

Texas' Contributions to the National Probabilistic Surveys and Future Direction of the States' Biological Monitoring Program



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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
SURFACE WATER QUALITY MONITORING PROGRAM



Texas' Involvement with Large Scale Biological Monitoring Projects

- In the early to mid-1980s – *An Assessment of Six Least Disturbed Unclassified Texas Streams* (Twidwell and Davis 1989), using the ecoregion approach statewide to identify and report on least disturbed streams
- Led to next study - *Texas Aquatic Ecoregion Project: An Assessment of Least Disturbed Streams* (Bayer et.al. 1992). A biological survey of reference conditions in 11 of Texas' 12 Level III ecoregions
- Involved considerable resources to conduct monitoring by a centrally-based team over a state as big and varied as Texas
- Identified challenges in accomplishing a comprehensive statewide survey from a single central office with relatively few staff resources

National Aquatic Resource Surveys

- National Wadeable Streams Assessment – 2004
- National Lakes Assessment – 2007
- National Rivers and Streams Assessment – 2008, 2009
- National Coastal Condition Assessment – 2010
- Currently considering National Wetlands Condition Assessment 2011

NARS Goals and Objectives

Design Goals:

- Ecological assessment of water bodies throughout the US
- Sample surveys stratified by ecoregion (Level II) adhering to statistically valid design allowing extrapolation of condition throughout each ecoregion and aggregation to the national level
- Conducted by states using common biologically-based protocols
- Complement state monitoring programs

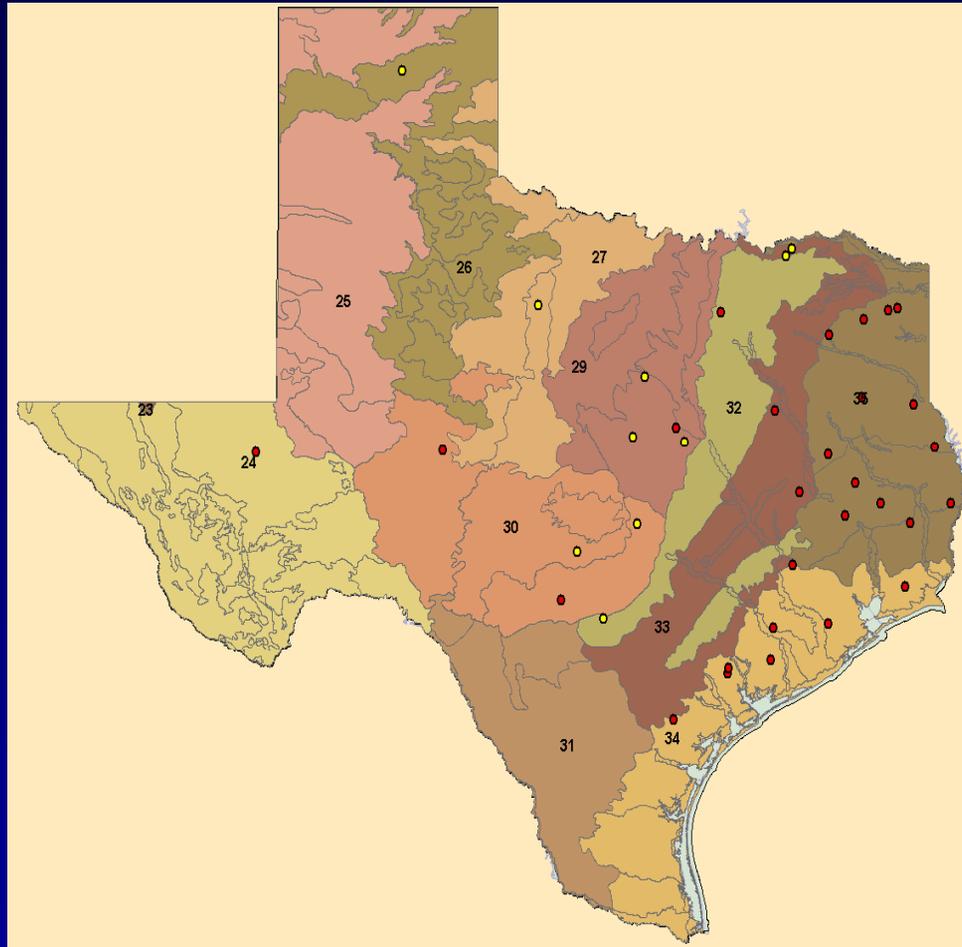
Objectives:

- Provide national status report on condition and health of the water body type using collaborative state effort
- Help build state capacity for monitoring and assessment
- Provide a means to assess comparability of state methods with those employed in the study

