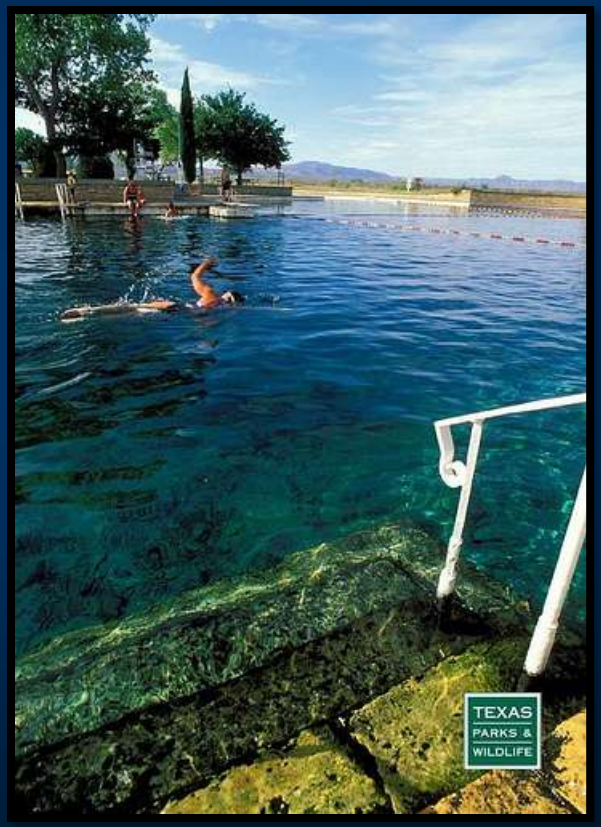
Texas: Water For Wildlife

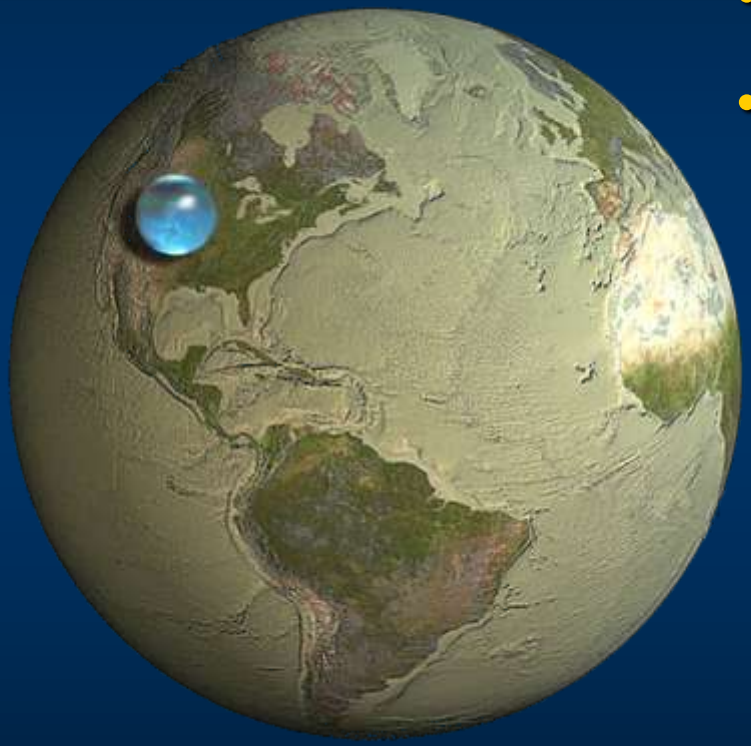
Cappy Smith

TEXAS
PARKS &
WILDLIFE

- Texas water resources
- Understanding wildlife's connection
- Who owns the water?
- Why care?
- What can I do?



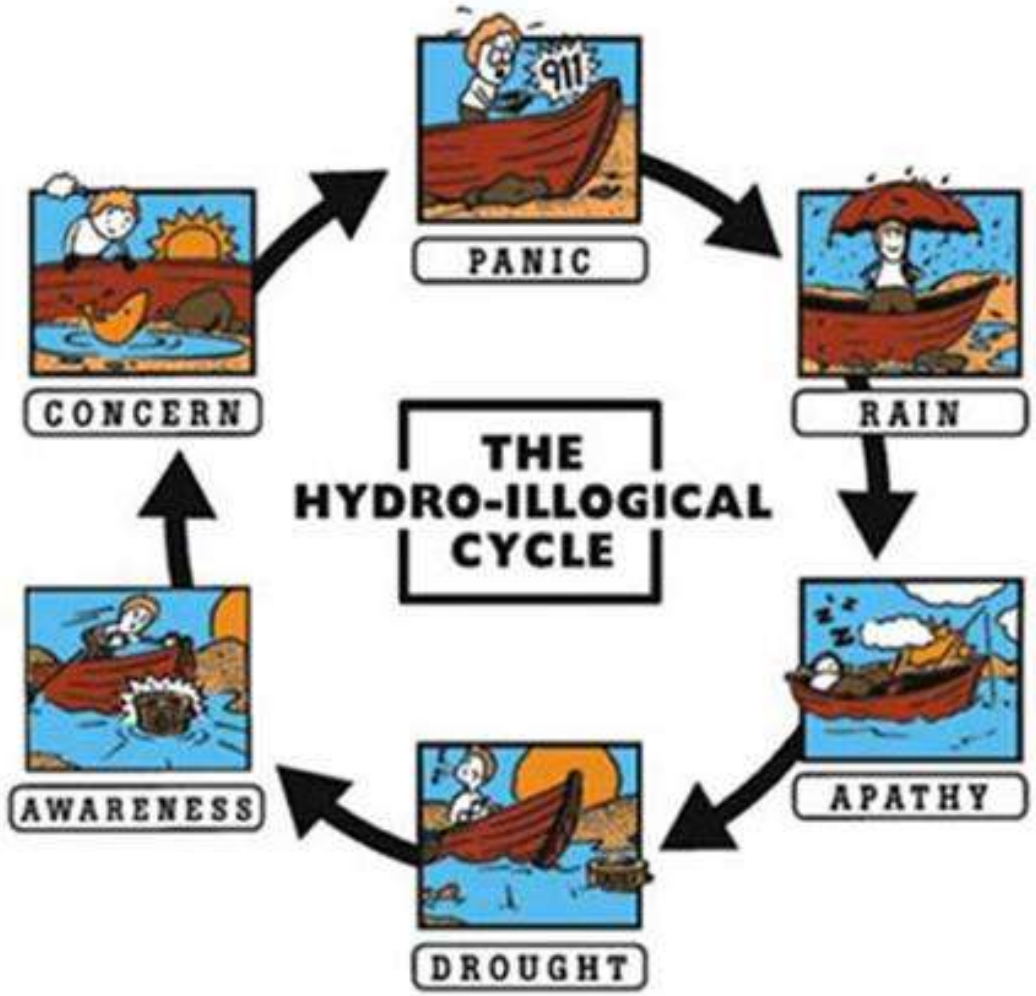
How Wet Is Our Planet?



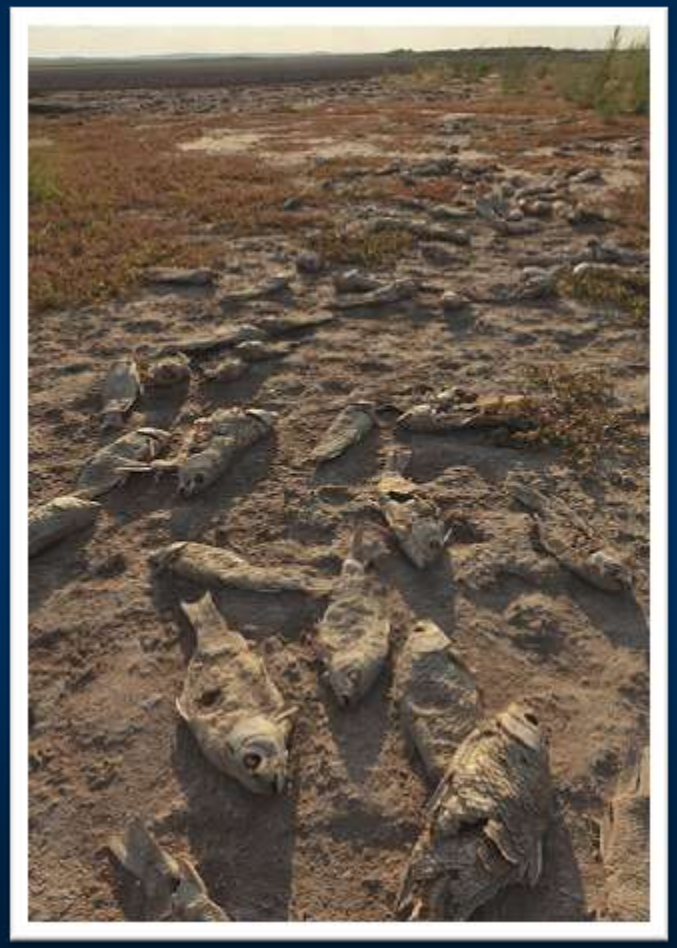
- 97% salt water
- 3% fresh water
  - 69% icecaps and glaciers
  - 30% ground water
  - 1% surface water
    - 87% lakes
    - 11% swamps
    - 2% rivers

Image © Woods Hole Oceanographic Institution
Used with permission

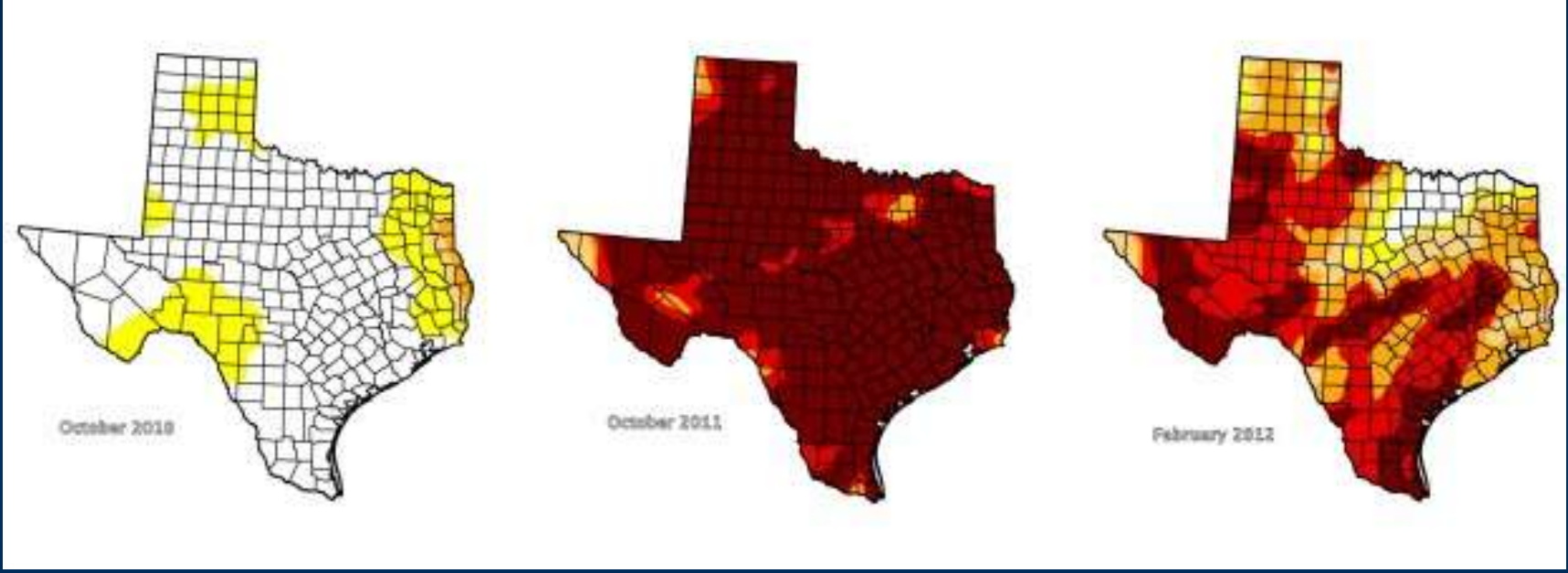
How Do We Use Water?


