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Reviewed: 7/27/2021

- NRSA -

National Rivers and Streams Assessment

Jenny Oakley
Environmental Scientist
Environmental Institute of Houston
University of Houston-Clear Lake

SWQM Workshop
October 29, 2013

Environmental Institute of Houston
University of Houston-Clear Lake

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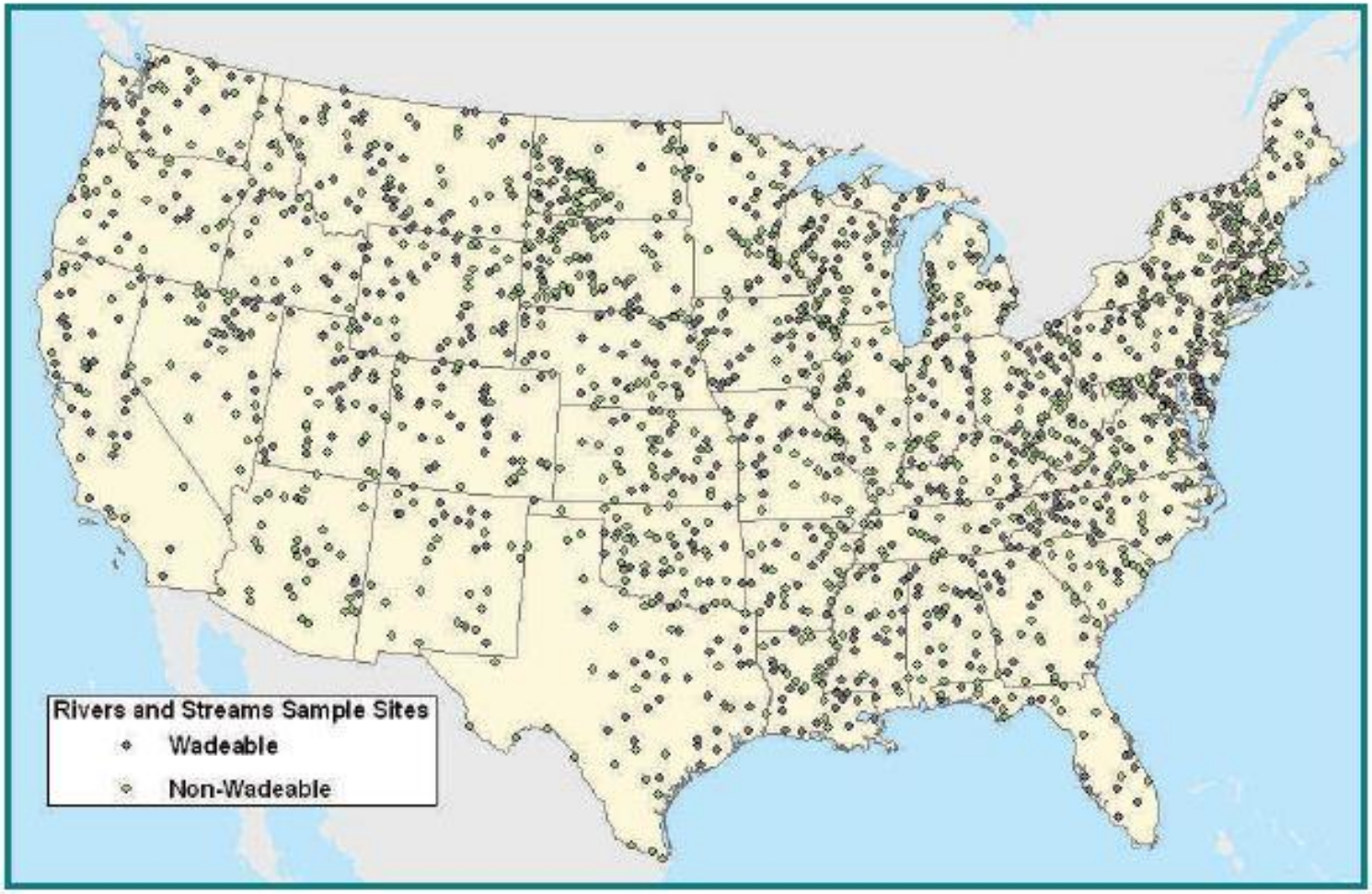
N.O.A. Building, Box 540
Houston, TX 77058
(281) 283-3950

eih@uhcl.edu
www.eih.uhcl.edu

NRSA Background

- What is NRSA?
  - second nationwide survey of the condition of the nation's rivers and streams
- Goals of NRSA
  - Measure Health
  - Evaluate protection and restoration efforts
  - Prevent pollution
- Timeline

NRSA Site Locations



1,800 Sites

68 Sites in Texas
(72 events)
Tulsa
Santa Fe
Albuquerque
Amarillo
Oklahoma City
OKLAHOMA
Little Roc
ARKANSAS
NEW MEXICO
LLANO ESTACADO (STAKED PLAIN)
Lubbock
Dallas
Fort Worth
Ciudad Juárez
El Paso
Midland
Odessa
TEXAS
LOUISIANA
Austin
Baton Rouge
Houston
San Antonio
Chihuahua
CHIHUAHUA
COAHUILA
Legend
Sampled
2013
2014
N
0
100
200
400 Miles
Brownsville
Monterrey
Torreón
Saltillo
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC
Gulf

Some sites were missing a key ingredient…

2013 Sites
Wichita Falls
South Fish Creek
Lubbock
Spring Creek
Denton
Denton Creek
Plano
Brazos River
Long Creek
Unnamed Stream
Big Cypress Bayou
Elm Creek
Fort Worth
Arlington
Dallas
Village Creek
Longview
Unnamed Stream
Shreveport
Abilene
Tyler
Neches River
Colorado River
Colorado River
Leon River
Brazos River
Waco
Angelina River
San Angelo
Colorado River
Brazos River
Brady Creek
Killeen
Clear Creek
Campbells Branch
Little River
Sabine River
EDWARDS PLATEAU
South Fork San Gabriel River
College Station
Bryan
Trinity River
Austin
The Woodlands
Lake Charles
White Oak Bayou
Beaumont
Houston
San Antonio
Acuña
Medina River
Guadalupe River
East Carancahua Creek
Victoria
Nueces River
Piedras Negras
Nueces River
0
50
100
200 Miles
Legend
<all other values>
Sample_Typ
Boatable
Wadeable
N
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

Logistics

"WRS" Samples
(1) Cubitainer (4 L)
CHEM
(3) filters in centrifuge tubes (50 mL), in zip-top bag
CHLA
PBIO
PCHL

Non-Chilled Samples (Batched) – per site
(1 or more) 1 L wide-mouth bottle
BERW (wadeable)
BETB (boatable)
(1) Centrifuge tube (screw-top, 50-mL)
PERI
(1 or more) 1 L wide-mouth bottle
VERT (*at QA voucher sites only*)

Frozen Samples (Batched) – per site
(1) HDPE bottle (500 mL, white, wide-mouth)
MICX
(2) Filters in centrifuge tubes in bag (*plus blank if revisit site V1*)
ENTE
(2) Fish Tissu
FPLG

Frozen Whole Fish Tissue Samples* (Batched) – per site
(5) Fish in Large plastic

Completed Data Packs (Batched)
All data forms from a site, reviewed for completeness,

Pack 1 site's worth of samples in lined cooler with ice in bags

SHIP WITHIN 24 HOURS (MON-FRI)