National Wadeable Streams Assessment

Project Details

- Considerable assistance in sampling the South Central Semi-Arid Prairies by Central Plains Center for BioAssessment in Lawrence, KS
- First attempt by TCEQ to pull together the “Virtual” Biological Assessment Team (VBAT) by drawing on expertise outside the Central Office
- First large-scale study by TCEQ to rely on landowner identification and permission for access



National Wadeable Streams Assessment Sites in Texas

- CPCBA Sampled
- TCEQ Sampled

Statistics

Candidate Sites: 99

Target Sites: 35-40

TCEQ: 29 Sites (included 11 reference streams)

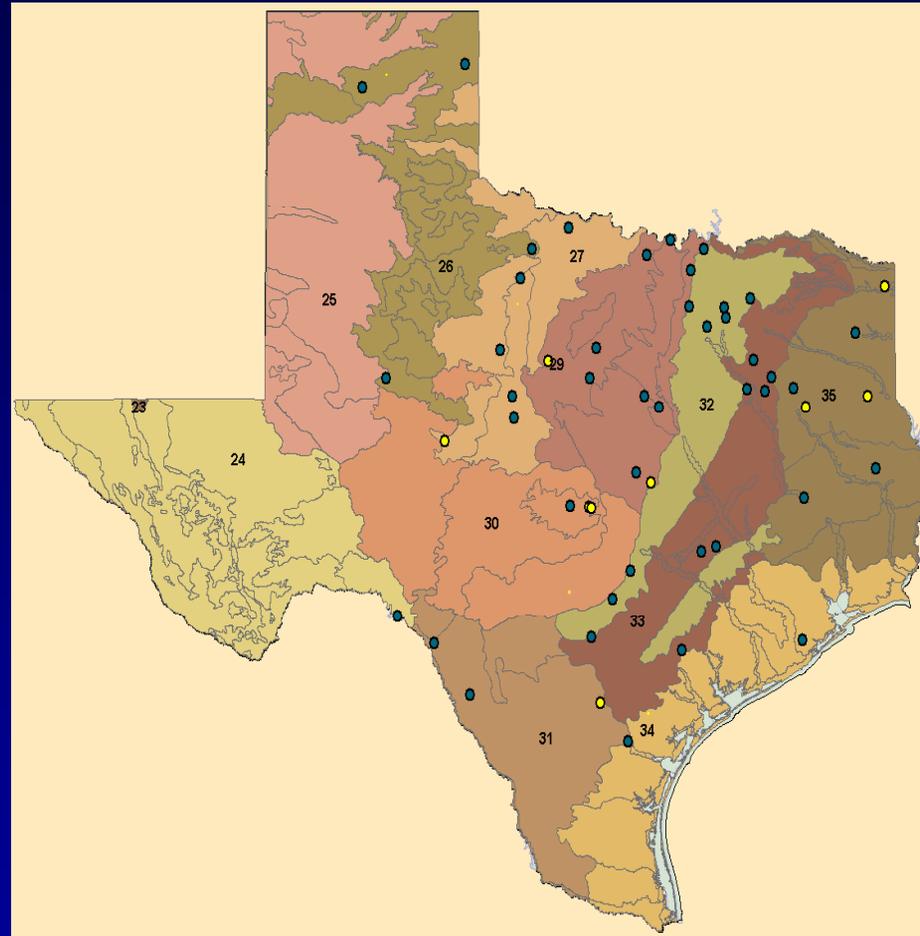
CPCBA: 10 Sites

Total Sites Sampled: 39

National Lakes Assessment

Project Details

- Texas was assigned 25 sites (with 5 re-visits)
- Texas added an additional 20 sites for a total of 50 data sets
 - Drawn from the overdraw list to allow a statistically valid data set at the state level
- Funding for additional 20 sites; the same protocols were conducted at all sites