911
PANIC
RAIN
APATHY
DROUGHT
AWARENESS
CONCERN
THE HYDRO-ILLOGICAL CYCLE

Summer 2011



The 2011 Drought



Abnormally Dry-
Moderate Drought
Severe Drought
Extreme Drought
Exceptional Drought

The Drought Today

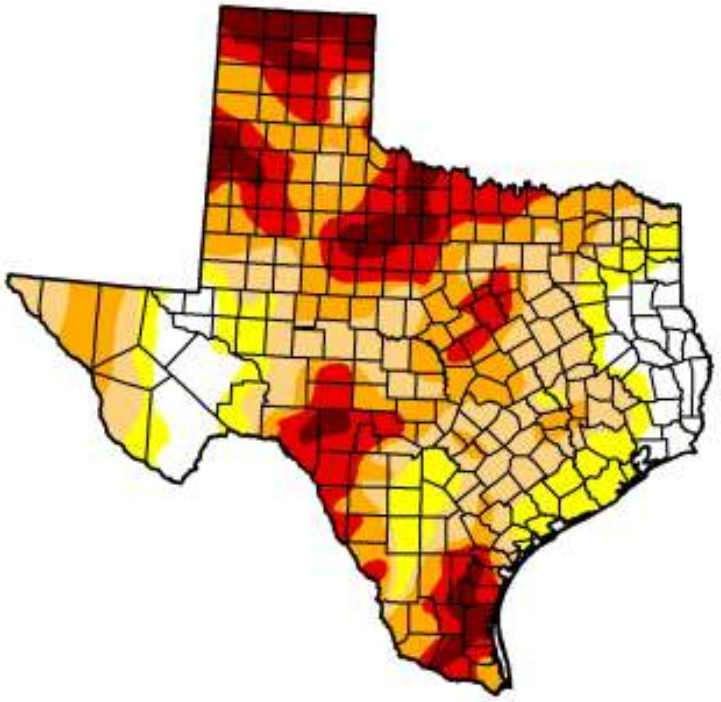
U.S. Drought Monitor

February 12, 2013
Valid 7 a.m. EST

Texas

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	10.84	89.16	75.62	50.05	24.83	7.79
Last Week (02/05/2013 map)	9.52	90.48	77.26	52.64	23.72	7.79
3 Months Ago (11/13/2012 map)	10.54	89.46	69.59	36.99	18.92	6.12
Start of Calendar Year (01/01/2013 map)	3.04	96.96	87.00	65.39	35.03	11.96
Start of Water Year (09/25/2012 map)	9.13	90.87	78.73	57.41	24.91	5.18
One Year Ago (02/07/2012 map)	4.93	95.07	90.05	77.46	54.96	23.12



Intensity:

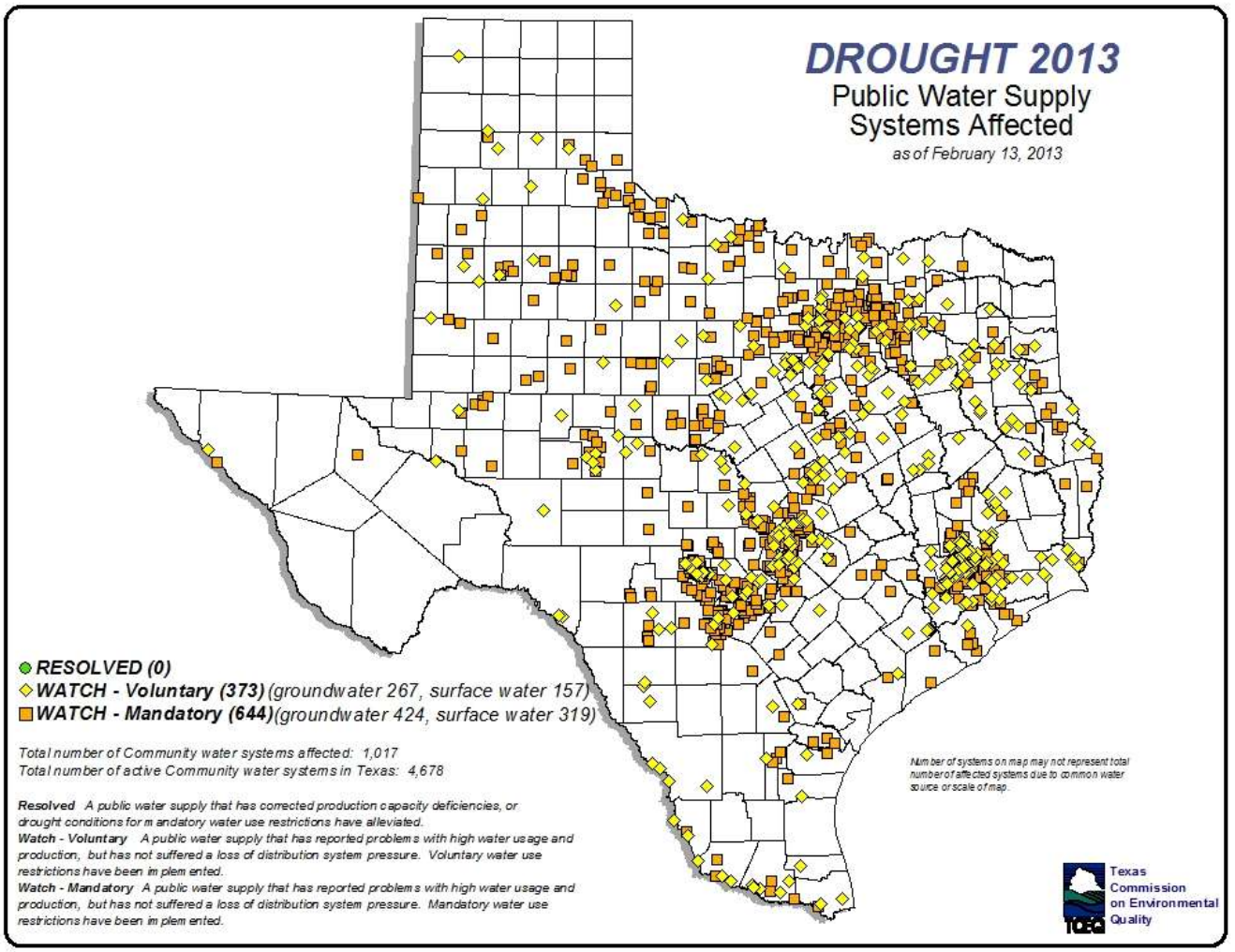
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

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

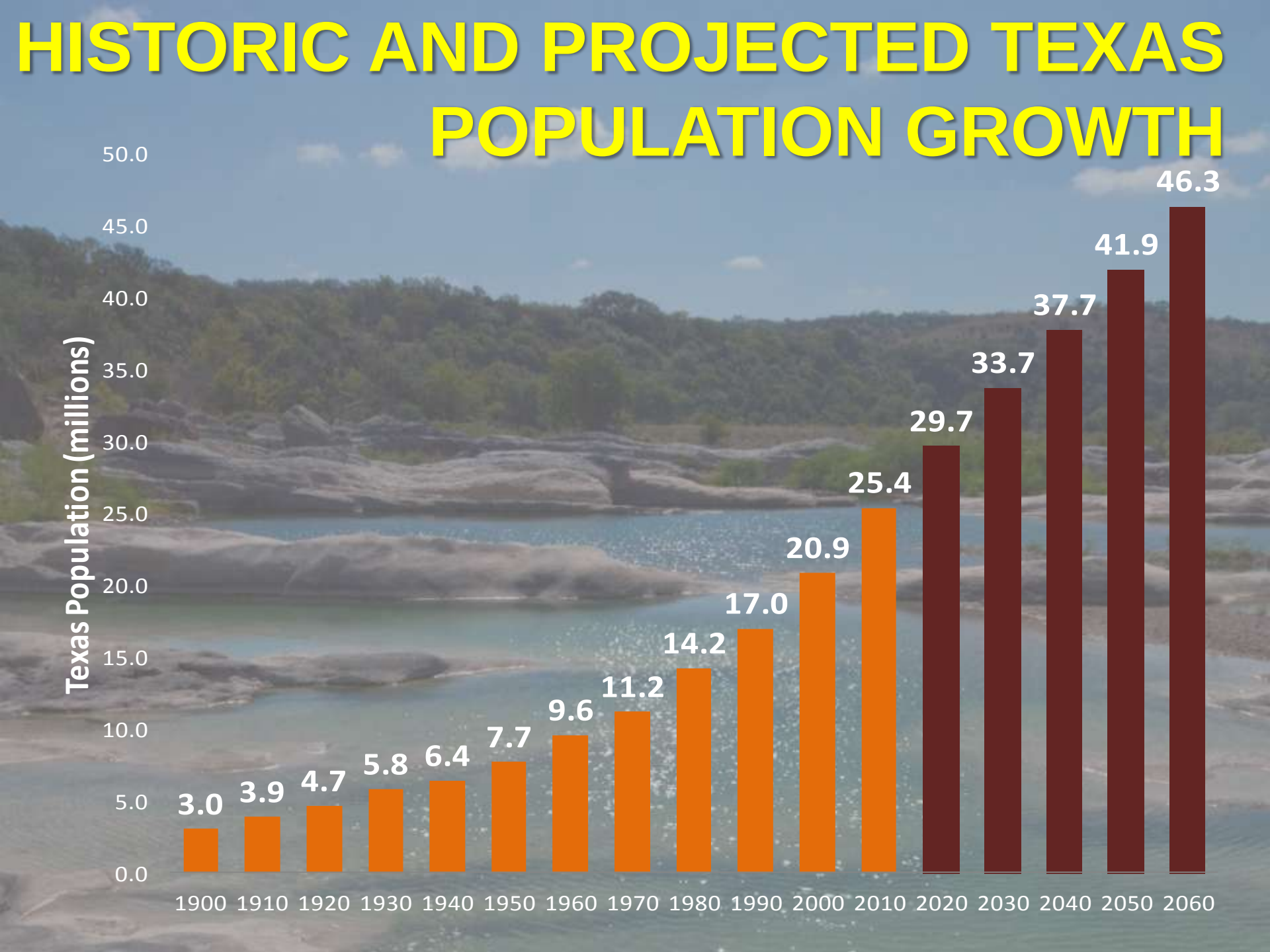
http://droughtmonitor.unl.edu

Released Thursday, February 14, 2013
Michael Brewer, National Climatic Data Center, NOAA

