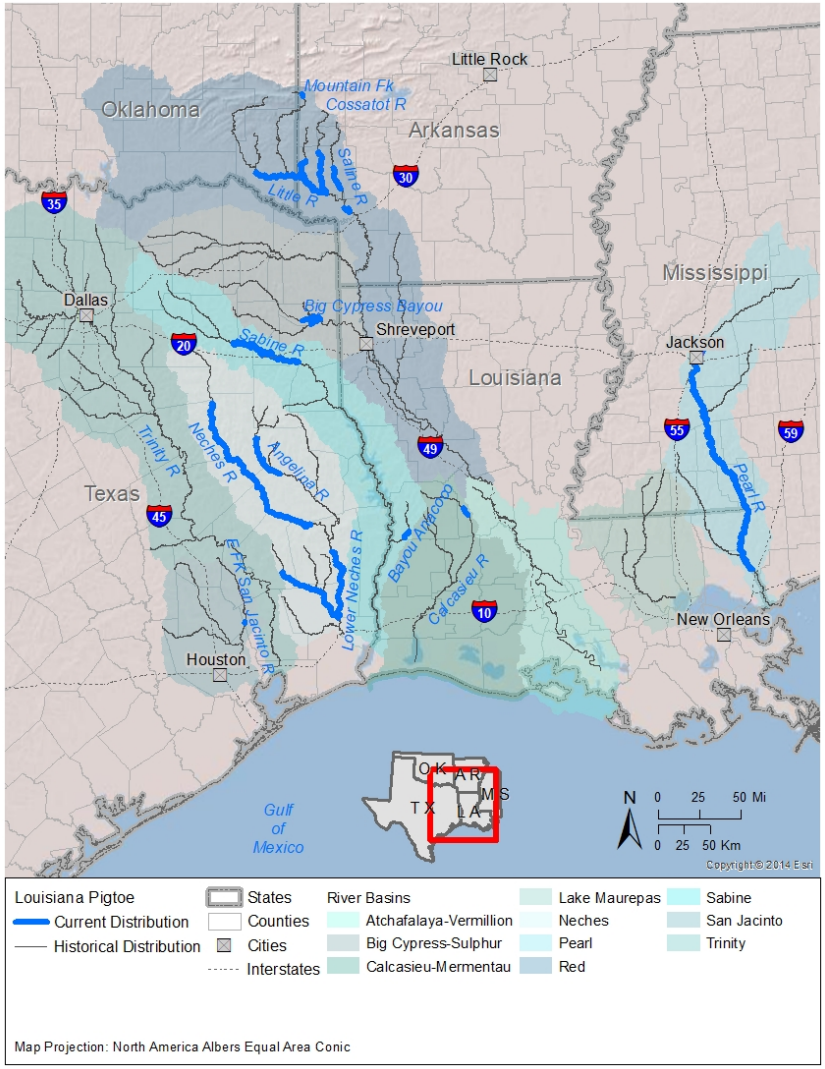
- Petitioned to list in 2007, substantial 90-day finding published in 2009
- Species Needs:
  - Water quality and quantity sufficient to meet life history needs (mussels and host fish)
  - Prefer low to moderate stream flows (0.3 – 1.4 m/s)
  - Substrate: riffles of cobble and rock; sand, gravel, woody debris
  - Spawn in summer and brood through winter
  - Host fish: red shiner, blacktail shiner, bullhead minnow

Louisiana pigtoe

Historical (black) and Current Distribution (blue)

- Historically endemic to 10 River Basins in AR, LA, OK, MS, and TX
- 14 Populations (Focal Areas) remain in 7 Basins (based on live/recent dead observed since 2000)

River Basin	State	Population	Length of Occupied Reach (miles)
Red	AR	**Mountain Fork**	2.3
	AR/OK	**Little River /Rolling Fork**	103.6
	AR	**Cossatot River**	41.9
	AR	**Saline River**	27.9
	AR	**Lower Little River**	8.5
Big Cypress-Sulphur	TX	**Big Cypress Bayou**	32.3
Calcasieu-Mermentau	LA	**Upper Calcasieu River**	9.9
Pearl	LA/MS	**Pearl River**	280.8
Sabine	TX	**Sabine River**	86.8
	LA	**Bayou Anacoco**	9.1
Neches	TX	**Angelina River**	53.2
	TX	**Neches River**	203.0
	TX	**Lower Neches River**	160.4
San Jacinto	TX	**East Fork San Jacinto**	1.3



Threats (to mussels and host fish)