FedEx Express

PRIORITY OVERNIGHT

Pack 3-5 site's worth of samples in lined cooler with NO ICE

SHIP EVERY 2 WEEKS ANYTIME

FedEx Ground

GROUND

Pack 3-5 s
samples i
cooler v

SHI
M

FedEx Express

PRIORITY OVERNIGHT

FedEx Express

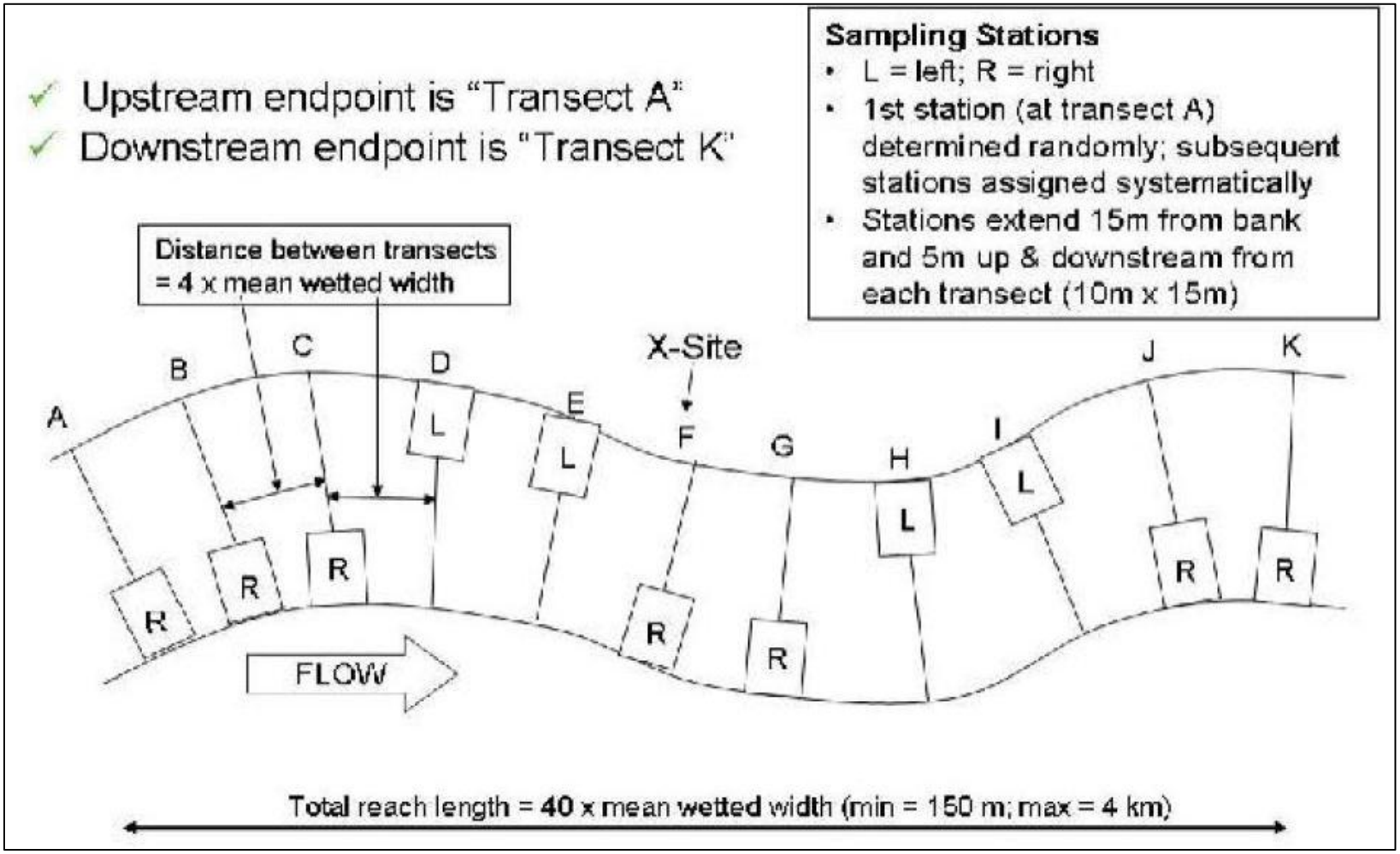
PRIORITY OVERNIGHT

FedEx Express

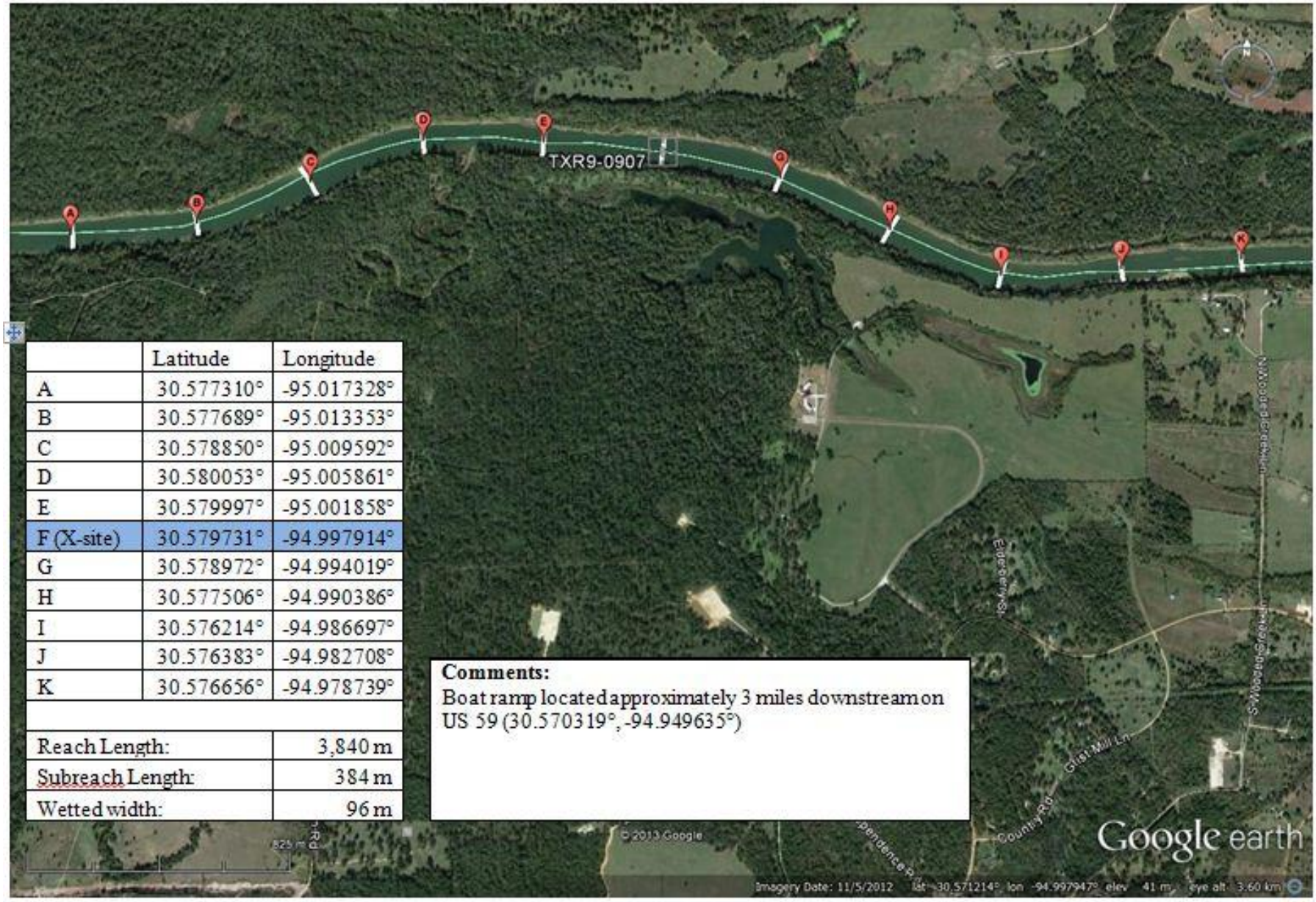
* *At a subset of pre-selected sites, whole fish tissue samples will be collected instead of fish tissue plugs*

Modes of Transportation

Boatable Site Layout



Boatable Site Layout

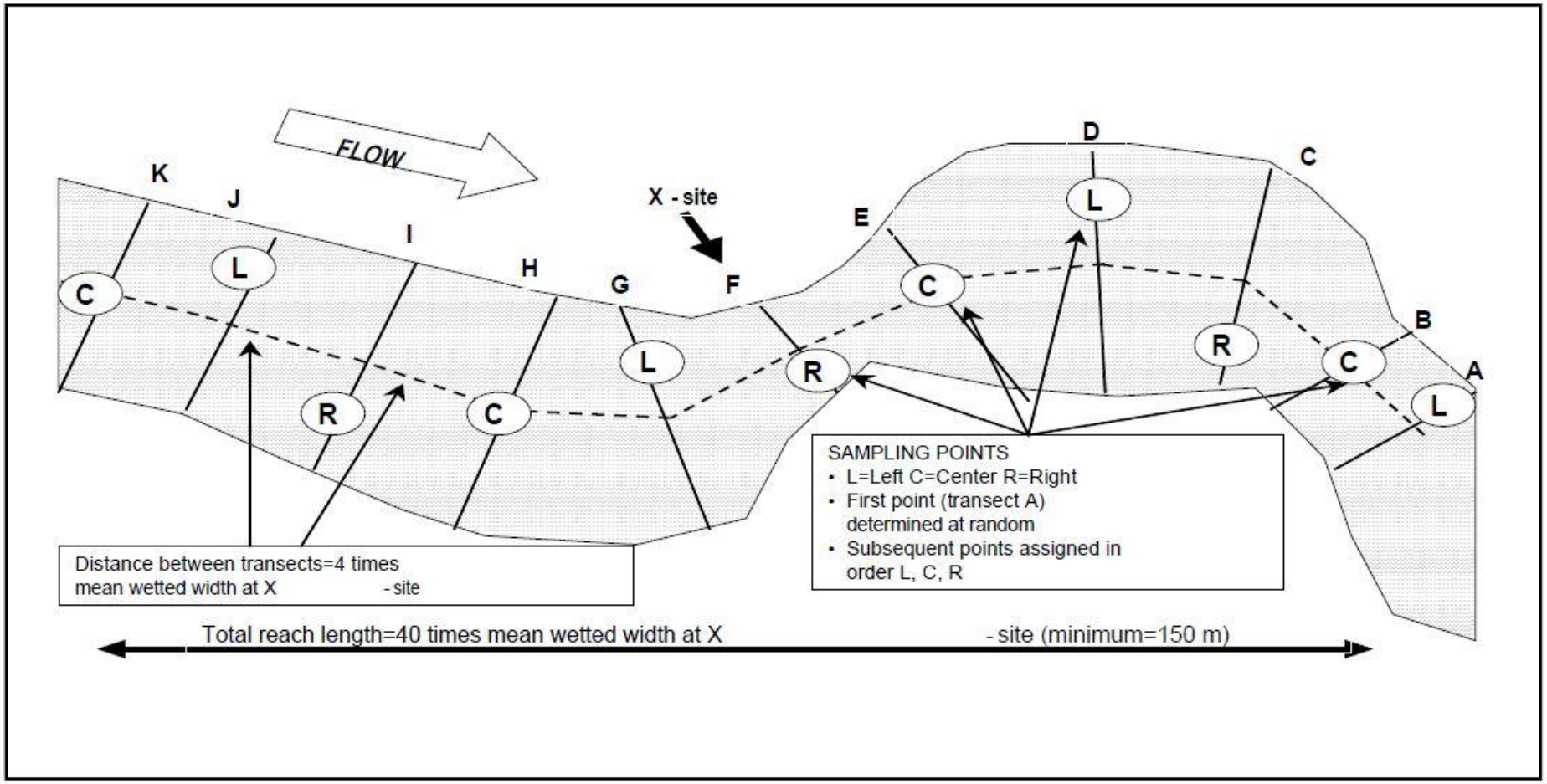


	Latitude	Longitude
A	30.577310°	-95.017328°
B	30.577689°	-95.013353°
C	30.578850°	-95.009592°
D	30.580053°	-95.005861°
E	30.579997°	-95.001858°
F (X-site)	30.579731°	-94.997914°
G	30.578972°	-94.994019°
H	30.577506°	-94.990386°
I	30.576214°	-94.986697°
J	30.576383°	-94.982708°
K	30.576656°	-94.978739°

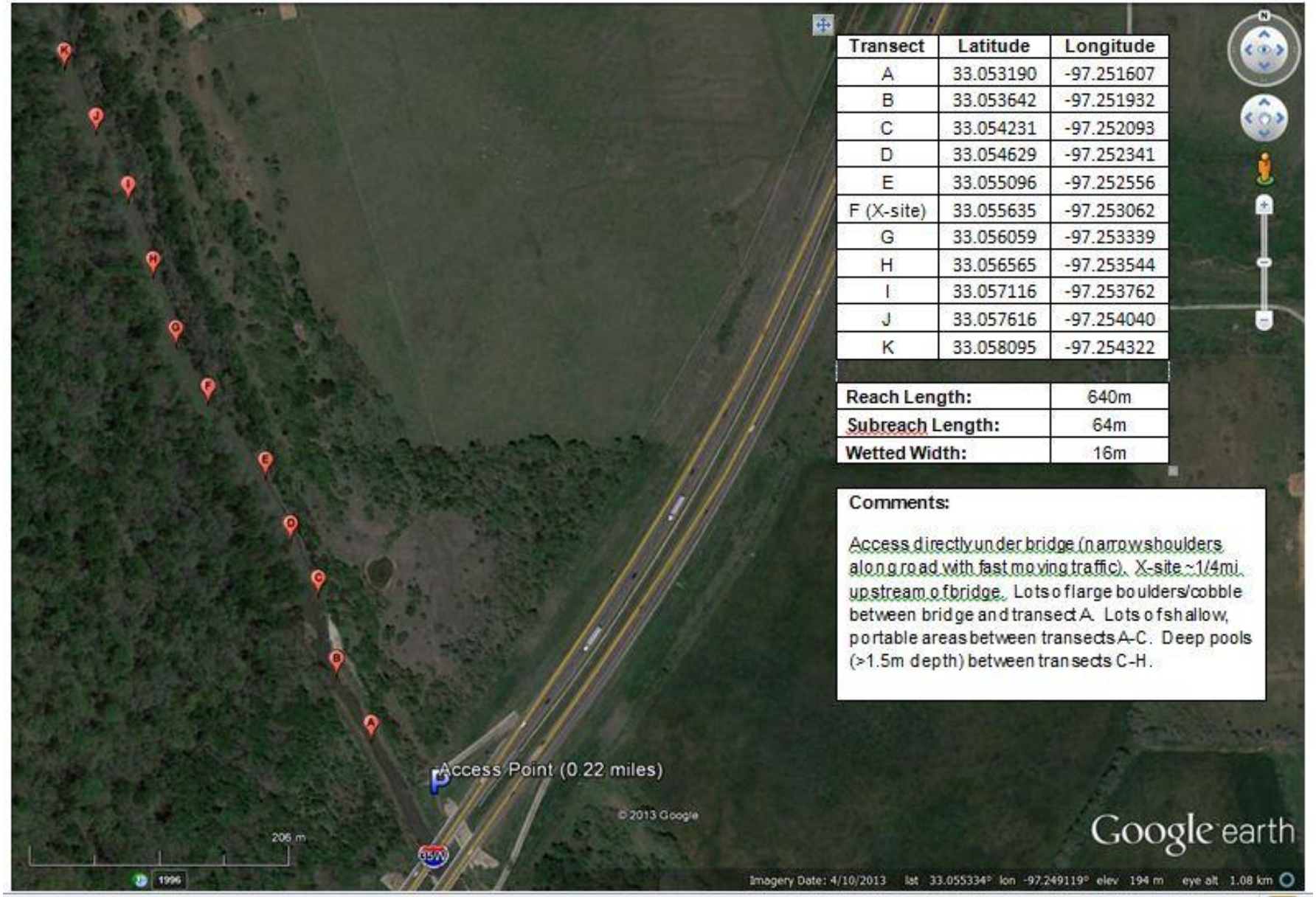
Reach Length:	3,840 m
Subreach Length:	384 m
Wetted width:	96 m

Comments:
Boat ramp located approximately 3 miles downstream on US 59 (30.570319°, -94.949635°)

Wadeable Site Layout



Wadeable Site Layout



Transect	Latitude	Longitude
A	33.053190	-97.251607
B	33.053642	-97.251932
C	33.054231	-97.252093
D	33.054629	-97.252341
E	33.055096	-97.252556
F (X-site)	33.055635	-97.253062
G	33.056059	-97.253339
H	33.056565	-97.253544
I	33.057116	-97.253762
J	33.057616	-97.254040
K	33.058095	-97.254322

Reach Length:	640m
Subreach Length:	64m
Wetted Width:	16m

Comments:

Access directly under bridge (narrow shoulders along road with fast moving traffic). X-site ~1/4mi upstream of bridge. Lots of large boulders/cobble between bridge and transect A. Lots of shallow, portable areas between transects A-C. Deep pools (>1.5m depth) between transects C-H.