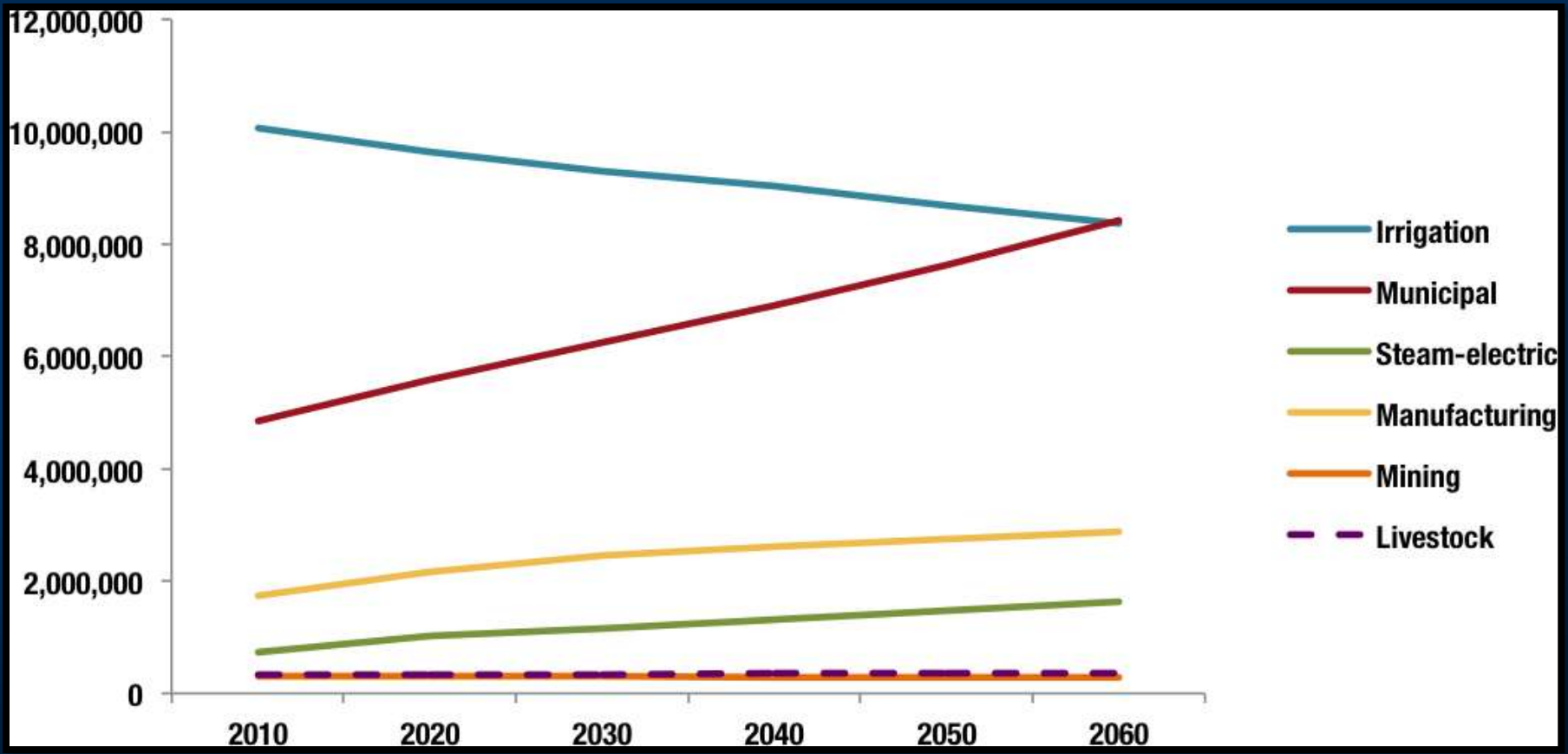
Water Shortages



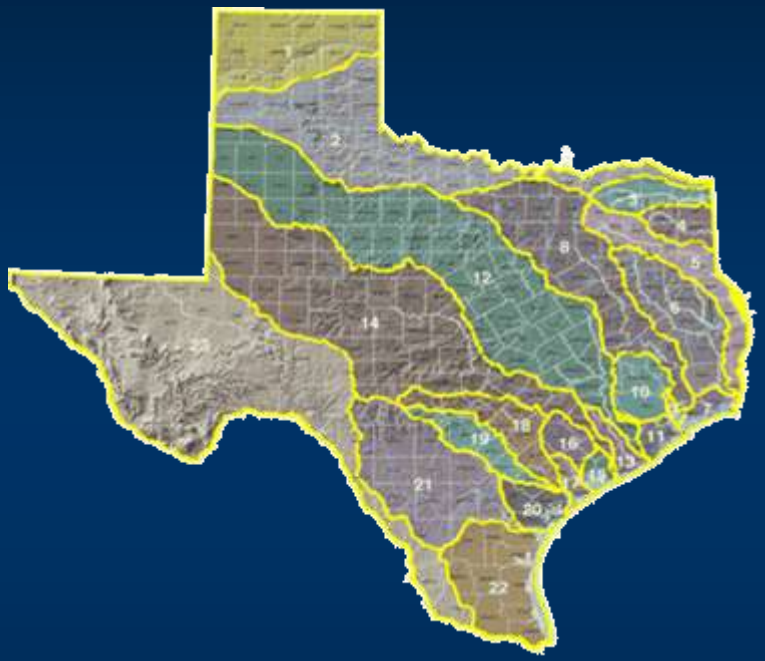
HISTORIC AND PROJECTED TEXAS POPULATION GROWTH

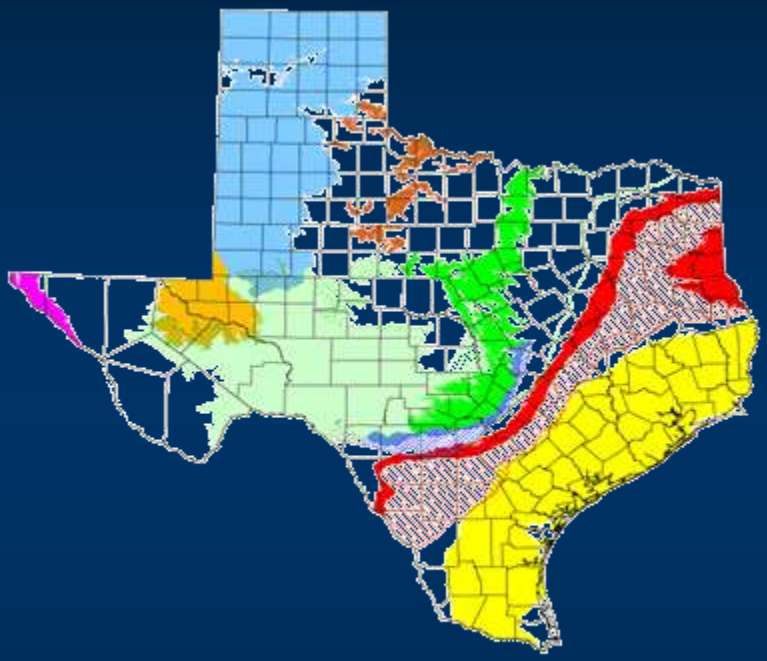


Water Demand Projections by Category



Texas Sources of Fresh Water





Source: Texas Water Development Board

Surface water

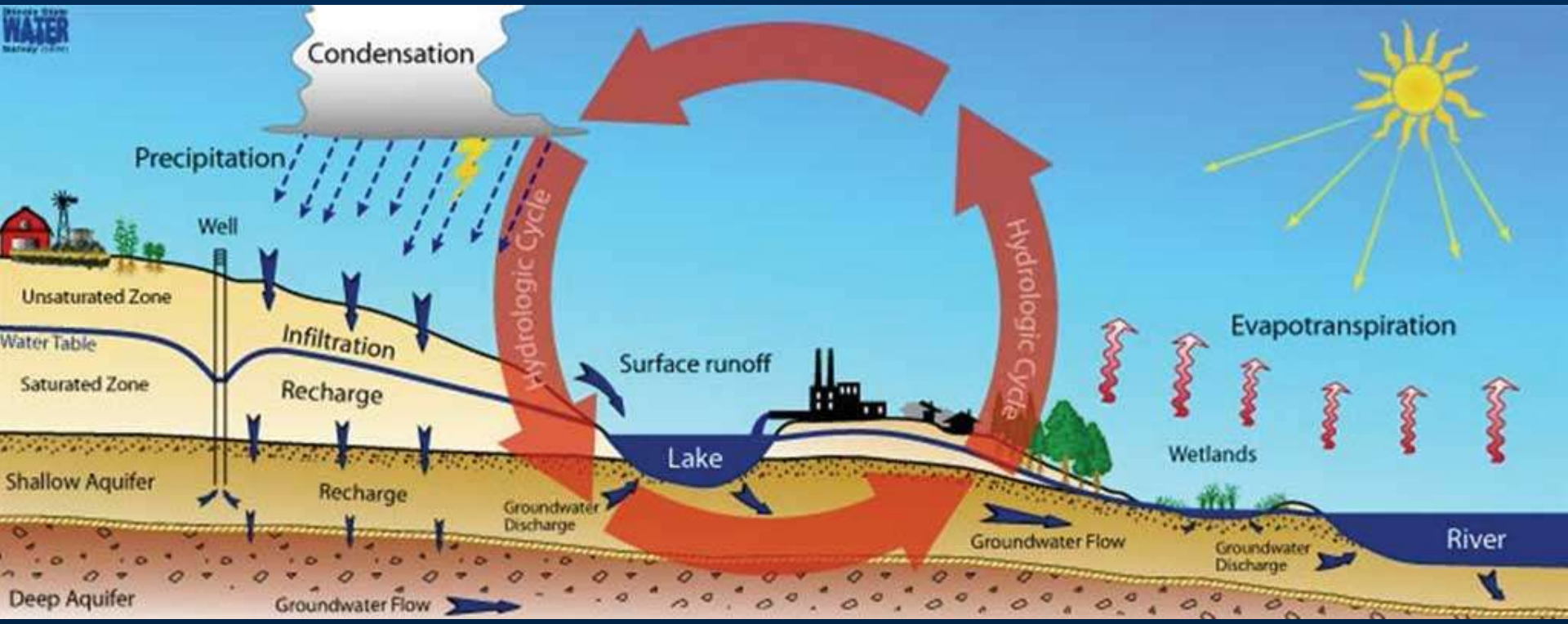
15 major river basins

Groundwater

9 major aquifers

20 minor aquifers

Groundwater- Surface Water Interaction



Texas River Habitat

191,000 miles of streams and rivers

80 % of all vertebrate species in the desert southwest depend on riparian areas for at least some part of their life cycle. **TPWD**

Texas Lakes

- 216 species birds
- 47 species mammals
- 90 species reptiles & amphibians

Texas Reservoirs

- 212 major reservoirs
- 500 small reservoirs

2nd only to Minnesota in surface area of lakes and reservoirs

Springs Habitat

Comal Springs

San Marcos River

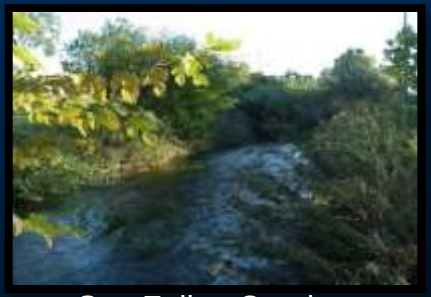
Of the 281 major and historical springs identified in Texas in 1981, more than 65 no longer flow.

Fountain Darter

Riffle Beetle

Texas Wild Rice

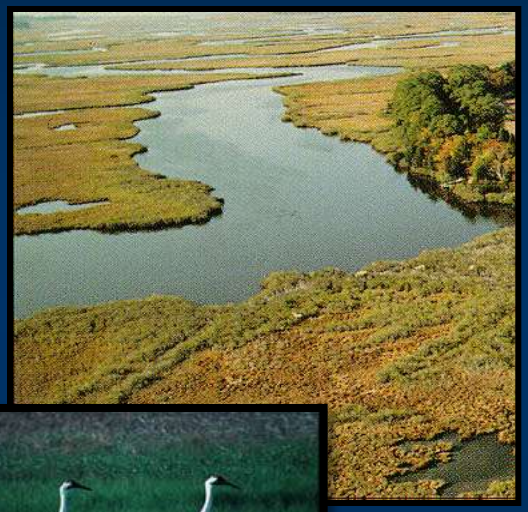
San Marcos Salamander



San Felipe Creek

Wetlands Habitat

Riparian Wetland



Marsh

Alligator

Frogs and Toads

Whooping Crane

Tri-colored Heron

Water Lilies

White Ibis

Wetlands improve water quality, prevent floods, control erosion, and act as feeding grounds and nurseries for wildlife.

More than 12 million shorebirds and wading birds are highly dependent on water in ricelands for nesting, migrating, and wintering habitat. Gulf Coast Joint Venture

Estuarine Habitat

Galveston Bay

Nueces Bay

Estuaries are transition zones loaded with nutrients. Estuaries provide important nursery grounds for most of our seafood, saltwater sportfish, shrimp and crabs.