- **Habitat Modification – decline of mussels is primarily due to habitat loss and degradation**
  - **Altered hydrology** - activities like groundwater pumping, reservoirs, and various discharges change natural flow regimes; resulting in permanent increases or decreases to baseflows, amplifying max & min flows, causing an increase in stream drying during low flows or scouring from high-flow runoff events
  - **Siltation/sedimentation** – changes to hydrology can cause erosion, increased movement and deposition of sediments, and streambank collapse; sedimentation can bury & smother mussel beds
  - **Impoundments/barriers to fish & mussel movement** - dams, diversions, reservoirs, crossings = habitat fragmentation; may cause local extirpations of host fishes
  - **Pollution** – point and non-point sources degrade water quality; cause changes to basic water chemistry (DO, salinity, temp) and increased contaminant input. Can cause acute and chronic toxicity (e.g., deposit Persistent Bioaccumulative and Toxic (PBT) Chemicals in sediment). Influence of point source discharges (e.g., municipal wastewater) on WQ is > during low flows
  - **Climate change** – more extreme weather events; more intense droughts/floods; future likely to be hotter and drier; exacerbates other threats; hotter temps will likely translate into less dilution for point source pollutants; the toxicity of many pollutants also increases at higher temperatures
- **Direct Mortality –** predation, collection (personal or scientific), bait for recreational fishing
- **Invasive species –** can alter nutrient cycling (zebra), impact water quality (feral hogs)

Reservoirs

- Reservoirs built 1° for flood control and raw water supply
- Hydrology is permanently altered upstream and downstream, hence ecology is altered (e.g., fish community);
- Altered flow regime - river no longer manages storm flows naturally (expanding into floodplain).
  - Storm releases ↑ max flows, cause erosion & scouring downstream
  - As flows are held back to conserve water in summer, downstream flows are reduced
- Basic water chemistry changes downstream, most notably to water temperature, but also dissolved oxygen, nutrient cycling, and other parameters
- Bulk of suspended sediments trapped in lake; reduced deposition downstream under normal operations
- Forms barrier to host fish movement and mussel dispersion; populations isolated
- Lower aquatic diversity downstream, mussels often absent

Lake Livingston (Trinity River)

Water Quality

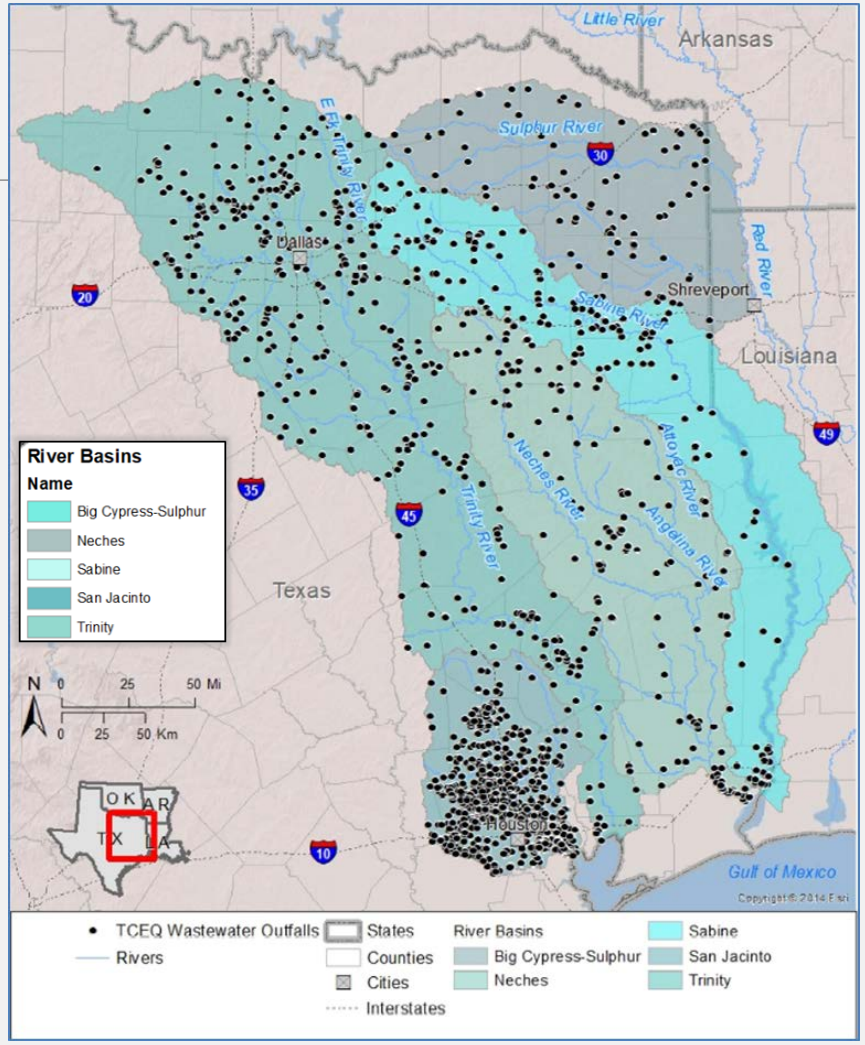
(Example of point-source pollution)