Samples Collected

- Water Sample Collection
- Benthic Macroinvertebrates
- Periphyton
- Physical Habitat Characterization
- Fish Assemblage

Water Sample Collection

In situ measurements (DO, pH, temperature, conductivity)

- Multi-probe from mid channel of stream.
- Measurements taken at 0.5m deep. If site is <1M deep collect at mid-depth.

Water chemistry samples

- All sampling supplies (beaker, cubitainer, lid) rinsed three times with stream water.
- Fill 4L cubitainer using nalgene beaker.
- Wear nitrile gloves! Ensure no air bubbles.
- Place pre-labeled, sealed cubitainer on ice after collection.

Chlorophyll-a (Water Column)

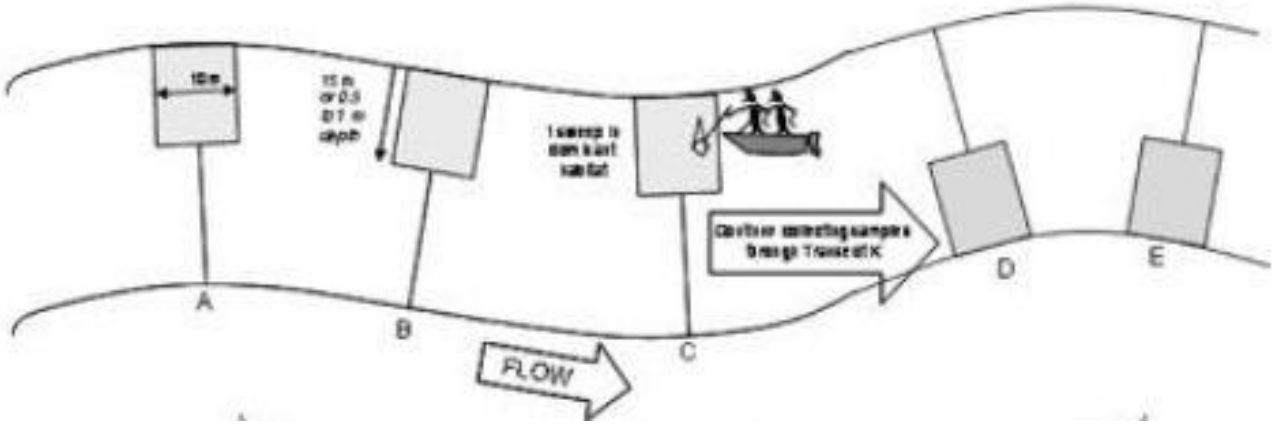
- Rinse amber bottle 3x with stream water.
- Fill using nalgene beaker.
- Keep on ice until filtration.

Algal Toxins (Microcystins)

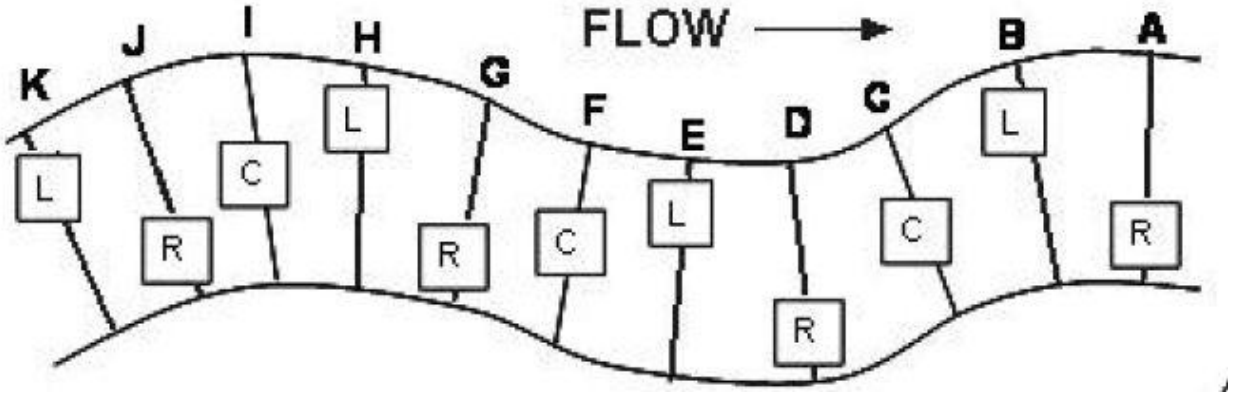
- Rinse 500ml bottle 3x with stream water.
- Fill pre-labeled bottle using nalgene beaker.
- Place on ice until frozen at base site.

Benthic Macroinvertebrates

Boatable



Wadeable



Benthic Macroinvertebrates

Combine **ALL** kick net samples collected from **ALL** transects

↓

TRANSECT SAMPLES (1 per transect)

Sampling point at each transect selected systematically after random start

Sampling points proceed in L, C, R pattern upstream

Modified D-frame kick net

1 square foot quadrat sampled for 30 seconds

↓

COMPOSITE SAMPLES FROM ALL TRANSECTS

- Sieve bucket or other bucket(s)

↓

SIEVE SAMPLE

- 500 µm sieve bucket
- Remove and wash large objects

↓

COMPOSITE AND PRESERVE SAMPLE

- 1 liter bottle(s) (*max of 4 bottles if possible*)
- Fill no more than 50% with sample
- Preserve with 95% ethanol for a final concentration of at least 70%

Periphyton

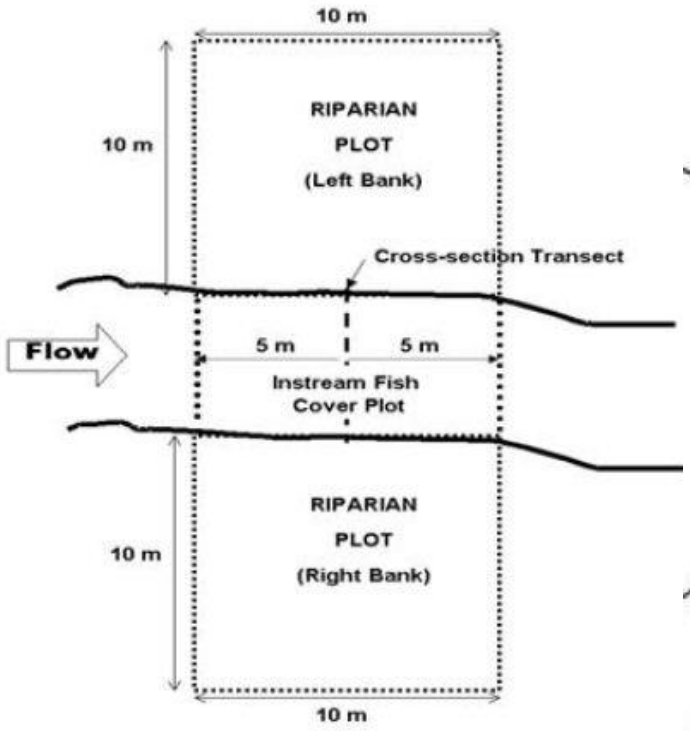
Sample Collection:

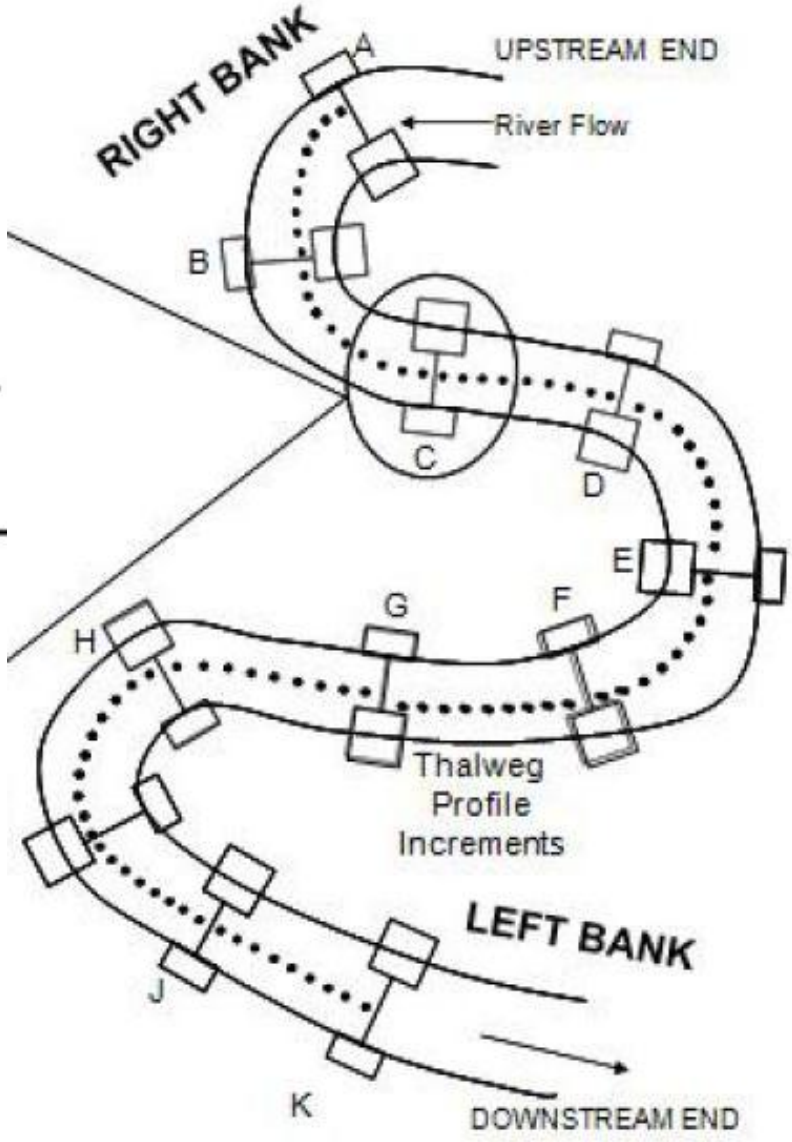
- Area delimiter: 12 cm^2
- 45mL wash each transect
- Composite from 11 transects

Samples:

- Periphyton Assemblage
- Chlorophyll
- Biomass

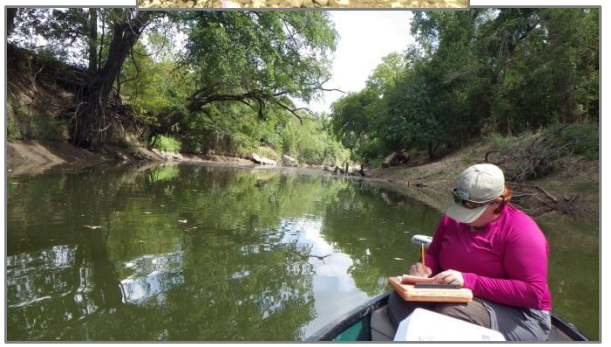
Physical Habitat Characterization





Physical Habitat Characterization

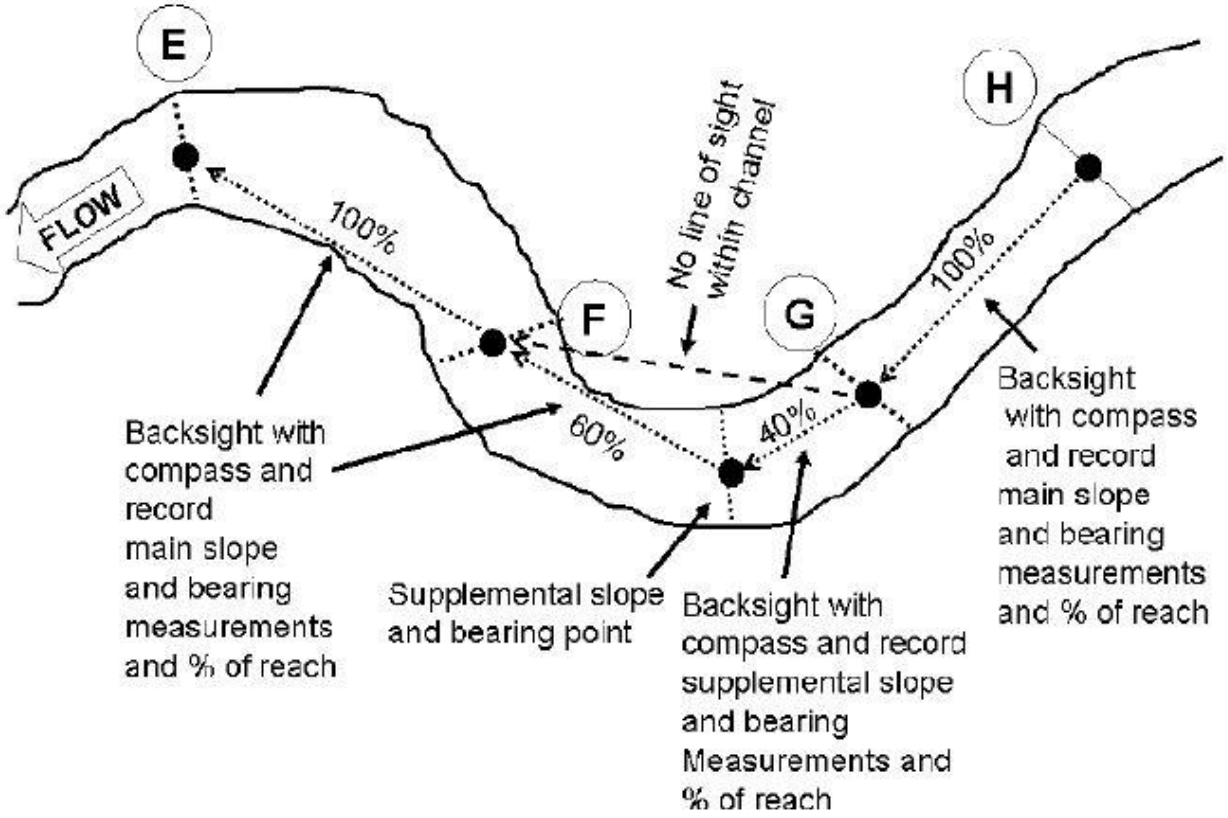
- Thalweg Profile
- Large Woody Debris
- Substrate
- Chanel Classification
- Bank Characteristics
- Canopy Cover
- Instream Fish Cover
- Human Influence