Bay Fishing

Brown Pelican

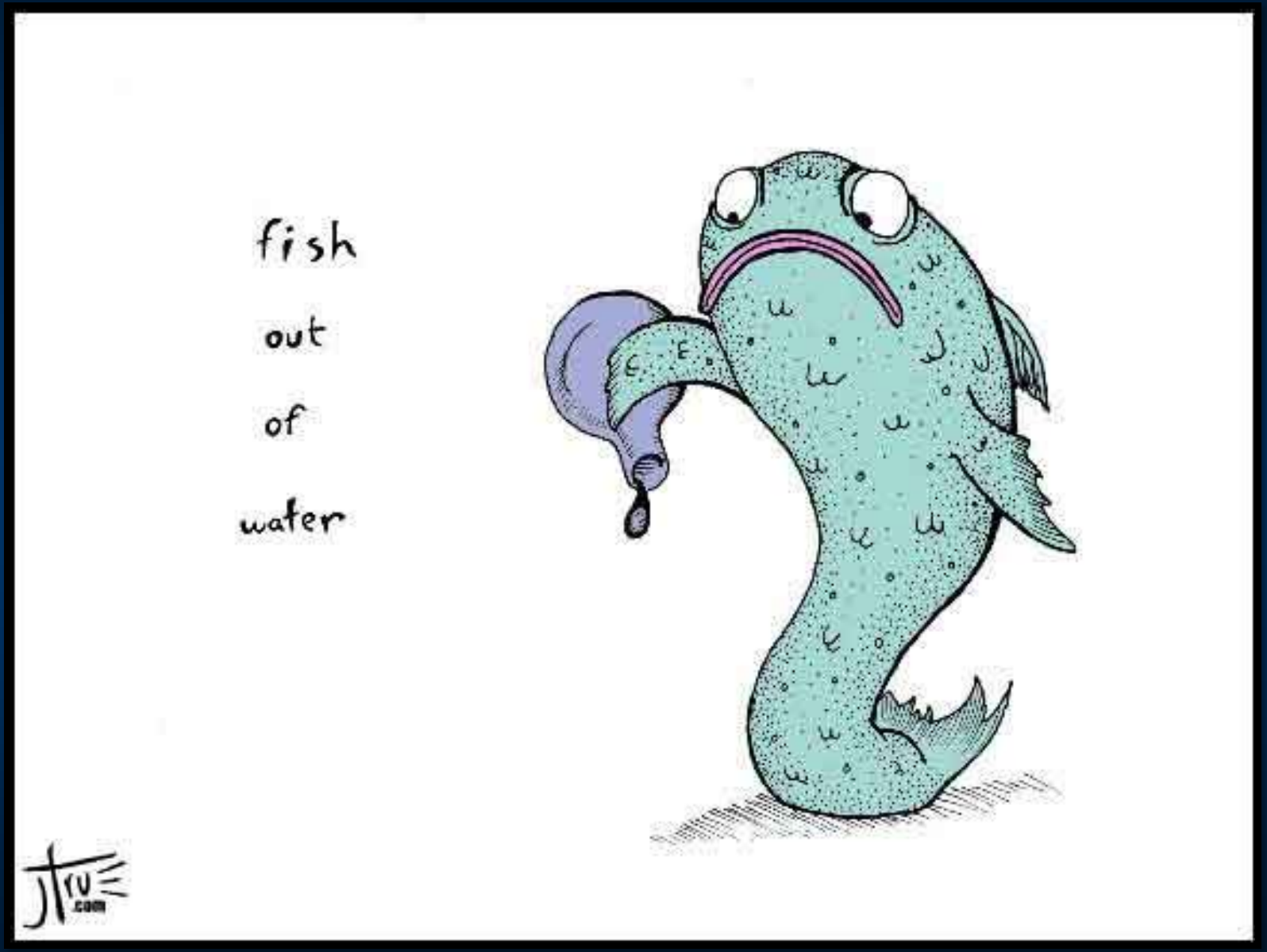
Shrimp Boats

Blue Crab

Environmental Flows

- Provide for aquatic and riparian habitat
- Water quality protection
- Recreation
- Navigation
- Freshwater Inflows to bays & estuaries

How Much Water Does A Fish Need?



Subsistence Flow

- Infrequent low flows, very dry or drought conditions
  - Highly stressful for aquatic biota
  - Water quality is maintained, but potentially compromised
  - Aquatic habitat is restricted. Little to no connectivity

Base Flow

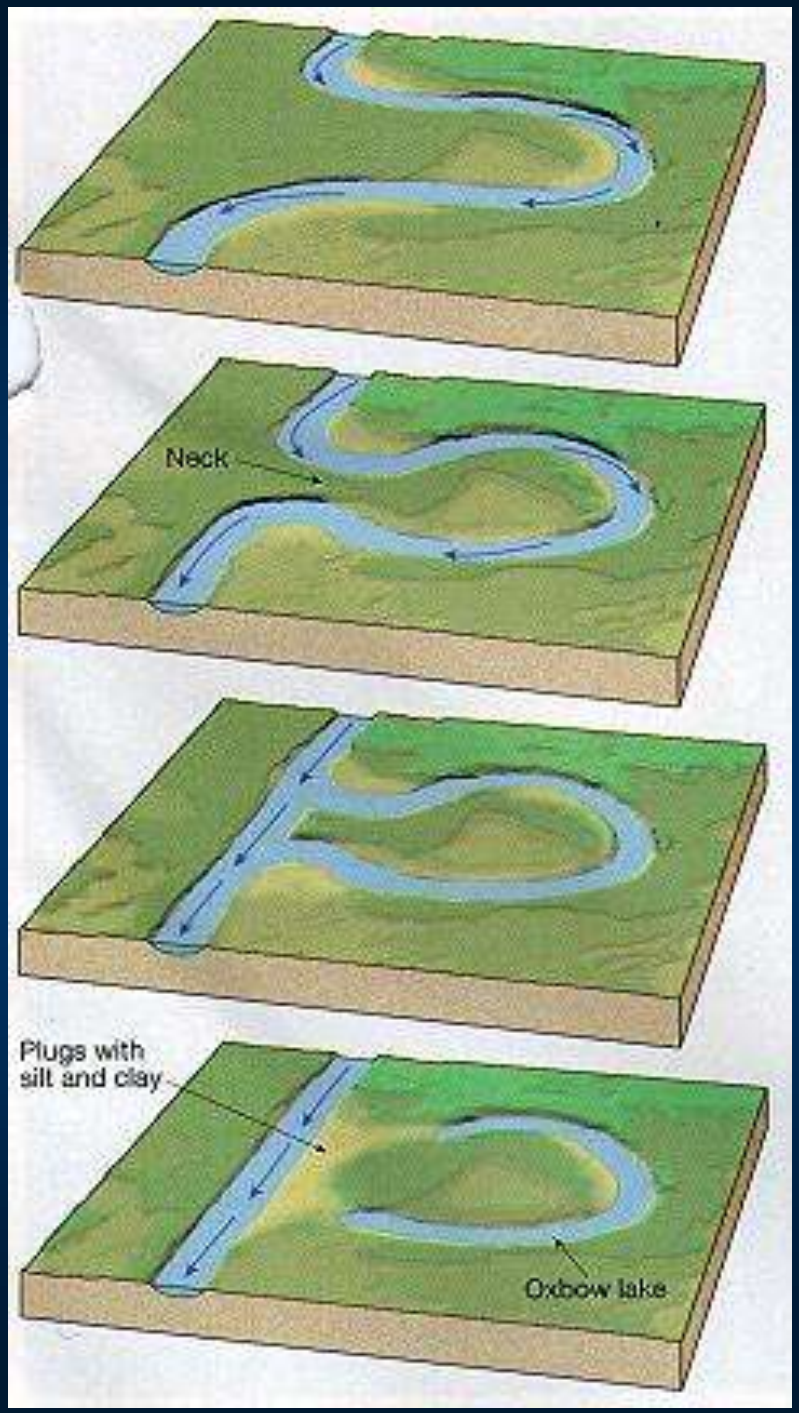
- Average flow conditions including variability
- Provides suitable aquatic habitat
- Maintain connectivity and diversity of habitats
- Provides suitable water quality

High Flow Pulses

- Provides a myriad of ecological functions including:
  - Spawning habitat
  - Providing connectivity to near channel water bodies
  - Flushing of fine sediment
  - Vegetation scouring
  - Seed dispersal

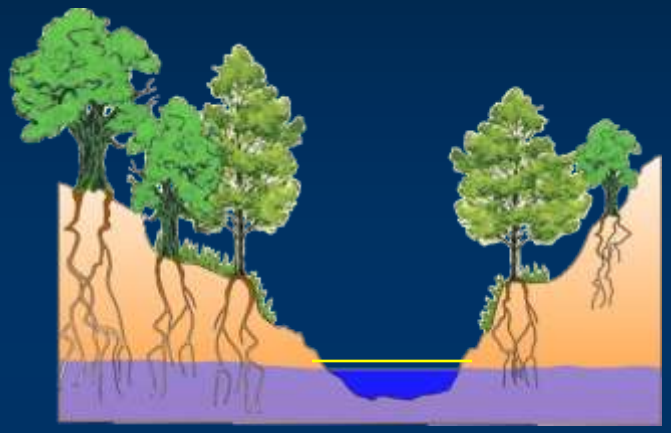
Overbank Flows

- Floodplain maintenance
- Nutrients into floodplain
- Riparian health
- Restore water quality in floodplain water bodies (oxbow lakes)