Wastewater Outfalls by Texas River Basin

San Jacinto	1052 outfalls
Trinity	386 outfalls
Neches	218 outfalls
Sabine	191 outfalls
Big Cypress/Sulphur	89 outfalls

- Water chemistry near outfall significantly altered
- Increased nutrients, algae, higher risk of toxicity

  and accumulation of persistent pollutants
- Discharges 24/7, 365 days (altered baseflows); zone of impact will vary based on volume of discharge and base flows
- Level of impact will vary by volume of ww discharged and volume of baseflows in river; cumulative impact is significant
- Reduced mussel survival and growth for at least 3.85 km downstream (Nobles and Zhang 2015); based on flows at Wilbarger Creek (~ 2 MGD) in Central Tx



Example: chemical complexity of municipal wastewater effluents (O_3 = treatment by ozonation for removal of emerging contaminants; ND = non-detect)

Description	Raw Sewage- AVE	Secondary Effluent AVE	O_3 Low Dose 2.5 mg/L	O_3 Medium Dose	O_3 High Dose
Analyte	**ppt**	**ppt**	**ppt**	**ppt**	**ppt**
Hydrocodone	218	240	ND	ND	ND
Acetaminophen	43750	ND	ND	ND	ND
Caffeine	97800	51	ND	ND	ND
Erythromycin-H_2O	285	133	ND	ND	ND
Sulfamethoxazole	590	841	3.1	ND	ND
Fluoxetine	<25	18	ND	ND	ND
Pentoxifylline	46	ND	ND	ND	ND
Meprobamate	739	332	140	63	42
Dilantin	94	154	17	3.4	ND
TCEP	453	373	427	352	334
Carbamazepine	99	210	ND	ND	ND
DEET	413	188	39	10	3.4
Atrazine	251	ND	ND	ND	ND
Oxybenzone	2925	6	8.2	ND	1.5
Estriol	240	ND	ND	ND	ND
Ethynylestradiol	<25	ND	ND	ND	ND
Estrone	<25	ND	ND	1.1	ND
Estradiol	49	ND	ND	ND	ND
Testosterone	110	ND	ND	ND	ND
Progesterone	103	ND	ND	ND	ND
Androstenedione	684	ND	ND	ND	ND
Iopromide	37	22	6.2	2.0	ND
Ibuprofen	11950	19	1.1	ND	ND
Diclofenac	28	54	ND	ND	ND
Triclosan	1590	85	112	50	72
Galaxolide	1680	1169	46	ND	ND

Strategy for Municipal Wastewater

Prioritize – limited staff and resources, so focus on large volume dischargers in areas of highest concern to T&E species

Partnerships - work with Partners

- review permits & comment to TCEQ and EPA with concerns
- note violations

Avoid – if possible, work with City to locate outfalls away from sensitive areas and critical habitat; most protective