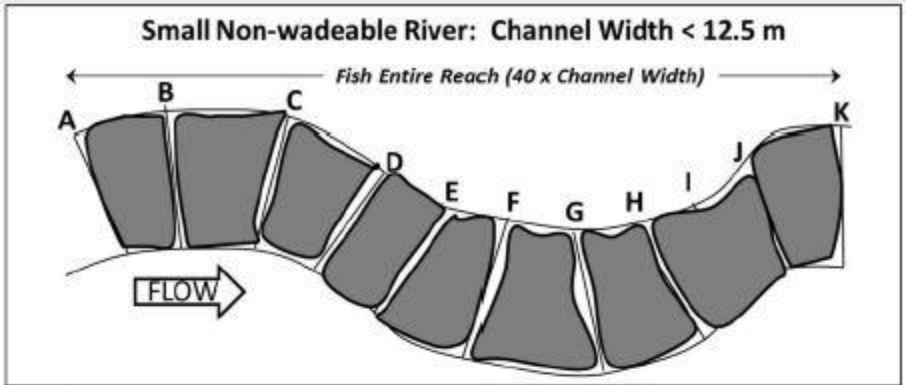
Physical Habitat Characterization

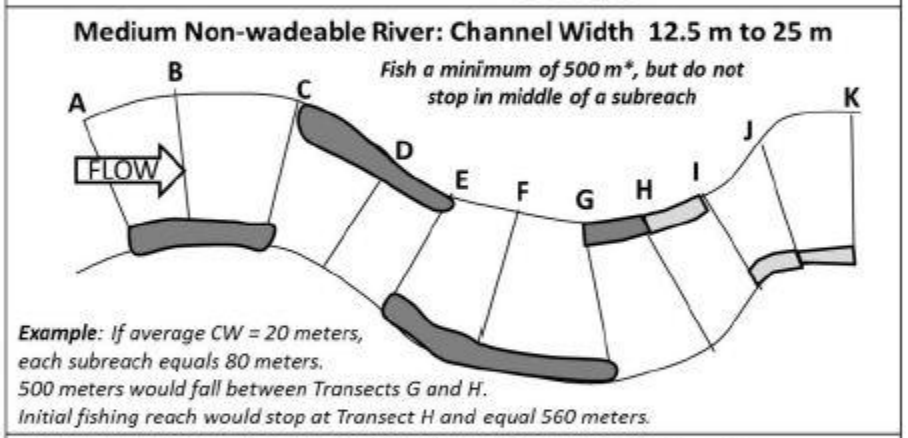
- Slope & Bearing

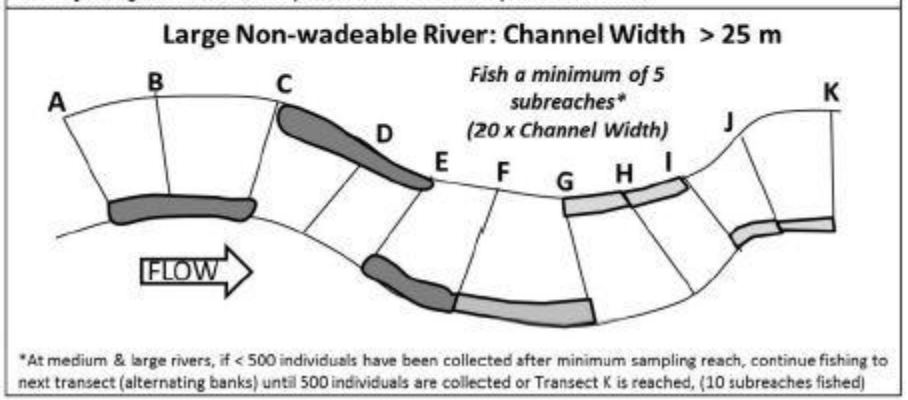
- Flow



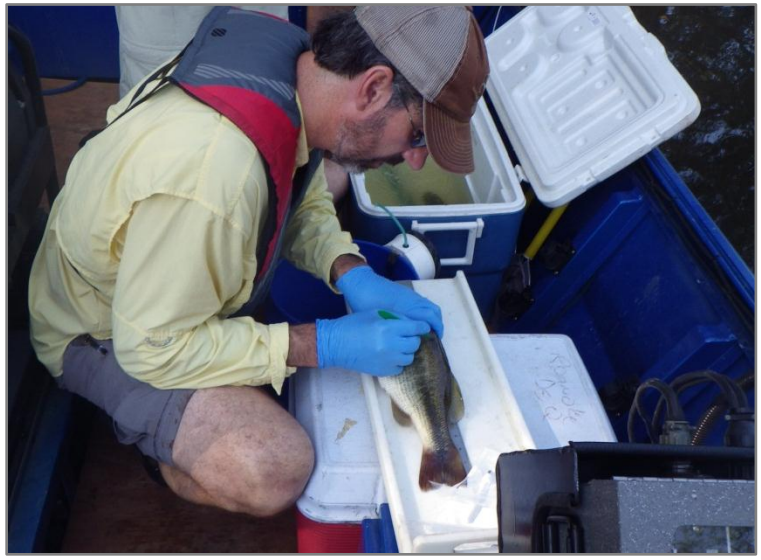
Fish Assemblage



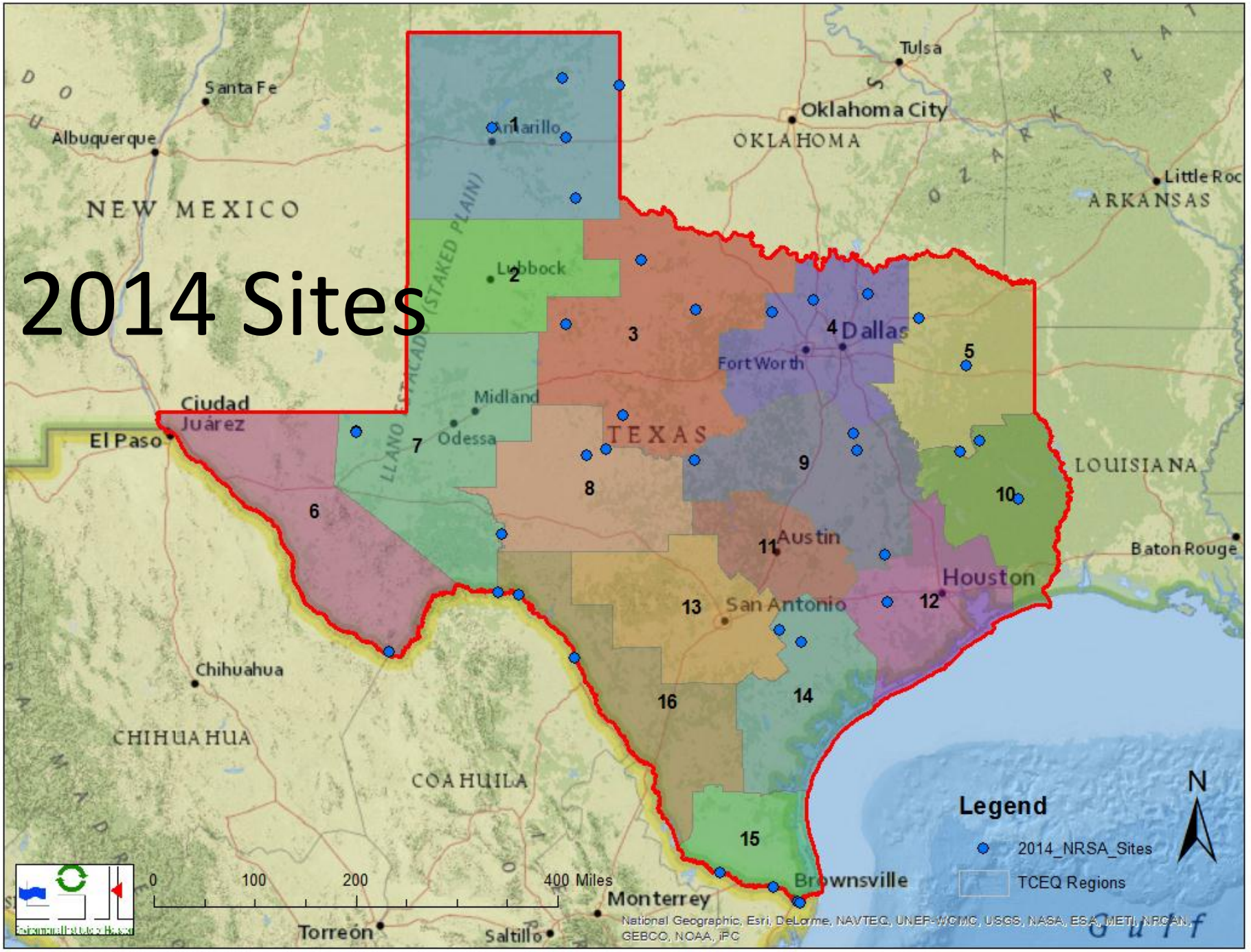


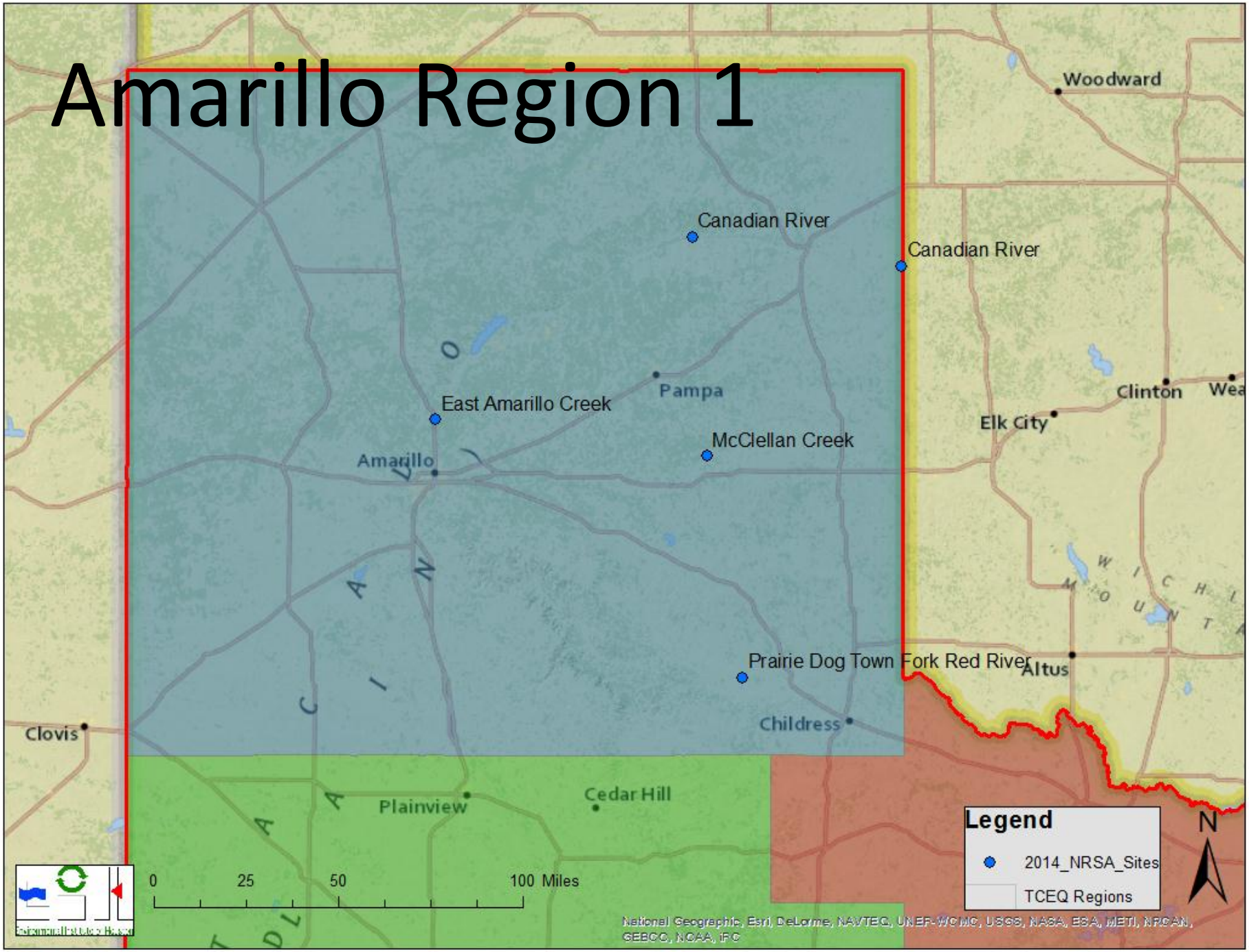


Fish Assemblage & Tissue Collection

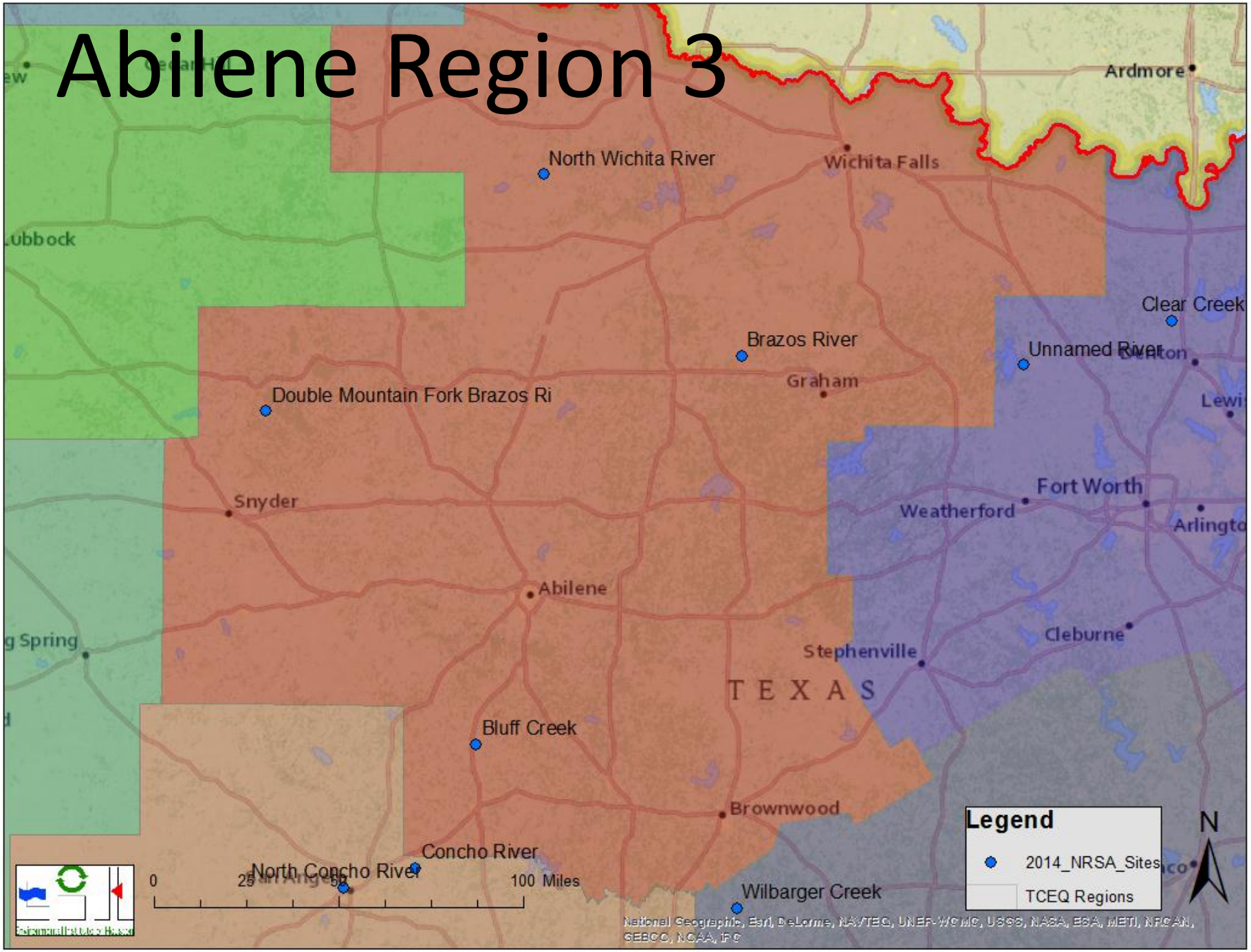


EIH Field Sampling Crew

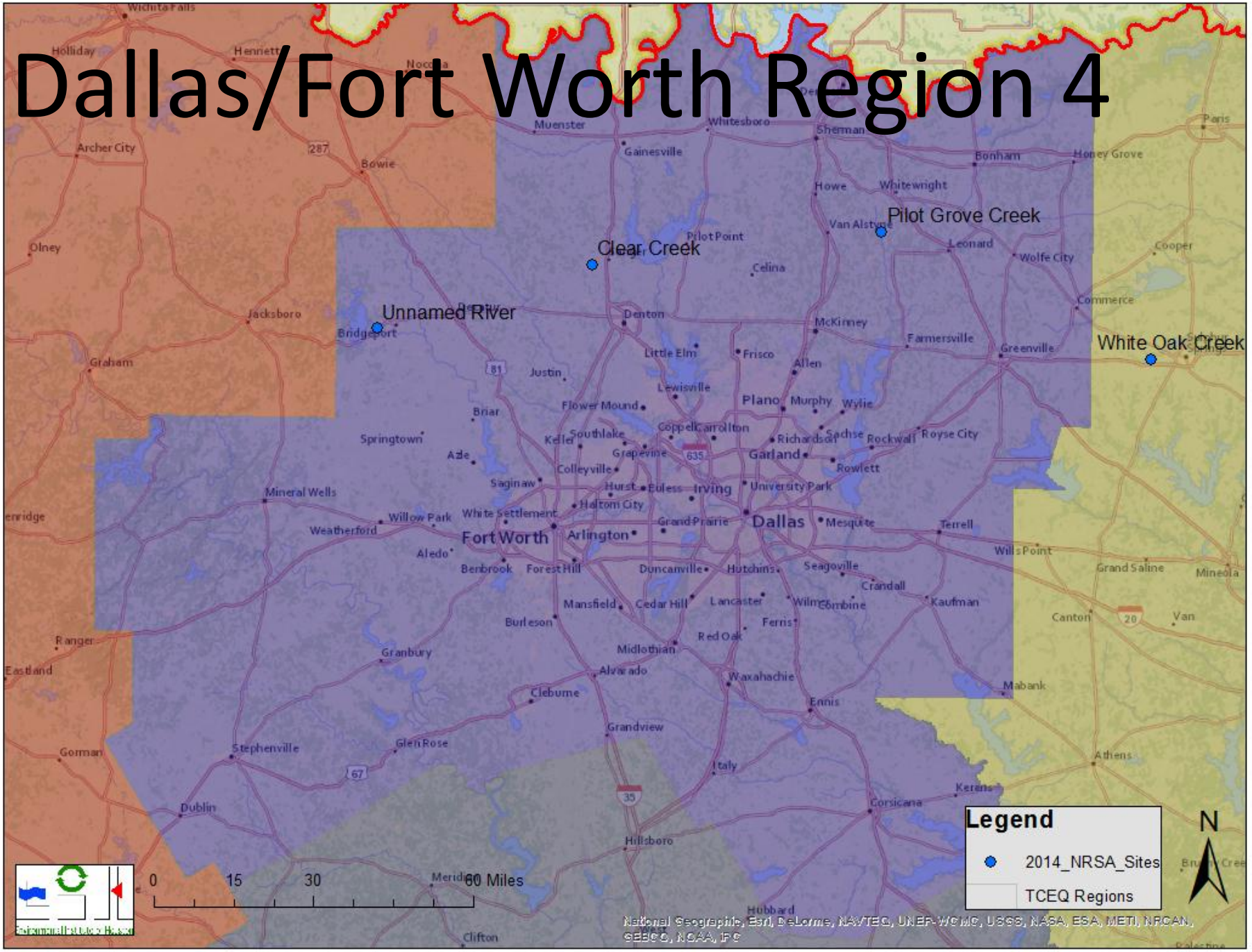

2014 Sites
Tulsa
Oklahoma City
OKLAHOMA
Little Roc
ARKANSAS
Santa Fe
Albuquerque
NEW MEXICO
Amarillo
Lubbock
Dallas
Fort Worth
Midland
Odessa
Ciudad Juárez
El Paso
TEXAS
LOUISIANA
Austin
Houston
San Antonio
Baton Rouge
Chihuahua
CHIHUAHUA
COAHUILA
Monterrey
Torreón
Saltillo
Brownsville
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Legend
2014_NRSA_Sites
TCEQ Regions
N
0
100
200
400 Miles
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