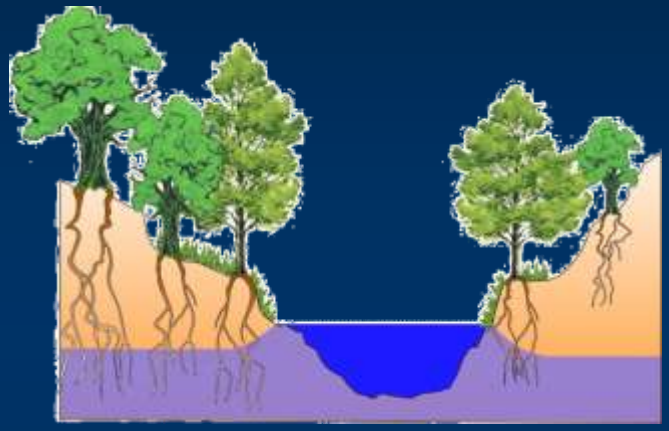

Neck
Plugs with
silt and clay
Oxbow lake

Instream Flow Components

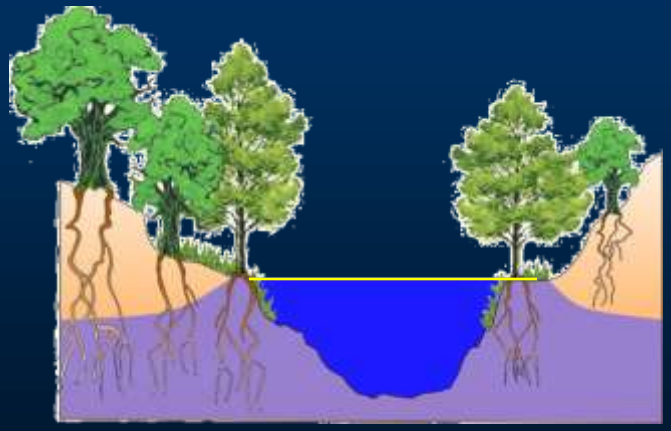
Subsistence Flows



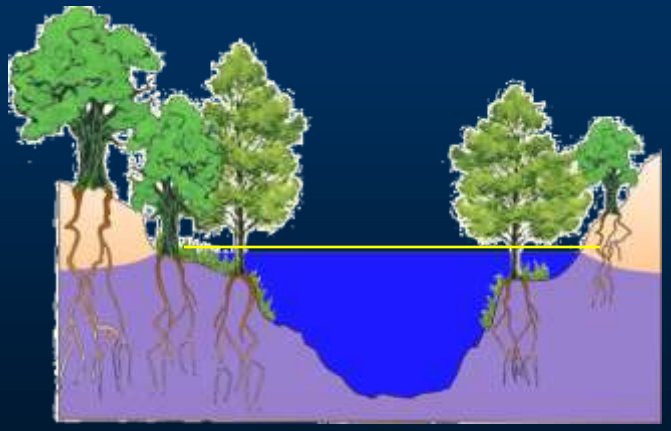
Base Flows



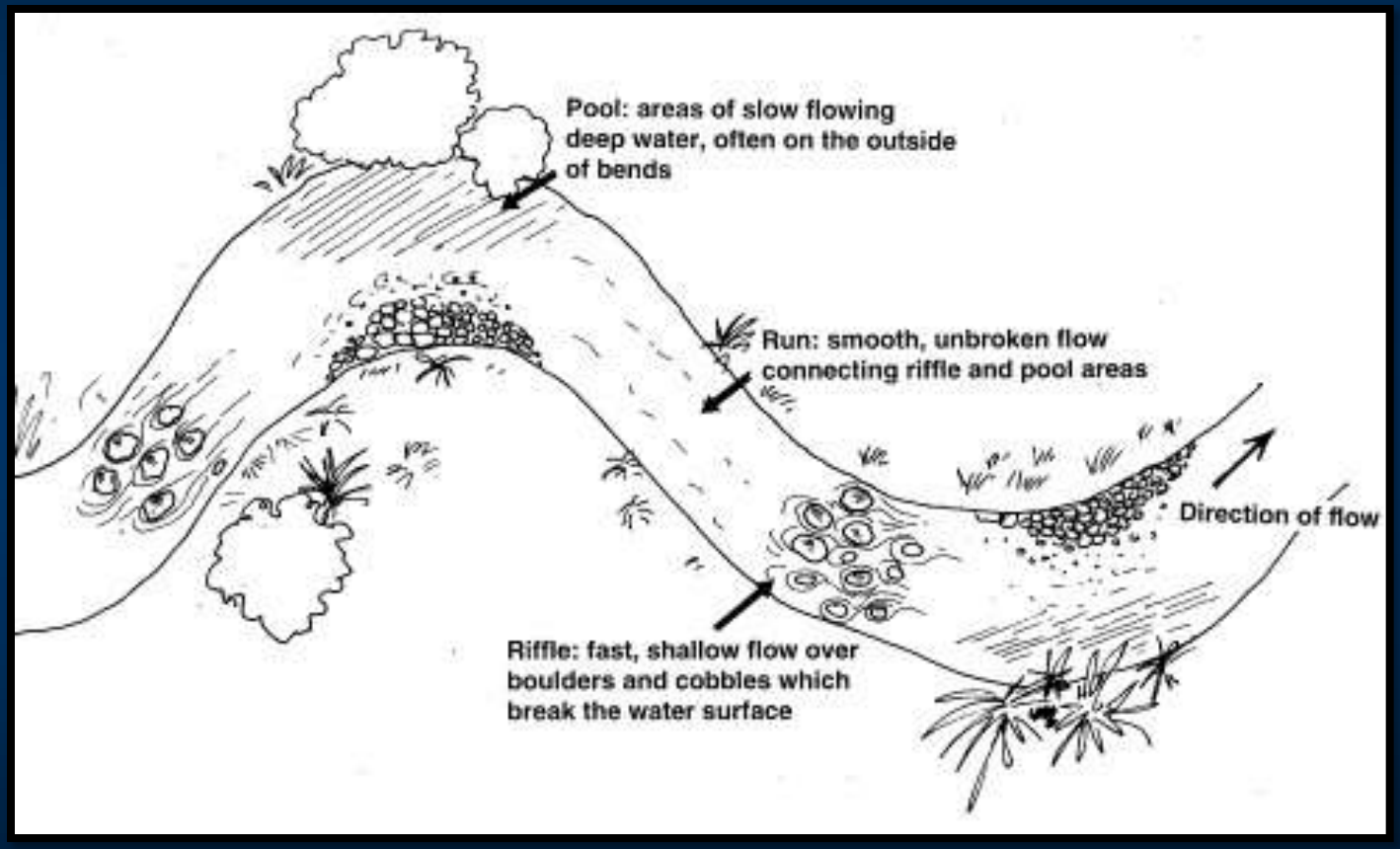
High Flow Pulses



Overbank Flows

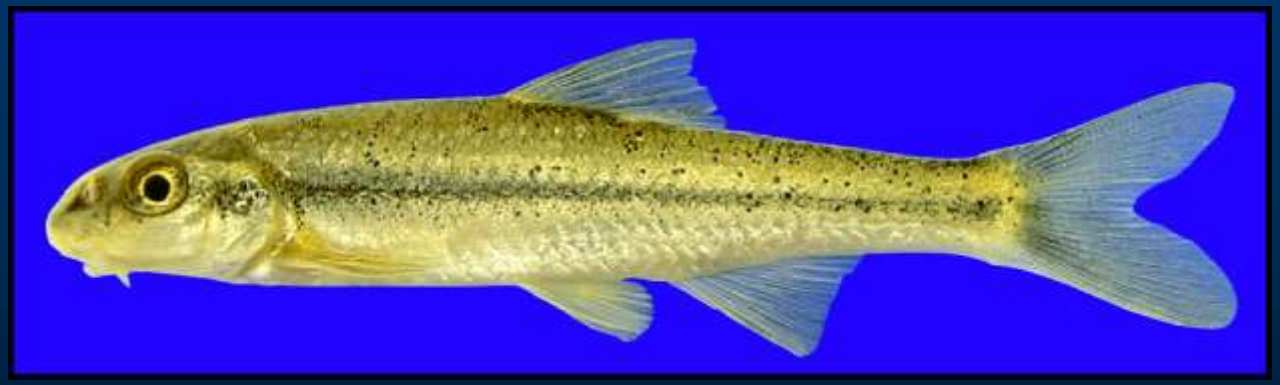


Stream Habitats



http://share3.esd105.wednet.edu/rsandelin/ees/Resources/Flowing%20water%20concepts.htm

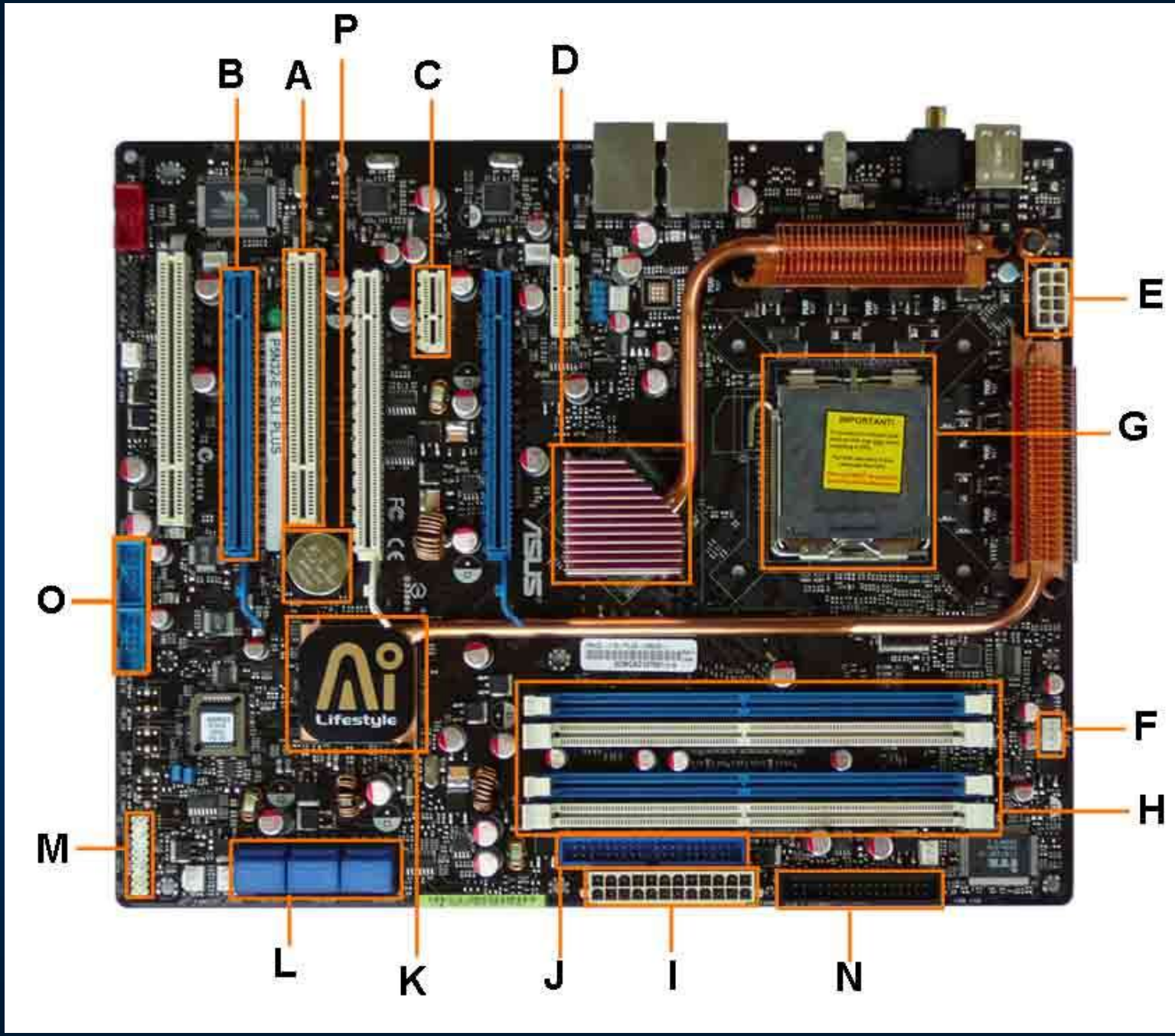
Tied to Flow



Burrhead chub

www.bio.txstate.edu/~tbonner/txfishes/

Picture by Chad Thomas, Texas State University-San Marcos


P
B
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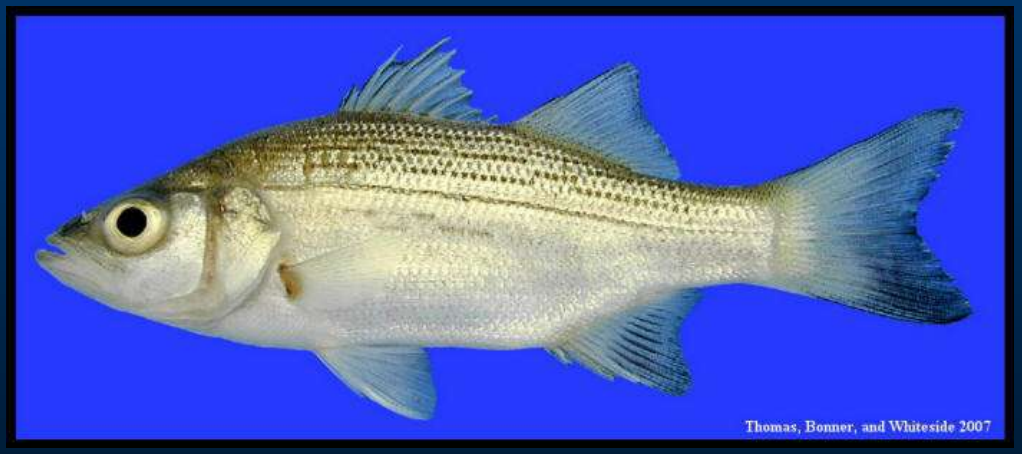
Lifestyle

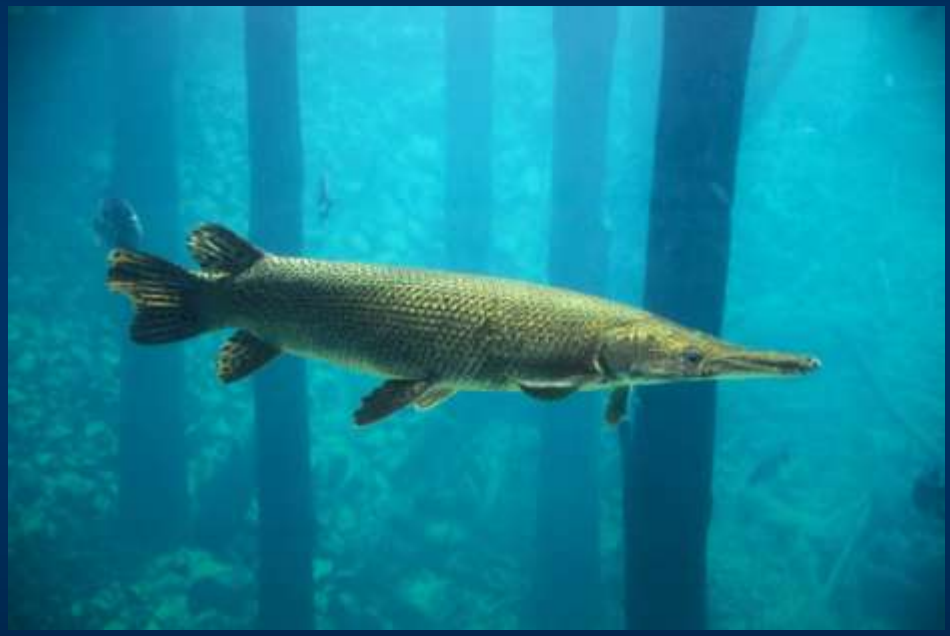
Tied to Flow



White bass

www.bio.txstate.edu/~tbonner/txfishes/
Picture by Chad Thomas, Texas State University-San Marcos

Tied to Flow



Alligator Gar

Low Flow

Brazos River

Who Owns the Water?