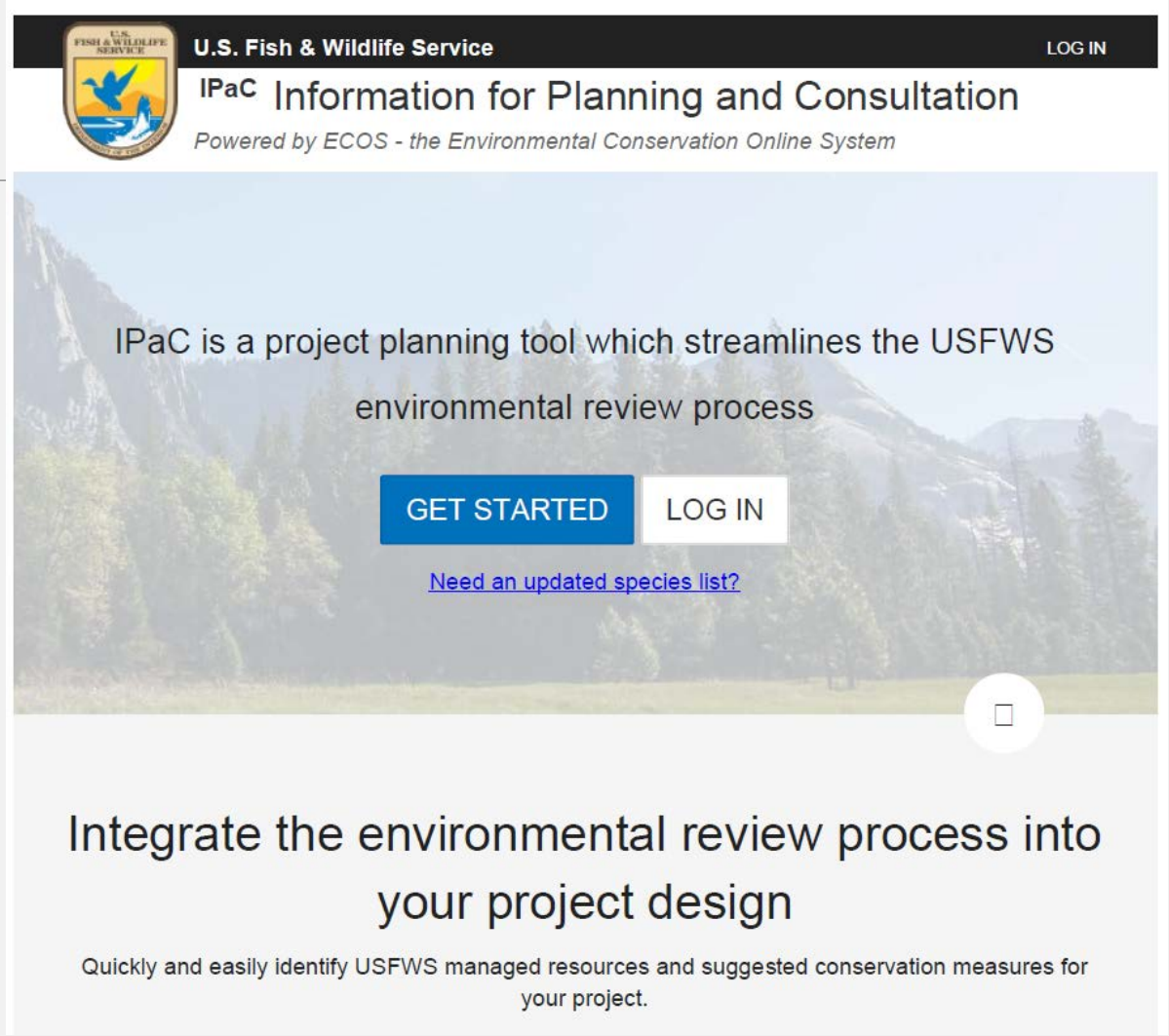
Minimize – if can't avoid, ask permittee to:

- Monitor, report, and evaluate priority pollutants
- WET - water flea and fathead minnow chronic toxicity tests
- Weight of evidence approach to assess risks moving forward; evaluate and adaptively manage
- Encourage use of Best Available Technologies (BATs) for ww treatment

Mitigate – if injury is unavoidable, look for ways to benefit the species

Tools - IPAC

- https://ecos.fws.gov/ipac/
- Online resource to evaluate FWS resources located near your project