National Lakes Assessment Sites in Texas

- NLA sites - TCEQ sampled
- NLA reference sites

Statistics

21 Public
Access Lakes

21 Privately
Owned Lakes

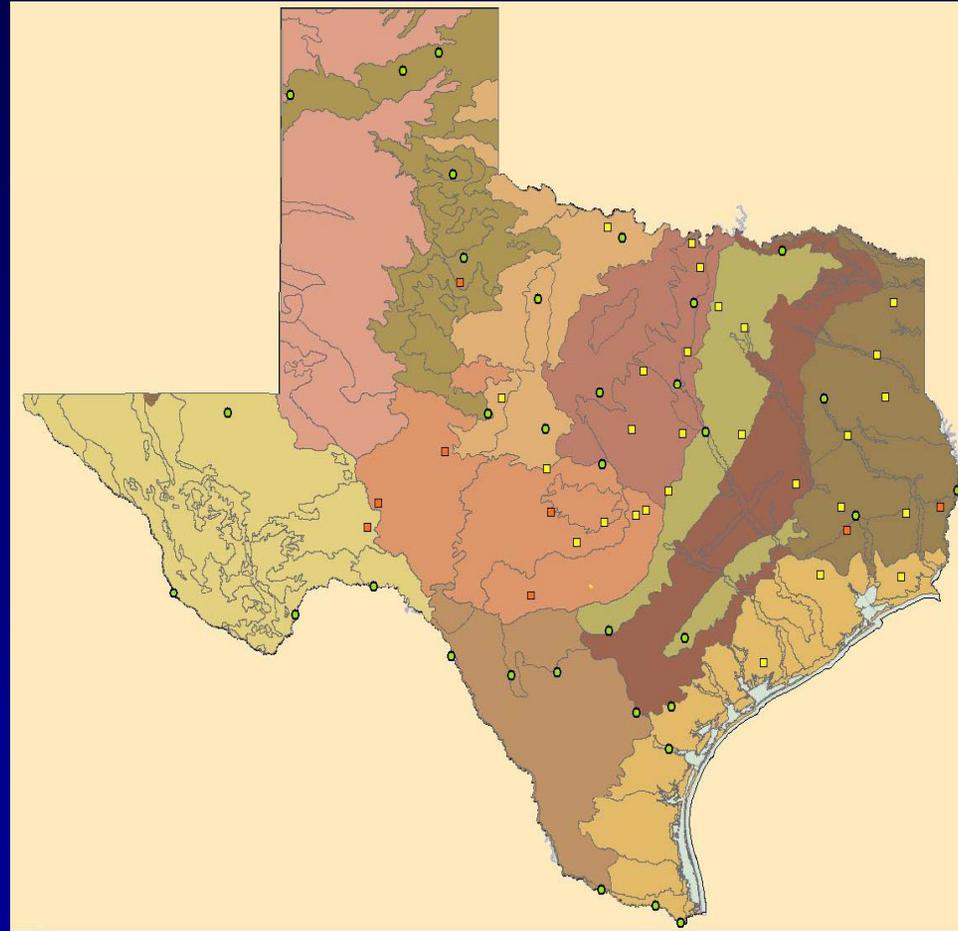
Maximum Lake
Size – Sam
Rayburn
Reservoir at
45,650 ha
(112,801 acres)

Minimum Lake
Size – Jones
Family Lake at
4.28 ha (10.58
acres)

National Rivers and Streams Assessment

Project Details:

- First time VBAT has included contractors as cooperative planners in survey (TPWD, Tetra Tech)
- Sampled over two-year period
- Very heavy sampling schedule to some very remote locations around the state



National Rivers and Streams Assessment Sites in Texas

- NRSA sites - TCEQ sampled
- NRSA sites - Tetra Tech sampled
- NRSA reference sites - Tetra Tech sampled

Statistics:

56 total draw sites in Texas

TCEQ/TPWD sampled 28, plus 2 revisits = 30

Tetra Tech sampled 27, plus 2 revisits and 8 reference streams = 37

Texas NARS Study Participants

- TCEQ Central Office:
 - 14 staff from 4 different Central Office water programs
- TCEQ Regional Offices:
 - 17 staff from 7 Regional Offices
- Texas Parks and Wildlife Department
 - 8 staff from River Studies Program in Austin
- Central Plains Center for BioAssessment
 - Sampled the South Central Semi-Arid Prairies Ecoregion for WSA
- USGS, Austin, TX Office
- Tetra Tech, Santa Fe, NM Office

Best Work Practice for Flowing Water Sites

Day 1:

- Use morning to prepare crew, equipment, etc. for trip
- Arrive at site in afternoon
- Perform reconnaissance and mark the “X” site
- Measure widths and determine reach length
- Work from “F” (X) to mark and label transects to “A” and to “K” (staying out of stream as much as possible)
- Finish for the day to allow stream to equilibrate overnight

Best Work Practice for Flowing Water Sites (cont.)

Day 2:

- Arrive at site and deploy multiprobe instrument at transect “F”
- Depending on wadeable or non-wadeable, the fish or benthic crews begin work at “A” or “K”
- PHab crew falls in behind and upon arrival at transect “F”, records multiprobe measurements
- Chemistry samples/flow measurement collected by PHab crew after their work is complete, usually at end of reach
- Legacy Trees performed by PHab crew
- Channel Constraint and Visual Assessment forms completed by entire crew at end of day (usually driving out of site)

Challenges Faced... and Overcome!



Pools on “wadeable” streams

The need for armed US Border Patrol guards at seven Rio Grande sites

- Gear sometimes hauled a mile or so to a site through thick brush and brambles
- Sometimes deeply incised channel made bank traverse difficult or impossible
- Challenge to haul in everything that was needed for the day and keep up with it all



Extremely slippery banks!