Surface Water

"First in time, first in right"

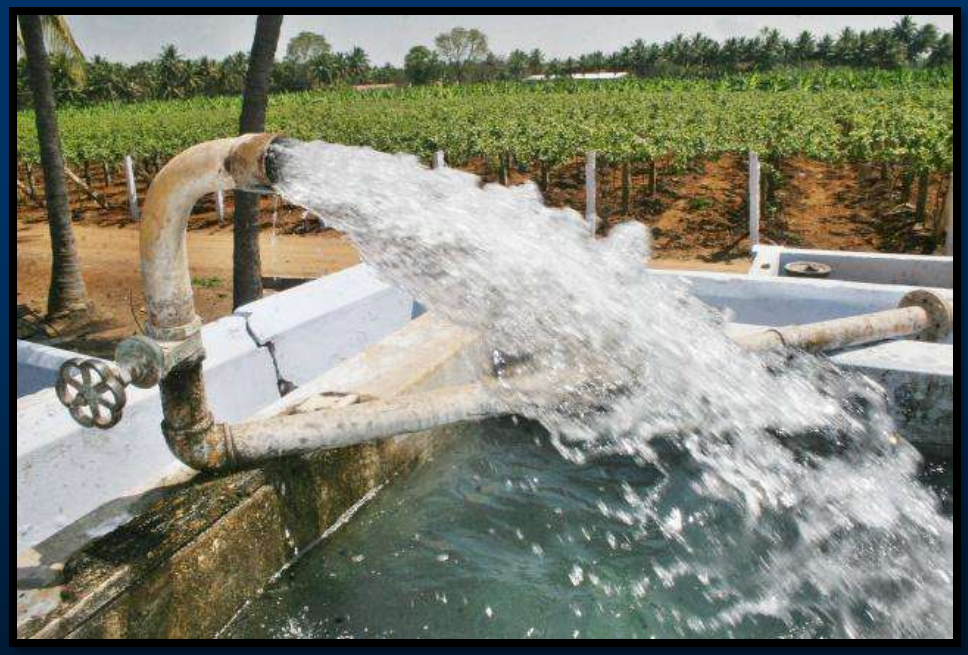
Groundwater

"The biggest straw wins"

http://www.tceq.state.tx.us/permitting/water_supply/water_rights/eflows/group.html

LEGISLATIVE OVERVIEW

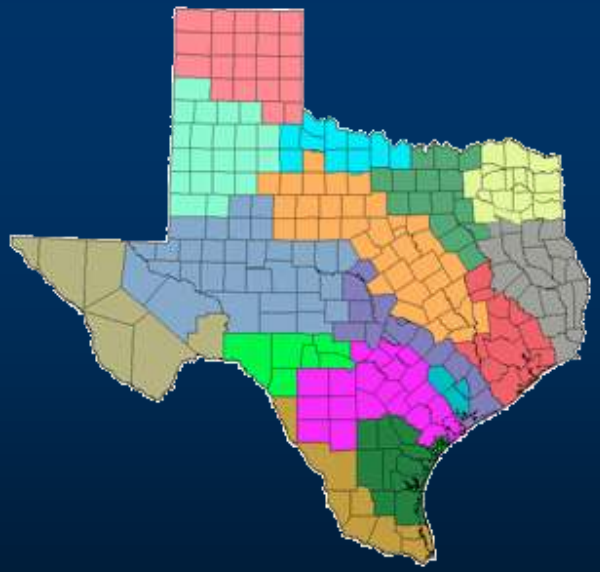
- Prior to 1975, no consideration of environmental flows in the water right permitting process



Water Legislation

Senate Bill 1 (1997)

- Water planning conducted by regional planning groups

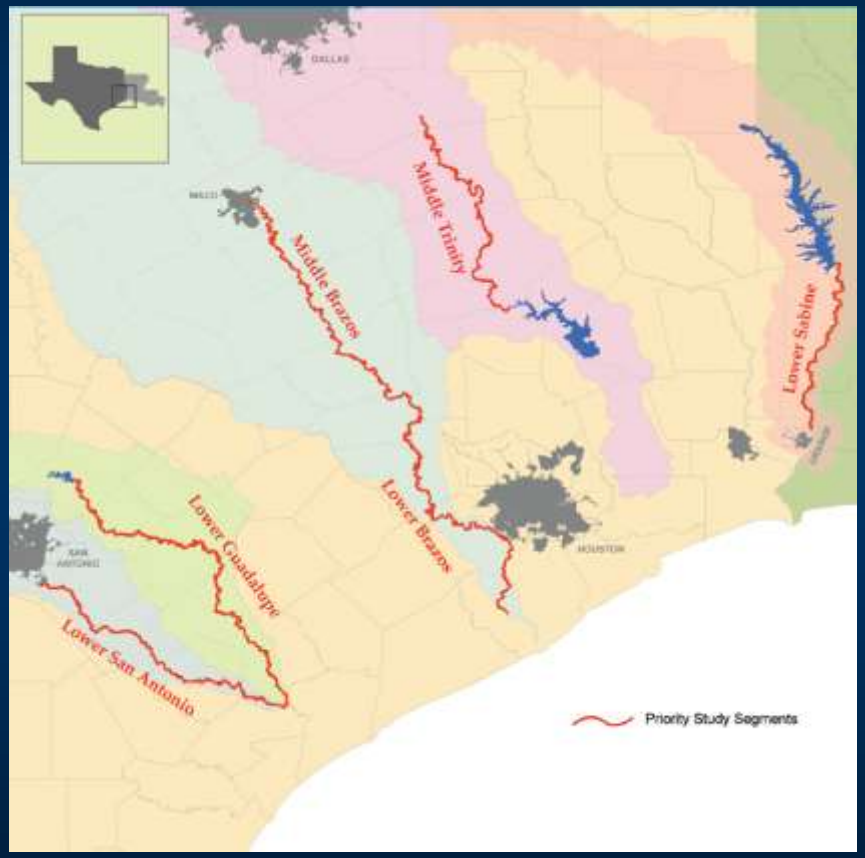


Water Legislation

Senate Bill 2 (2001)

TEXAS INSTREAM FLOW PROGRAM

Conduct studies to assess flow conditions necessary to support a sound ecological environment



Water Legislation

Senate Bill 3 (2007)

Set aside water for the environment—

Both instream flows and freshwater inflows for bays and estuaries

Planning for the Future

What if we do nothing?

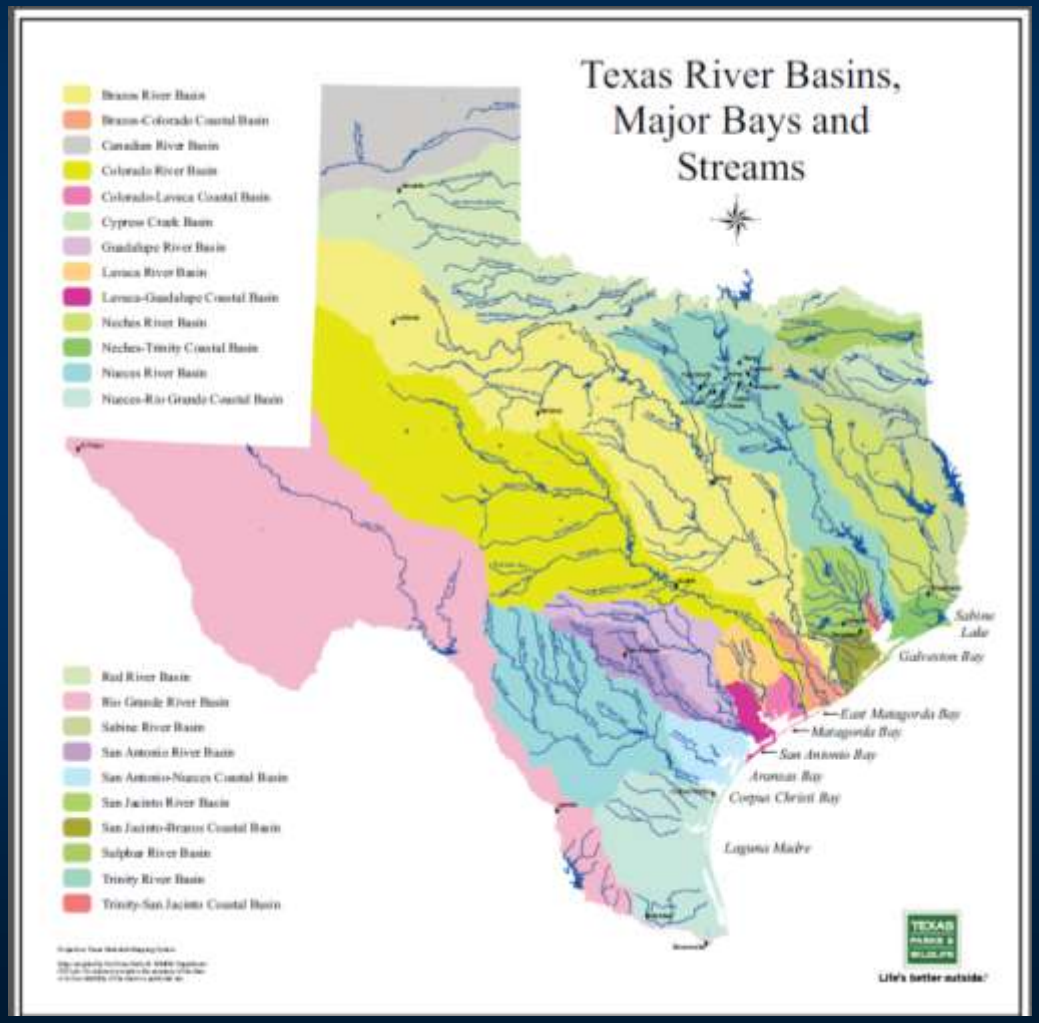
Water shortages occurring during drought, could cost businesses and workers in the state about $11.9 billion annually and $115.7 billion per year by 2060.

As economic activity declines—the cost of doing business is either passed on to the consumer OR the business moves away from Texas resulting in loss of jobs and tax base.

Let's Head to the Beach

Texas Gulf Coast

Dependent on Freshwater Inflows



- **7 major bays**
- **367 miles of gulf shoreline**
- **3,300 miles of bay beaches**

15,000 species found in the Gulf

Why Is Freshwater Important to Texas Bays?

Oyster

Speckled Trout

Stone Crab

Delta

Wetland

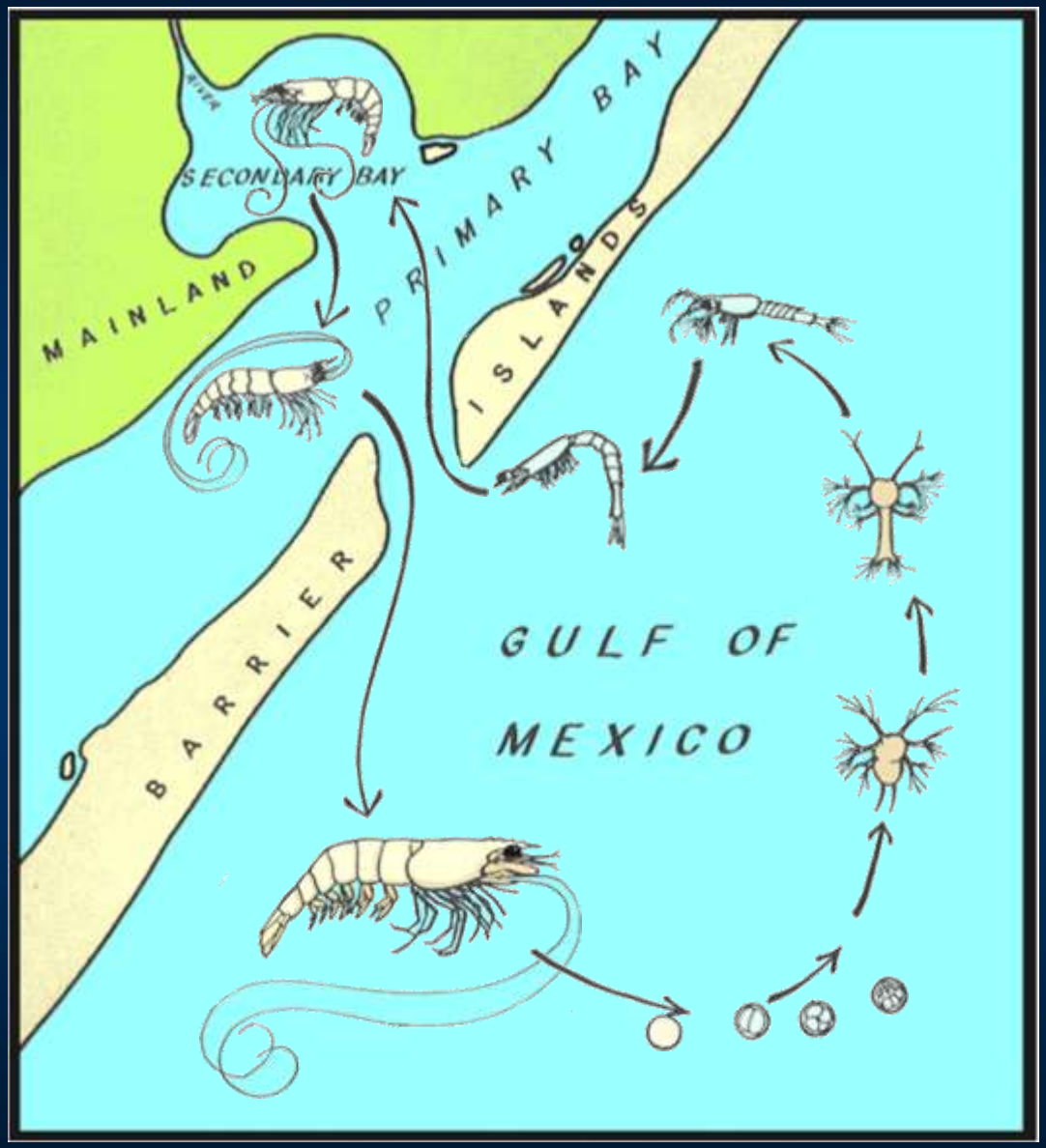
- **Nutrients**
- **Sediments for maintaining deltas and wetlands**
- **Salinity and temperature gradients**

