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David Yoskowitz, Ph.D.
Executive Director

November 6, 2023

Ms. Kelly Keel
Interim Executive Director
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Dear Ms. Keel:

Thank you for your letter dated August 8, 2023. Texas Parks and Wildlife Department (TPWD) appreciates the opportunity to offer input to Texas Commission on Environmental Quality (TCEQ) on activities related to environmental flow standards and recommendations for the statewide workplan including timeline and methods for prioritizing the review of standards.

Activities related to Environmental Flow Standards

Since the adoption of environmental flow standards in 2011-2013, TPWD made significant science-based contributions to the study of instream flows and freshwater inflows, including performing studies to quantify biotic responses to changes in hydrology, developing habitat and species-specific flow-ecology relationships, and designing and implementing tools to disseminate and share information. TPWD managed and directed external funding, including pass-through grants from the Texas Water Development Board (TWDB), U.S. Fish and Wildlife Service (USFWS), and other entities. TPWD led or collaborated on comprehensive studies of instream flow needs in several basins including the Devils, San Antonio, Guadalupe, Trinity and Brazos river basins as part of TPWD and state-mandated science initiatives, including the Texas Instream Flow Program. These studies and activities, documented in the Attachment, are helpful for informing adaptive management of environmental flow standards across the river basin and bay systems in Texas. These provide information to better understand environmental flows and to validate or refine environmental flow recommendations, standards adopted by the commission, or strategies to achieve those standards.

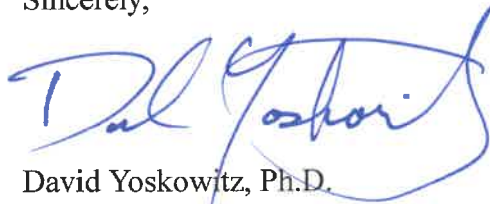
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TPWD Recommendations for the Statewide Workplan to Prioritize and Schedule the Review of Environmental Flow Standards (Texas Water Code Sec. 11.02363(b))

TPWD recommends that the timeline of the review of the environmental flow standards of each river basin and bay system consider existing agency workloads. Staggering start times or sequencing systems would enable the most efficient support of the adaptive management process, including allowing lessons learned from each review to be incorporated into subsequent reviews.

TPWD looks forward to working with TCEQ and TWDB to aid the Science Advisory Committee and the Basin and Bay Expert Science Teams, as requested.

Sincerely,



David Yoskowitz, Ph.D.
Executive Director

DY:TB:cc

Attachment

cc: Mr. Craig Bonds
Ms. Allison Winney
Mr. James Murphy
Ms. Shannon Love
Mr. Tim Birdsong
Mr. Robin Riechers
Mr. Kevin Mayes

Attachment: Texas Parks and Wildlife Department science-based efforts for informing the environmental flows adaptive management process

Statewide, Multi-Basin, or Species-specific

- *Ongoing*. Fishes of Texas. Federal, state, and other funding sources. 2002-present.
 - 2022. Hendrickson, Dean A., and Adam E. Cohen. 2022. Fishes of Texas Project Database (Version 3.0). <http://doi.org/10.17603/C3WC70>.
- *Ongoing*. Mussels of Texas. Federal, state, and other funding sources. 2017-present.
 - 2020. C. R. Randklev, N.B. Ford, M. Fisher, R. Anderson, C.R. Robertson, M. Hart, J. Khan and R. Lopez. Mussels of Texas Project Database, Version 1.0.
- *In Progress*. Identifying environmental thresholds for fish species and communities in Texas. Baylor University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-234.
- *In Progress*. Gap Sampling within the Texas Native Fish Conservation Areas Network. University of Texas and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-180.
 - *In Progress*. Little River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Sulphur River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. San Bernard River watershed bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Lavaca-Navidad River Watershed bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Lower Colorado River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Pecos River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Upper Rio Grande Basin in Texas bioassessment. Texas Parks and Wildlife Department and University of Texas.
- *In Progress*. Effects of a catastrophic flood on macroinvertebrate populations, hydrologic relationships with macroinvertebrate taxa, and Guadalupe Bass recruitment in two central Texas rivers (Blanco River and Colorado River). Texas Parks and Wildlife Department.
- *In Progress*. Developing and validating bioenergetics models for Guadalupe Bass. University of Texas at San Antonio and Texas Parks and Wildlife Department. State Wildlife Grant.
- *In Progress*. Quantification of physiological performance and other functional traits of plains fishes in support of mechanistic management and conservation. University of North Texas and Texas Parks and Wildlife Department. USFWS Section 6 F22AP03119.
- *In Progress*. Habitat (Oyster Beds, Seagrass, Soft Bottom) Mapping Using TOP15 Aerial Imagery. State Wildlife Grant TX-168-R-1.