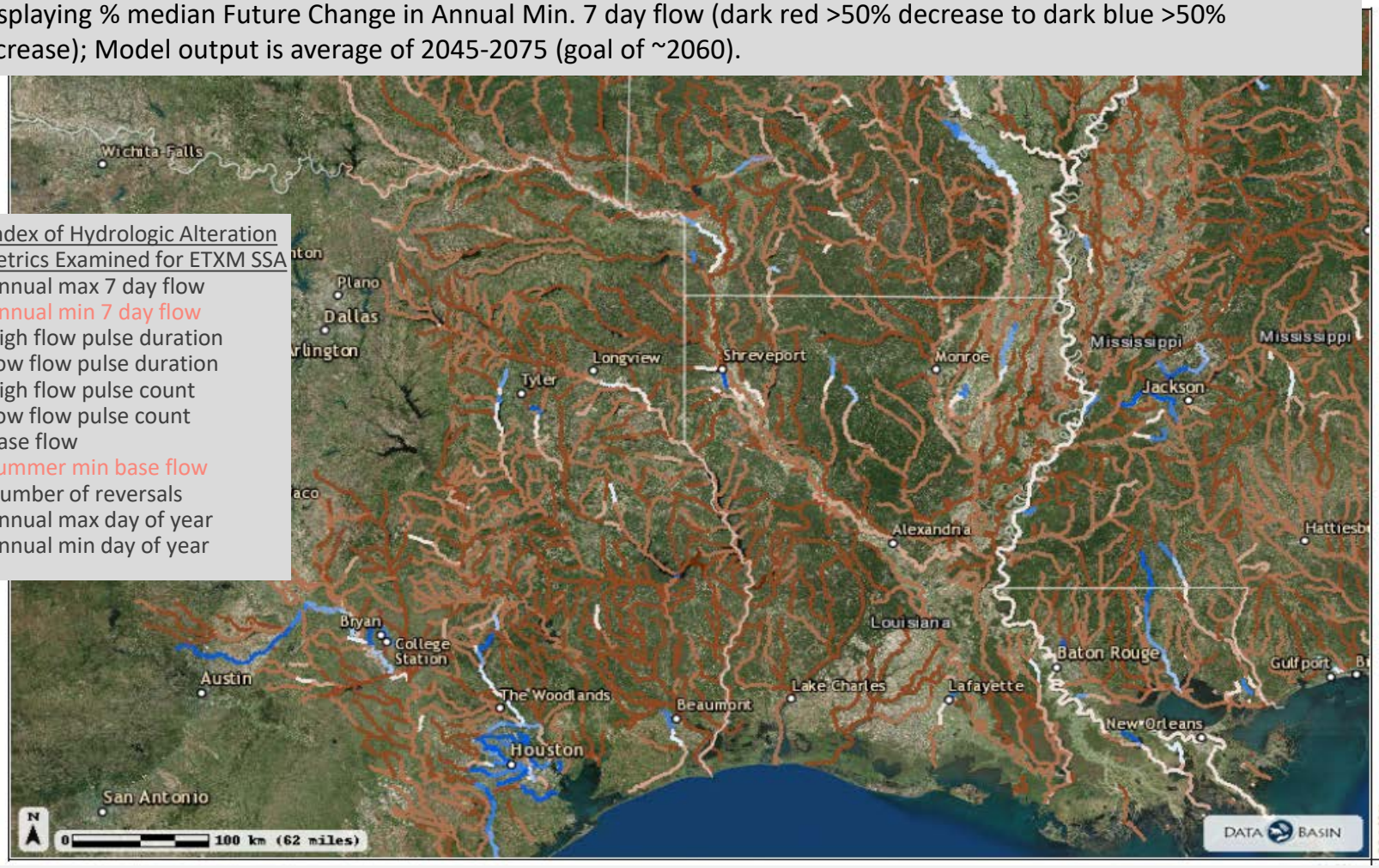
TOOLS - Assessing Climate Change using PRMS (Precipitation Runoff Modelling System)

- Model funded by the FWS and developed by USGS to evaluate changes to hydrology based on historical observations, potential climate projections, and changes to land cover for the period 1952 – 2099
- Study area included the entire southwestern U.S., which was divided into HRUs (hydrologic response units)
- The PRMS computes flow generated locally on each HRU for each time step. These flow units are directed to stream segments (SEGs) for flow aggregation.
- 52 streamflow metrics (Index of Hydrologic Alteration (IHA metrics)) were calculated based on daily model flow outputs.
- The streamflow metrics were selected to describe streamflow conditions believed to be most helpful in defining the suitability for each river or stream to support sustaining populations of priority aquatic species
- Model available here: https://gcpolcc.databasin.org/maps/c3423bb56f9c44c4bcd478a092ed3c28/active

Displaying % median Future Change in Annual Min. 7 day flow (dark red >50% decrease to dark blue >50% increase); Model output is average of 2045-2075 (goal of ~2060).

Index of Hydrologic Alteration Metrics Examined for ETXM SSA

- Annual max 7 day flow
- Annual min 7 day flow
- High flow pulse duration
- Low flow pulse duration
- High flow pulse count
- Low flow pulse count
- Base flow
- Summer min base flow
- Number of reversals
- Annual max day of year
- Annual min day of year



Legend

Annual Min 7 Day Flow
Displaying: DL3 - Median % Future Difference

- -1000.0 - -50.0
- -49.9 - -20.0
- -19.9 - -10.0
- -9.9 - -5.0
- -4.9 - 0.0
- 0.1 - 5.0
- 5.1 - 10.0
- 10.1 - 20.0
- 20.1 - 50.0
- 50.1 - 1000.0

PRMS Model Domain - HRU and SEG with labels

De Soto, MO 63020, USA

Guiding Principles

- **Science** - sound science is the foundation for decision-making and guides natural resource management

- **Partnerships** – cooperation over conflict; leverage capacity by working with State, Federal, and local communities to protect water quality and meet conservation goals.

- **Prevention** – invest in early detection and intervention to minimize impacts of potentially harmful and protect trust resources

Questions?

Visit www.fws.gov or contact erik_orsak@fws.gov for more information

Comments or Announcements?

Thank you!

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