Fish Fingerlings

Juvenile Red Drum

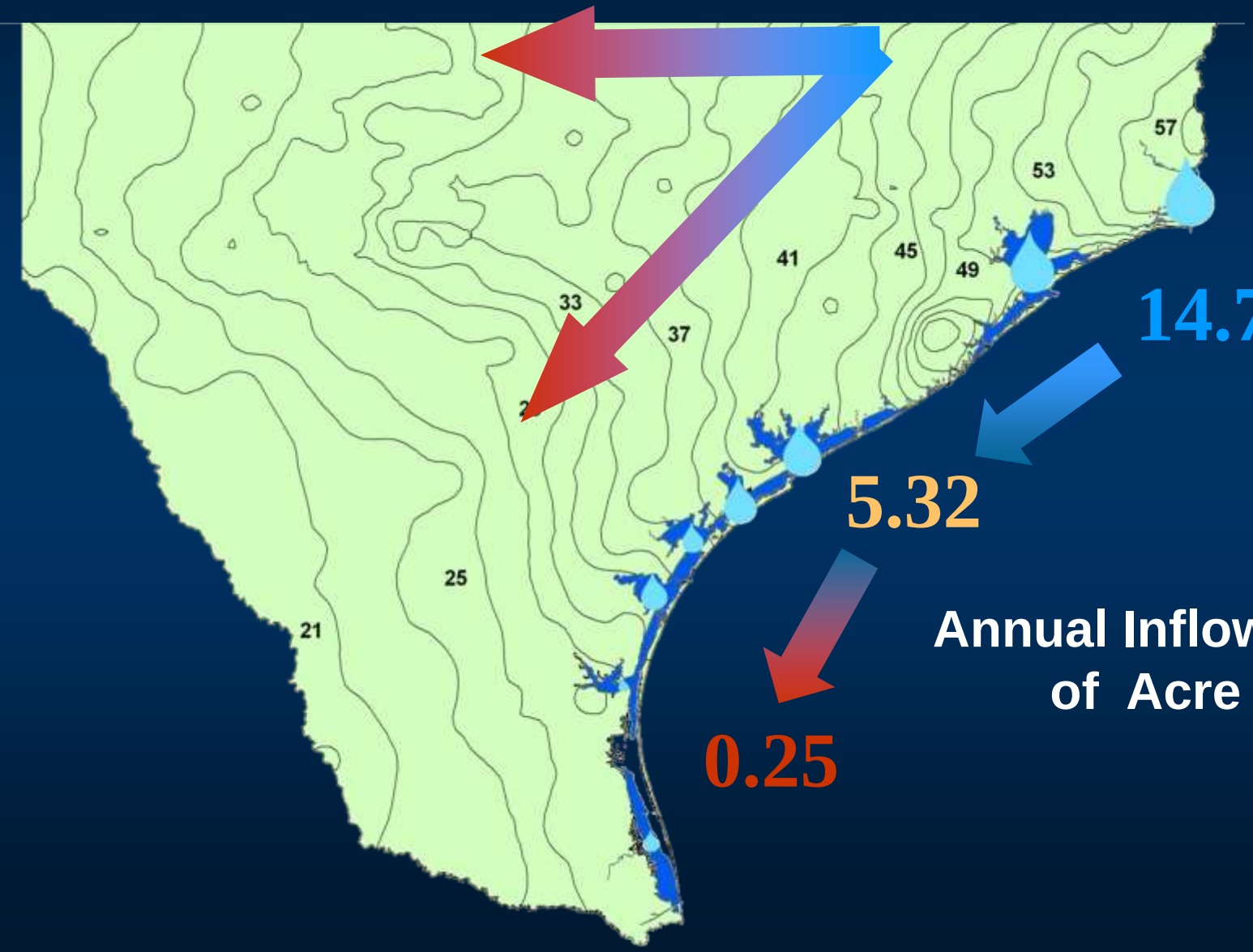
Gulf Shrimp

Tied to Flow


SECONDARY BAY
PRIMARY BAY
MAINLAND
ISLANDS
BARRIER
GULF OF
MEXICO

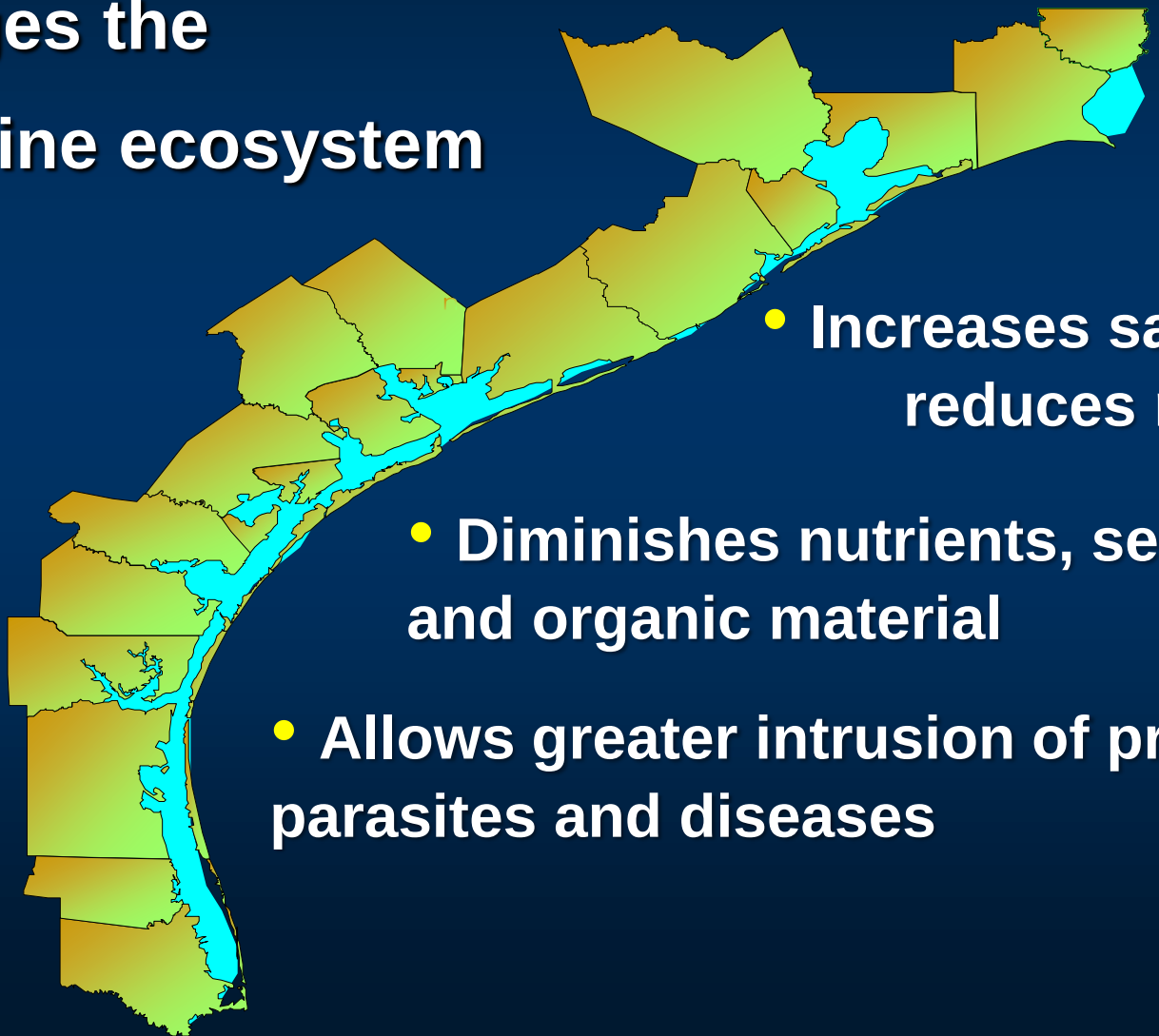
Why Is Freshwater Important to Texas Bays?

Climate Affects Inflows



Reduced Freshwater Inflow

Changes the estuarine ecosystem



- **Increases salinities and reduces mixing**
- **Diminishes nutrients, sediments and organic material**
- **Allows greater intrusion of predators, parasites and diseases**

Importance of Aquatic Ecosystems

- Habitat for 255 species of fishes
- Over 150 native freshwater fish species
- Over 550 species of marine fish
- Sportsmen spend $6.6 billion/yr

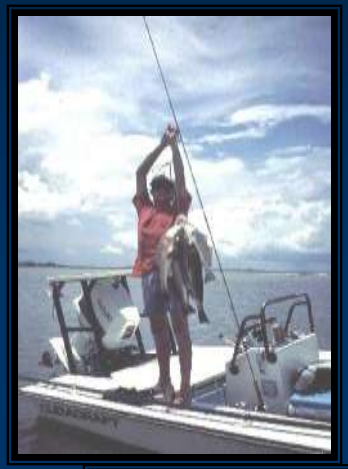
Commercial Fisheries

- 14.4 million pounds valued at $28.9 million
- 6.1 million pounds valued at $13.9 million for Galveston Bay
- $25 million estimated economic impact

TPWD unpublished data 2007

Recreational Fishing

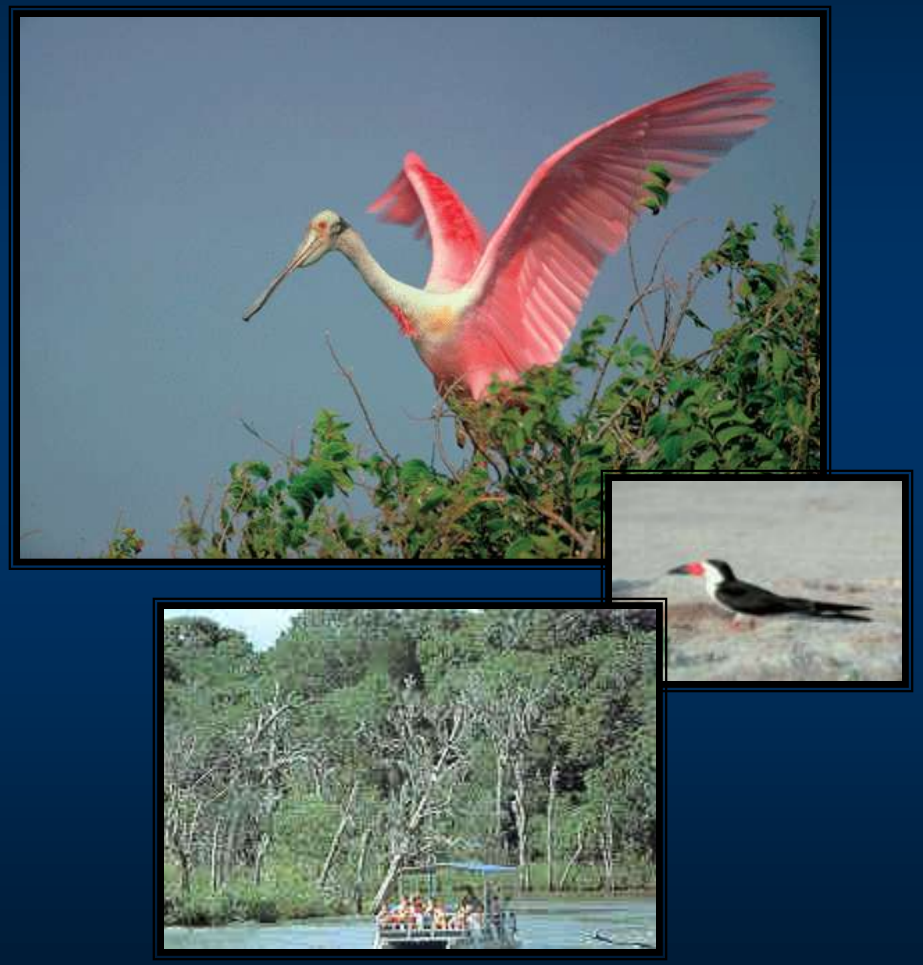
- Texas saltwater angling
  - 1.14 million anglers
  - 15.1 million days
  - Total Retail Sales
  - $981 million
- Total estimated outputs $1.8 billion