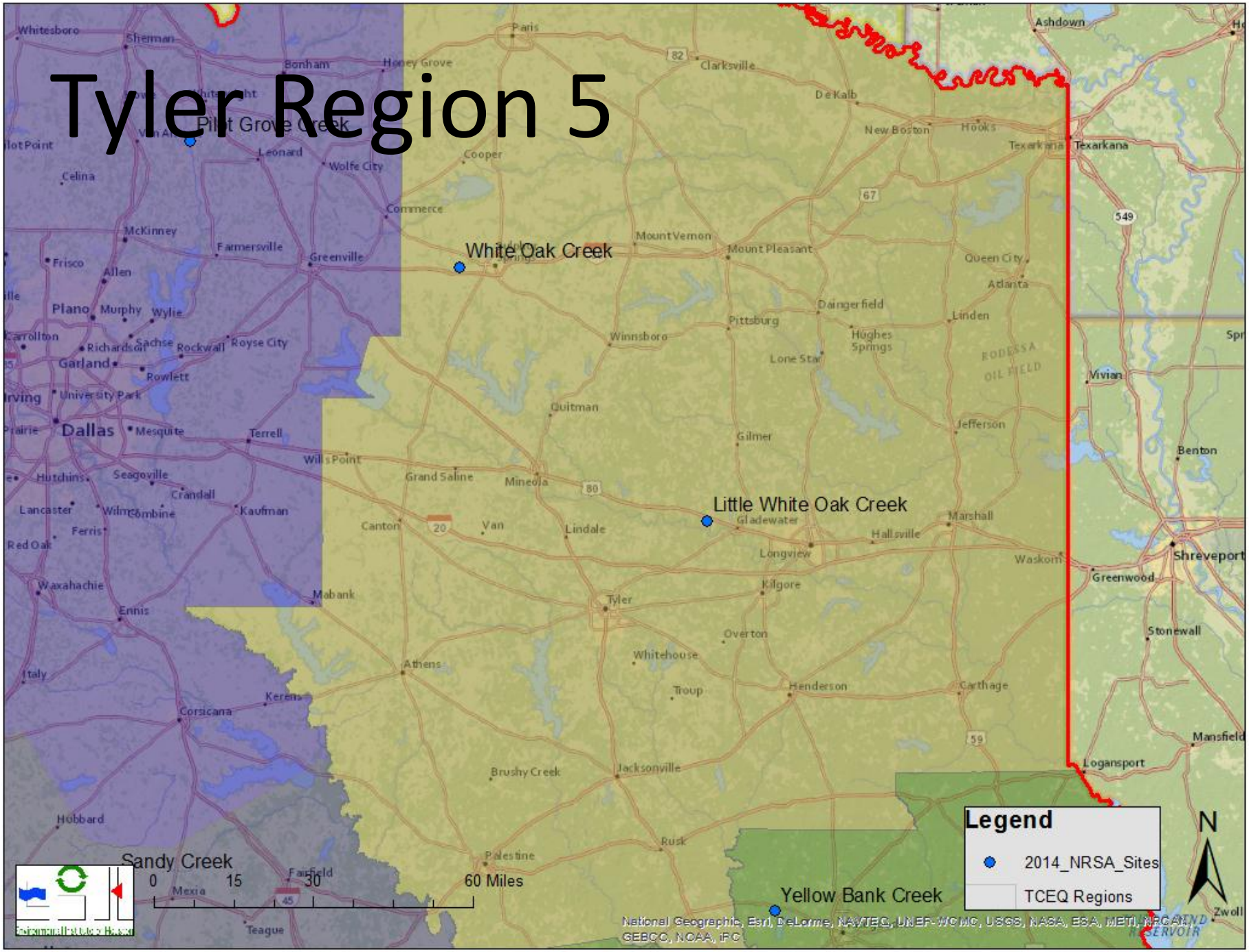

Amarillo Region 1
Woodward
Canadian River
Canadian River
Pampa
East Amarillo Creek
McClellan Creek
Amarillo
Clinton
Elk City
Prairie Dog Town Fork Red River
Altus
Childress
Clovis
Plainview
Cedar Hill
0
25
50
100 Miles
Legend
2014_NRSA_Sites
TCEQ Regions
N
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