Massive Debris Jams at Many Sites Would Slow Work Considerably...Not to Mention Adding One Heck of a Woody Debris Count Challenge!



Too thick and steep to traverse

Too deep to wade

Other Challenges Included:



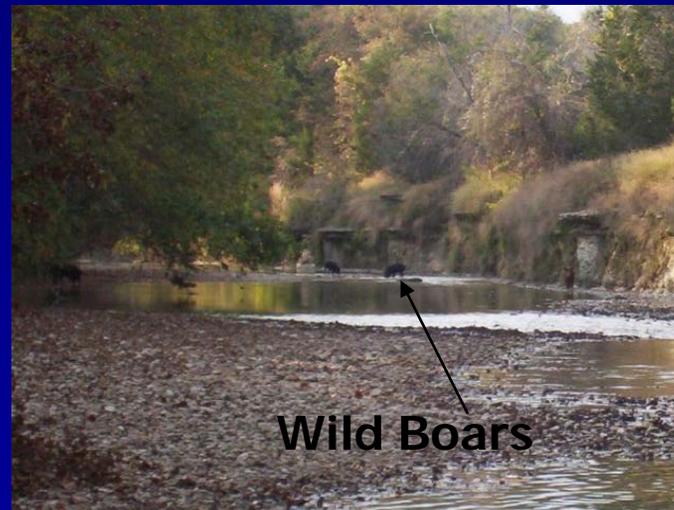
Boating 27 miles upstream from launch site to the "X"



Working without waders became the norm



Often working in barely wadeable stream with no shade



Wildlife hazards...snakes, wild boars, etc.

Lakes Sampling Challenges



Tricky Launches



Flooding,

Most Texas reservoirs were in flood state most of the summer of 2007



Flooding,



And More Flooding!

More Lakes Sampling Challenges



How will Texas Use NARS Data?

- Develop capacity for using probabilistic sampling methods
- Help direct targeted monitoring in future
- Provide a statistically valid estimate of various constituent levels in Texas lakes and rivers
 - Mercury levels for TMDLs and background levels
 - Standards development for nutrients, DO, etc.
- Comparison of Texas water quality to national averages
- Development of biological methods for reservoirs, streams, and large rivers
 - Benthic macroinvertebrates
 - Nekton (should they be used in managed reservoirs?)
 - Plankton
 - Periphyton

How Will TCEQ Use the Data in the Integrated Report?

- Data will be provided via Tetra Tech's ftp site
- TCEQ will include as narrative information in the Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d) describing water bodies of these strata in Texas
- Individual data points will not be loaded into the TCEQ's Integrated Report data base for inclusion in data sets

The Virtual Biological Assessment Team (VBAT)

Issues of Scale:

- Monitoring a state as large as Texas requires a new approach to monitoring biological resources for comprehensive studies in the state
- Work of this magnitude cannot be accomplished out of a single central office with 3-6 staff
- NARS has set the stage for future developments in both large-scale and more intensive regionalized approaches to monitoring such varied and often difficult to reach waters in the state
- NARS has provided several tests for this approach and has provided TCEQ with a successful experience with which to develop a statewide approach to biological monitoring

The Virtual Biological Assessment Team (VBAT)

- Past experience in the Texas aquatic ecoregion monitoring projects has enabled the development of a “virtual” biological assessment team (VBAT) for use in the NARS
 - Has proven highly successful in accomplishing work over either large geographic scales or more intensely over specific areas
 - VBAT staffs may include TCEQ central and regional offices, contracted entities, river authorities, universities, etc. working cooperatively in conducting strategic biological assessments
 - In addition to broader geographic coverage, the VBAT brings greater scientific expertise to a project
 - By expanding involvement to entities outside the TCEQ Central office program, a greater sense of ownership in projects and resulting data is generated
 - The VBAT also enhances professional development of the scientists involved by expanding their usual geographic areas of expertise into other parts of the state

Future Directions for Biological Monitoring in Texas

- Continuation of previous two ecoregion projects will add new reference sites and re-visit old ones to detect possible changes to conditions over time
 - Will include new landuse analyses previously unavailable in the 1980s
- Implementation of recent refinements to the biological program based on the Third Party Review of TCEQ's biological program by EPA
 - evaluation of biological and habitat metrics
 - biological data management
 - quality assurance of biological programs around the state
- Continued training of multiple entities around the state is highly beneficial as contracting of services continues to increase

Special Thanks To:

- Members of the Surface Water Quality Monitoring, Clean Rivers, Total Maximum Daily Load, and Water Quality Standards Teams in the TCEQ's Central Office
- Members of the TCEQ's Regional Office Surface Water Quality Monitoring Program
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- Evan Hornig, USGS in Austin, TX
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Questions?



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