2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation

Ecotourism

Galveston Bay generates an estimated $7.5 billion in travel and payroll dollars



EPA, National Coastal Condition Report II 2005

Habitat Value

In 2007 each acre of wetlands generated

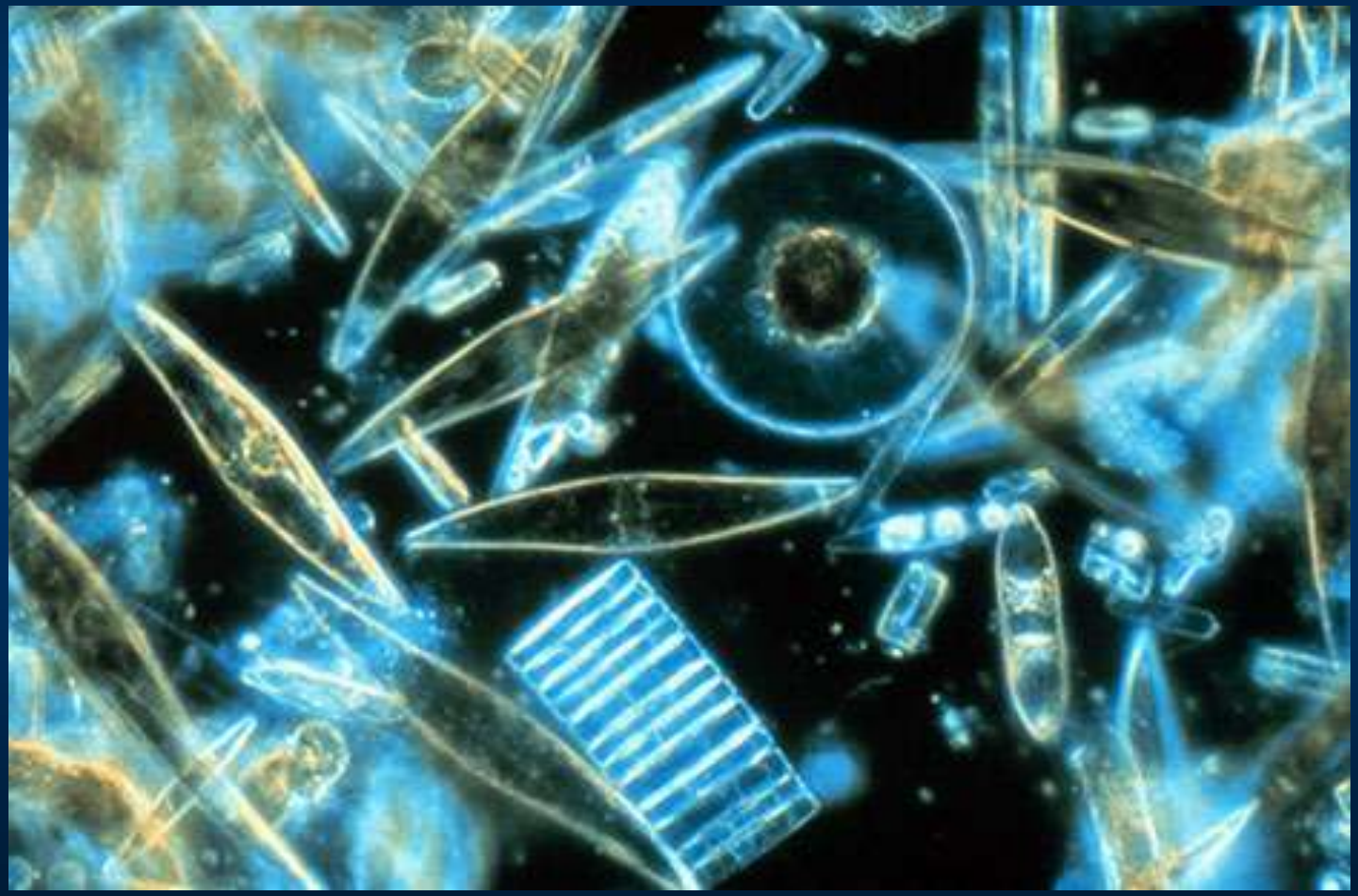
- $512 for recreational fishing
- $1,291 for commercial fishing
- $1,900 for bird watching

Woodward and Wui. 2001

Galveston area wetlands valued at $5.7 billion

The Economic Value of Ecosystem Services Provided by the Galveston Bay/Estuary System

Have you thanked Phytoplankton today?



Gulf of Mexico

- Communities
  - 37% Gulf states' population live in the Gulf Coast Region
- Economy
  - Gulf states GDP almost $3 trillion
  - 30% of the Nation's GDP
  - 1.5 million barrels of oil produced a day

If Gulf Coast were it's own country, it would be ranked 7th GDP in the world!

Threats to Aquatic Ecosystems

- Population expected to double by 2060
- Increased water use for
  - Land development
  - Irrigation
  - Energy production
  - Industry
  - Public supply

Threats to Aquatic Ecosystems

- **Point- source pollution:** discharge from factories and power plants

- **Non-point source pollution:** runoff from urban areas, homes, farms, roads, animal waste

Declining Aquatic Ecosystems

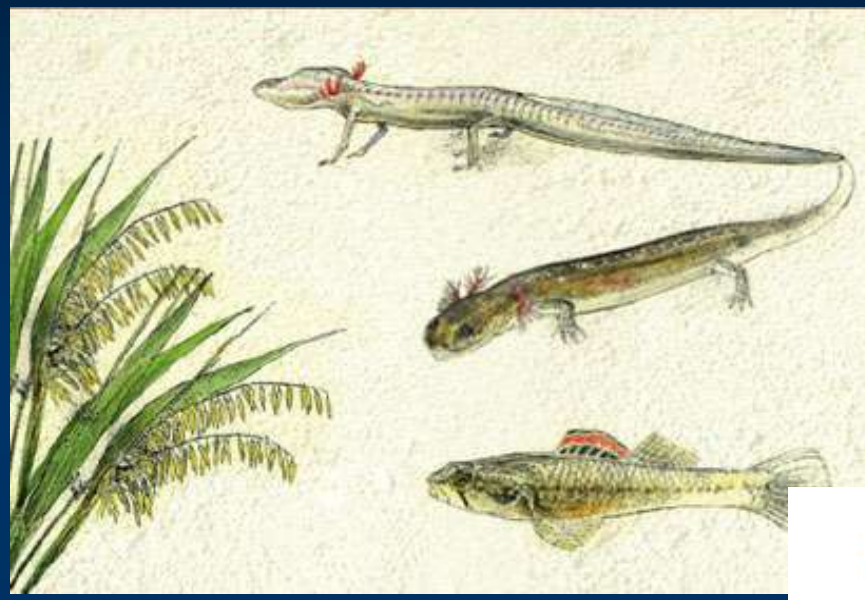
- 20% of fishes are threatened with extinction or extirpation from Texas
  - 5 fishes are extinct
  - 3 others are no longer located in TX

- TX ranks in top 5 states for number of endangered aquatic species
  - 31 state and federally-listed

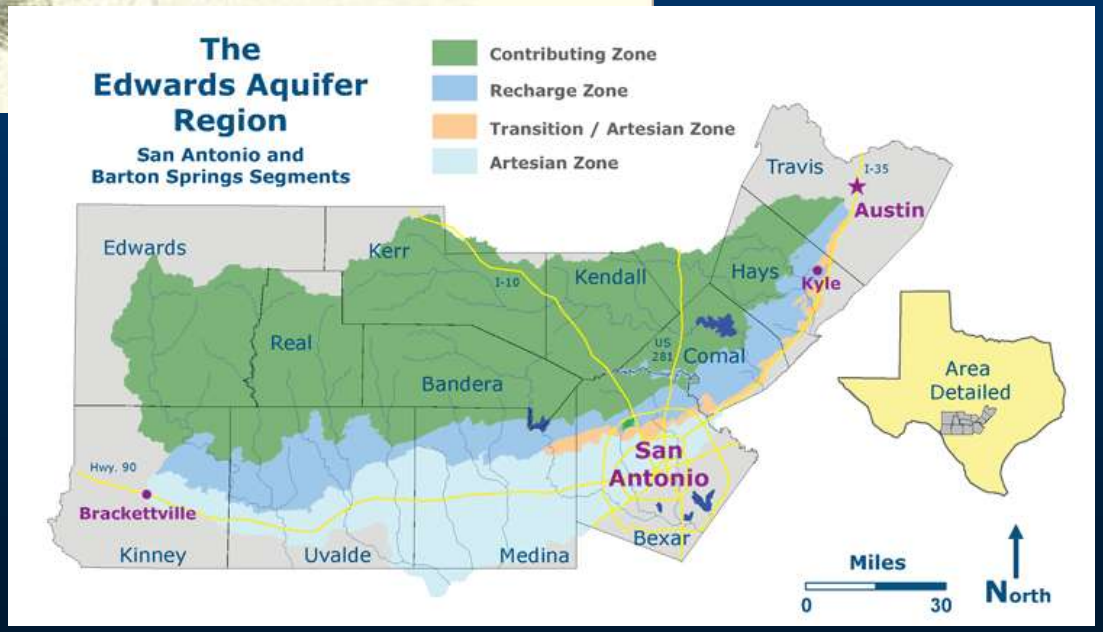
Signs of Decline

- Endangered species
- Fish kills
- Habitat fragmentation
- Harmful algal blooms
- Hypoxic zones
- Invasive species
- Loss of coastal wetlands
- Species declines
- Reduced freshwater inflows
- Temperature increases

Finding Solutions

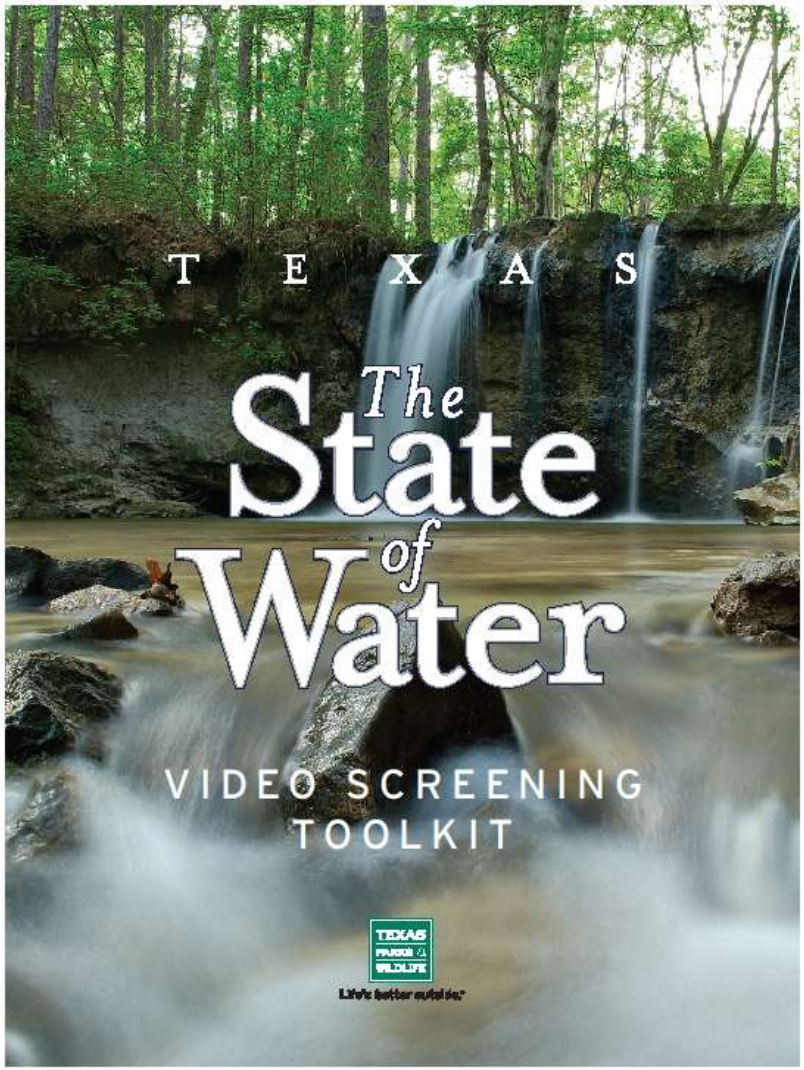


HABITAT CONSERVATION PLAN
EDWARDS AQUIFER



Everyone Plays A Role

Everyone Plays a Role
Get Involved!



Host A Screening

Texas: State of Water

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