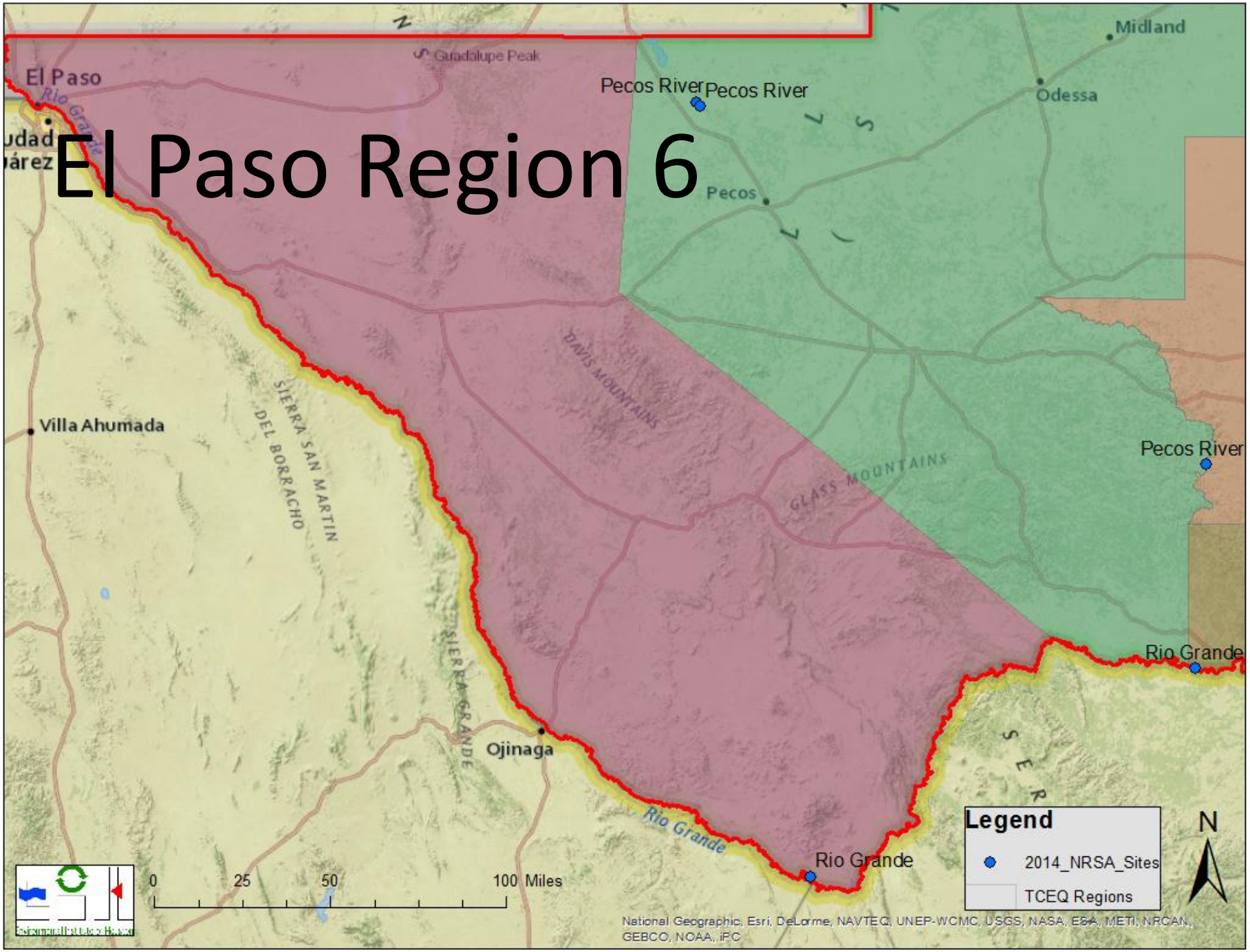
Abilene Region 3

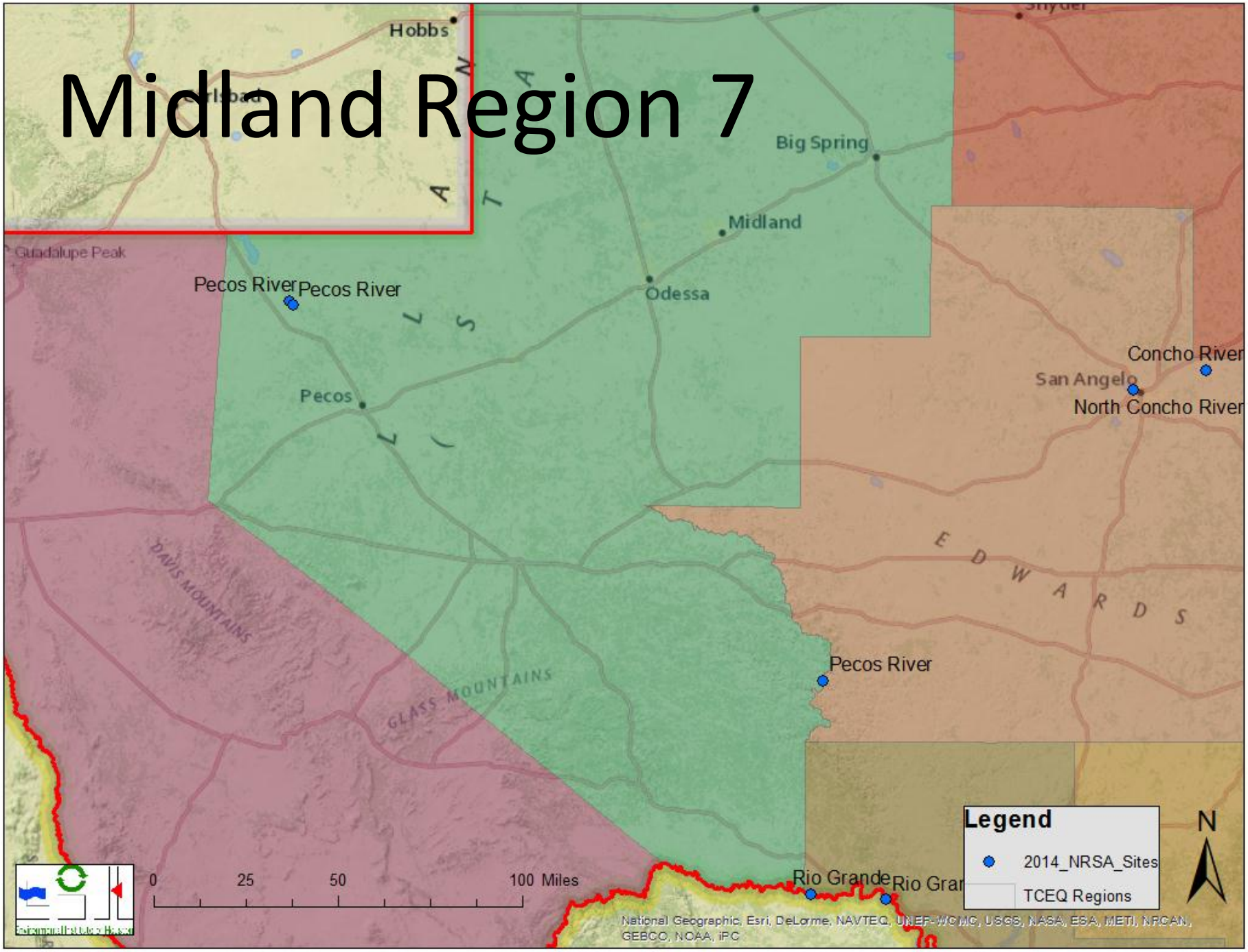


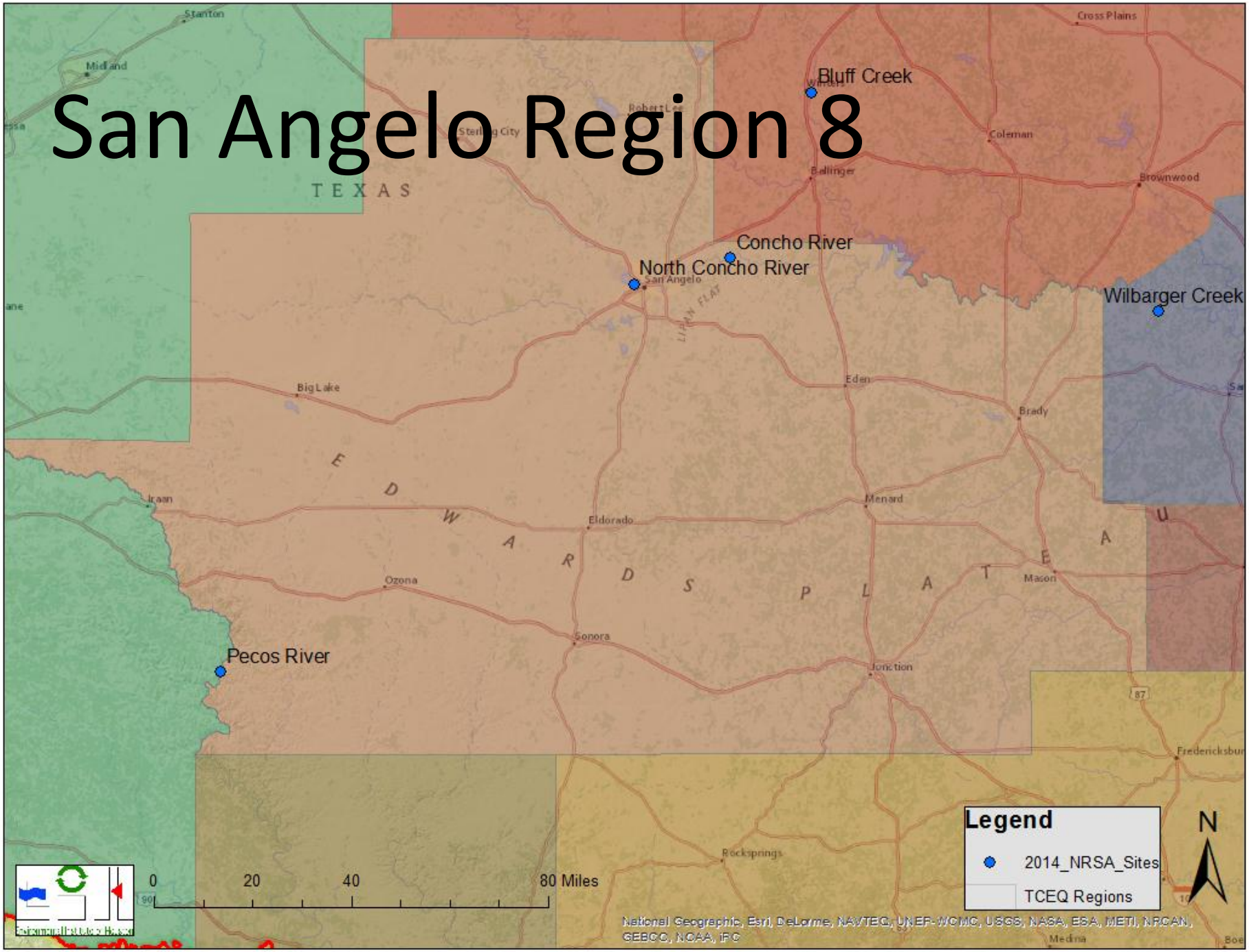
Dallas/Fort Worth Region 4

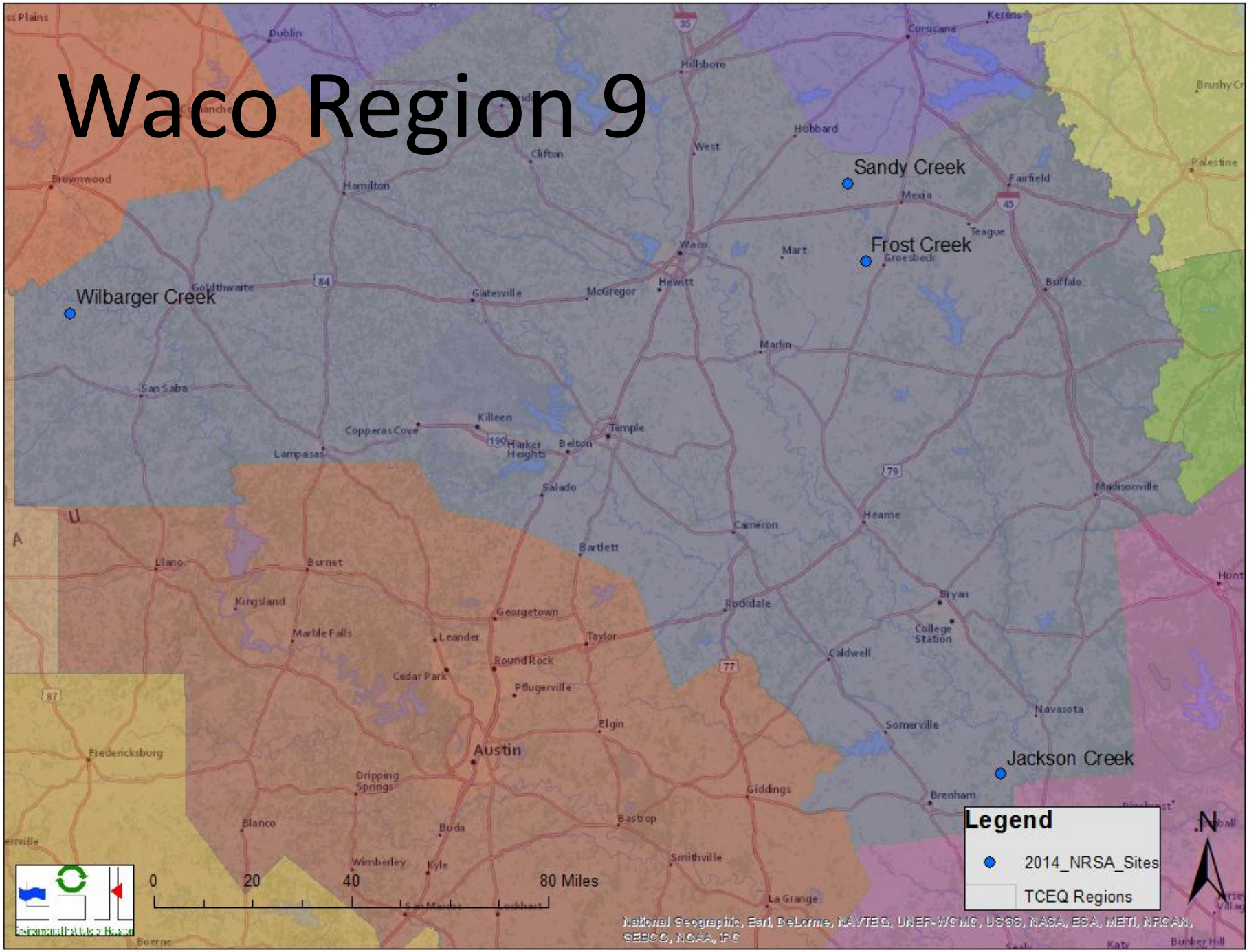


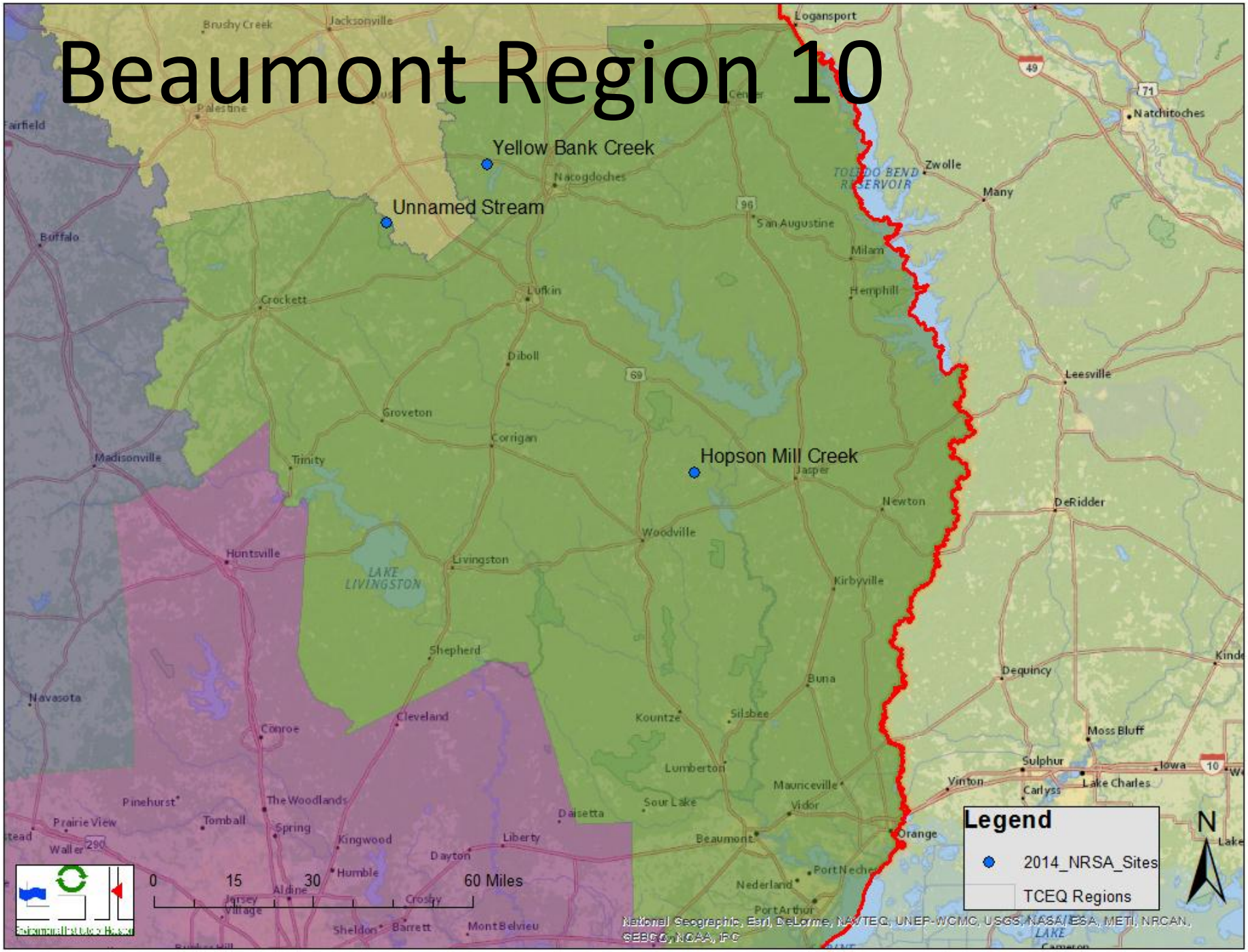

Tyler Region 5
Pilot Grove Creek
White Oak Creek
Little White Oak Creek
Sandy Creek
Yellow Bank Creek
Legend
2014_NRSA_Sites
TCEQ Regions
N
0 15 30 60 Miles
Whitesboro
Sherman
Bonham
Honey Grove
Paris
Clarksville
DeKalb
Ashdown
New Boston
Hooks
Texarkana
Leonard
Wolfe City
Cooper
Celina
Commerce
McKinney
Farmersville
Greenville
Frisco
Allen
Plano
Murphy
Wylie
Carrollton
Richardson
Sachse
Rockwall
Royse City
Garland
Rowlett
University Park
Irving
Dallas
Mesquite
Terrell
Prairie
Hutchins
Seagoville
Crandall
Lancaster
Wilmer
Combine
Kaufman
Ferris
Red Oak
Waxahachie
Ennis
Italy
Corsicana
Kerens
Mabank
Wills Point
Grand Saline
Mineola
Canton
Van
Lindale
Tyler
Athens
Troup
Whitehouse
Overton
Kilgore
Longview
Gladewater
Marshall
Hallsville
Waskom
Shreveport
Greenwood
Stonewall
Mansfield
Logansport
Carthage
Henderson
Jacksonville
Brushy Creek
Rusk
Palestine
Fairfield
Mexia
Teague
Hobbard
Mount Vernon
Mount Pleasant
Winnsboro
Pittsburg
Daingerfield
Queen City
Atlanta
Linden
Hughes Springs
Lone Star
Quitman
Gilmer
Jefferson
Vivian
Benton
Zwolle
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC


El Paso Region 6
El Paso
Rio Grande
Guadalupe Peak
Pecos River
Pecos River
Midland
Odessa
Pecos
Villa Ahumada
SIERRA SAN MARTIN
DEL BORRACHO
DAVIS MOUNTAINS
GLASS MOUNTAINS
Pecos River
Rio Grande
Ojinaga
SIERRA GRANDE
Rio Grande
Rio Grande
0
25
50
100 Miles
Legend
2014_NRSA_Sites
TCEQ Regions
N
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC


Midland Region 7
Hobbs
Big Spring
Midland
Odessa
Guadalupe Peak
Pecos River
Pecos River
Pecos
Concho River
San Angelo
North Concho River
Pecos River
Rio Grande
Rio Gran
DAVIS MOUNTAINS
GLASS MOUNTAINS
PLATEAU
EDWARDS
0
25
50
100 Miles
Legend
2014_NRSA_Sites
TCEQ Regions
N
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

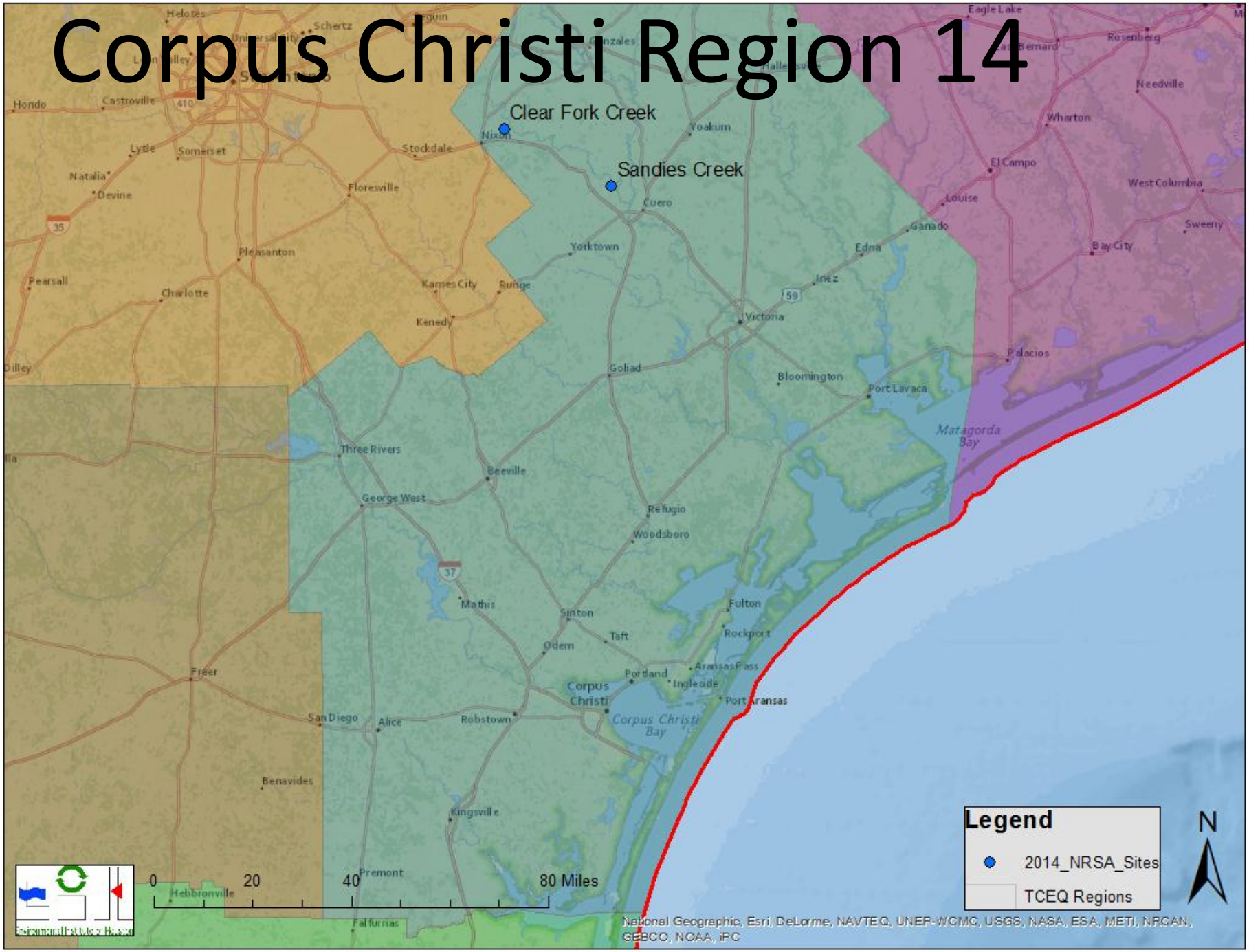

San Angelo Region 8
Bluff Creek
Concho River
North Concho River
Wilbarger Creek
Pecos River
TEXAS
EDWARDS PLATEAU
Stanton
Midland
Cross Plains
Coleman
Ballinger
Brownwood
Sterling City
San Angelo
Big Lake
Eden
Brady
Menard
Eldorado
Ozona
Mason
Sonora
Junction
Iraan
Rocksprings
Fredericksburg
Medina
0
20
40
80 Miles
Legend
2014_NRSA_Sites
TCEQ Regions
N
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC


Waco Region 9
Sandy Creek
Frost Creek
Wilbarger Creek
Jackson Creek
Austin
Waco
Temple
Killeen
Hillsboro
Corsicana
Mexia
Fairfield
Teague
Groesbeck
Mart
Hewitt
McGregor
Gatesville
Goldthwaite
Clifton
Hamilton
Brownwood
Hobbard
West
Buffalo
Marlin
San Saba
Copperas Cove
Harker Heights
Belton
Lampasas
Salado
Bartlett
Cameron
Hearne
Madisonville
Bryan
College Station
Rockdale
Caldwell
Navasota
Somerville
Giddings
Brenham
Llano
Burnet
Kingsland
Georgetown
Marble Falls
Leander
Taylor
Round Rock
Cedar Park
Pflugerville
Elgin
Fredericksburg
Dripping Springs
Blanco
Buda
Bastrop
Smithville
Wimberley
Kyle
La Grange
Dublin
Palestine
Brushy Cr
Hunt
Bunker Hill
Katy
Boerne
0
20
40
80 Miles
Legend
2014_NRSA_Sites
TCEQ Regions
N
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC


Beaumont Region 10
Yellow Bank Creek
Unnamed Stream
Hopson Mill Creek
Legend
2014_NRSA_Sites
TCEQ Regions
0
15
30
60 Miles
N
Logansport
Natchitoches
Zwolle
Many
Toledo Bend Reservoir
San Augustine
Milam
Hemphill
Leesville
DeRidder
Newton
Jasper
Woodville
Kirbyville
Buna
Dequincy
Moss Bluff
Sulphur
Lake Charles
Iowa
Vinton
Carlyss
Orange
Port Neches
Nederland
Port Arthur
Beaumont
Vidor
Mauriceville
Lumberton
Silsbee
Kountze
Sour Lake
Daisetta
Liberty
Dayton
Kingwood
Spring
Tomball
The Woodlands
Pinehurst
Prairie View
Waller
Conroe
Cleveland
Shepherd
Navasota
Huntsville
Livingston
Lake Livingston
Trinity
Madisonville
Groveton
Corrigan
Diboll
Lufkin
Crockett
Buffalo
Palestine
Nacogdoches
Jacksonville
Brushy Creek
Center
Humble
Jersey Village
Aldine
Crosby
Sheldon
Barrett
Mont Belvieu
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

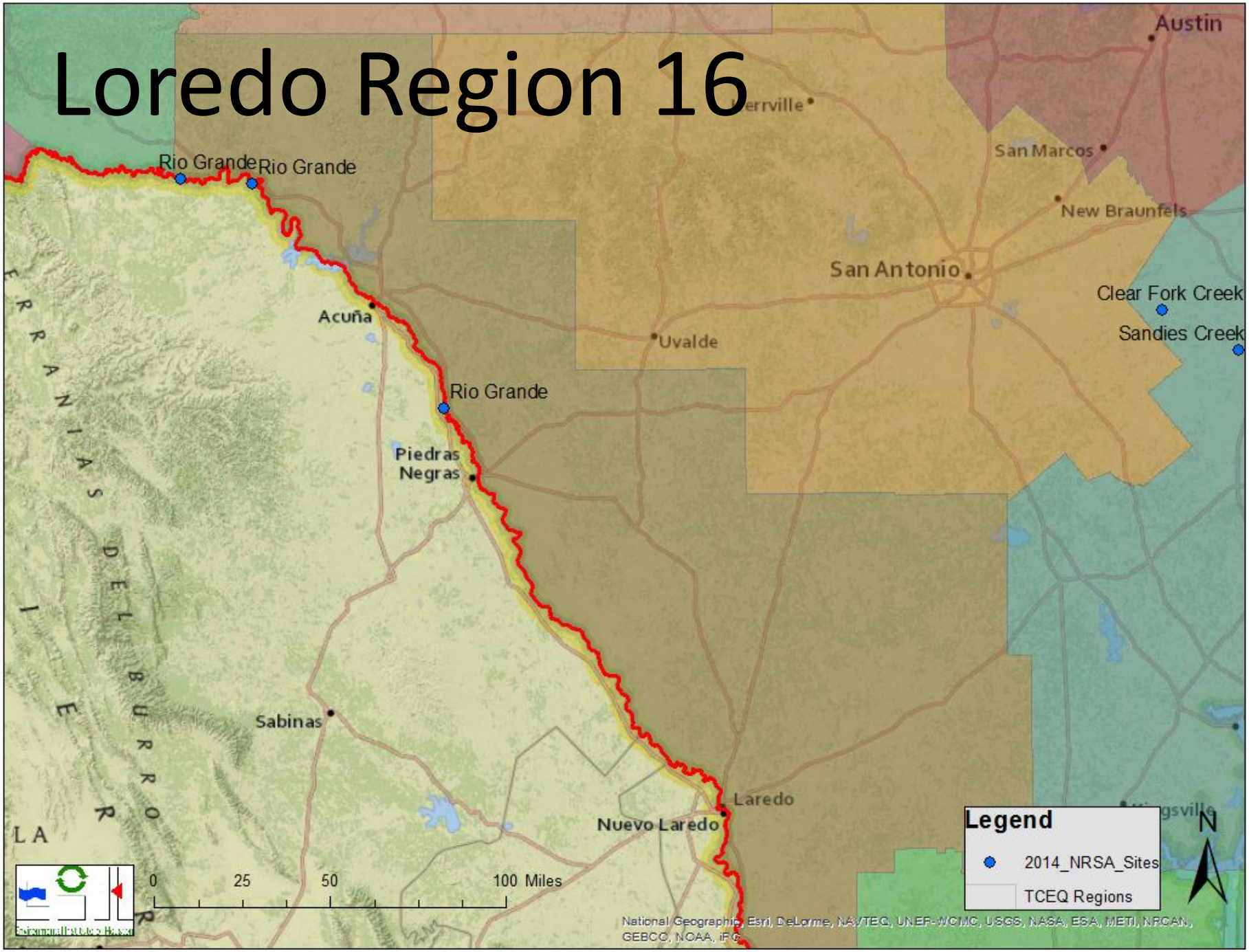
Houston Region 12
Jackson Creek
East Bernard Creek
Sandies Creek
Legend
2014_NRSA_Sites
TCEQ Regions
N
0
20
40
80 Miles
National Geographic, Esri, DeLorme, NAVTEQ, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, iPC

Corpus Christi Region 14



Harlingen Region 15

Loredo Region 16



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