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- 2021. Protecting and Restoring Environmental Flows and Water Levels in Texas. Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-160.
 - Literature Review and Subsequent Analyses of Flow-ecology Relationships for SGCN Fishes in Texas. Baylor University.
 - Geospatial Tool and Flow Alteration Analysis. Texas Conservation Science, Inc.
 - Development of flow-ecology based flow protection and restoration targets in support of the Great Plains Environmental Flow Information Toolkit (GPEFIT). The Nature Conservancy of Texas and Texas A&M University.
 - 2019. Valente, J., D. Bradsby, K. B. Mayes, C. Loeffler, L. Hamlin, D. Geeslin, K. Horndeski, D. Young, J. Trungale, R. Smith, K. Garmany, and T. Hayes. 2019. Developing a geospatial decision support tool for protecting and restoring environmental flows in Texas rivers and streams. Pages 253–267 *in* D. C. Dauwalter, T. W. Birdsong, and G. P. Garrett, editors. *Multispecies and watershed approaches to freshwater fish conservation*. American Fisheries Society, Symposium 91. Bethesda, Maryland.
- 2020. Kreiser, B. R., D. J. Daugherty, D. L. Buckmeier, N. G. Smith, and E. B. Newsome. Sibship analysis to characterize Alligator Gar reproductive contributions in two Texas systems. *North American Journal of Fisheries Management* 40:555-565. doi.org/10.1002/nafm.10400
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- 2019. Recruitment dynamics and reproductive ecology of Blue Sucker in Texas, with a focus on the Big Bend region of the Rio Grande. Texas Tech University, Texas State University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-136.
- 2019. Randklev, C.R., M.A. Hart, J.M. Khan, E.T. Tsakiris, and C.R. Robertson. Hydraulic requirements of freshwater mussels (Unionidae) and a conceptual framework for how they respond to high flows. *Ecosphere* 10(12):1-19.
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- 2018. Conserving Texas Biodiversity: Status, Trends, and Conservation Planning for Fishes of Greatest Conservation Need. University of Texas and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-106.

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- 2019. Robertson, S. M., S. Curtis, C. Robertson, A. Grubh, G. Linam, and M. Casarez. Upper Red River Basin bioassessment. River Studies Report Series, Texas Parks and Wildlife Department, Austin, Texas. 40 pp. [Final Report](#).
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- 2017. Assessment and Modeling of Environmental Flows to Support Riparian Areas, Native Fishes, and Unionid Mussels. Texas State University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-121.
- 2014. Opdyke, D. R., E. L. Oborny, S. K. Vaughn, and K. B. Mayes. Texas environmental flow standards and the hydrology-based environmental flow regime methodology. *Hydrological Sciences Journal* 59:820-830.
- 2012. Survey of habitat suitability for Texas freshwater fishes. Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-46.
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Sabine and Neches Rivers and Sabine Lake Bay

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- *In Progress*. Fish and freshwater mussel community assessments in off-channel habitats of the Sabine River drainage. Texas State University and Texas Parks and Wildlife Department. Texas Parks and Wildlife Department Contract CA-0005436.
- *In Progress*. Assessment of Impacts to Mussel Community Structure from a new Wastewater Discharge. Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-190.
- 2017. Population ecology of two state listed species, the Southern Hickorynut (*Obovaria arkansasensis*) and the Louisiana Pigtoe (*Pleurobema riddellii*). University of Texas-Tyler and Texas Parks and Wildlife Department. State Wildlife Grant.
- 2015. Blue Sucker movement and habitat use in the Lower Sabine River, Texas. Texas Parks and Wildlife Department. Texas Water Development Board Contract 1004831019. [Final Report](#).
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- 2011. Hydrologic and geomorphic controls on fish, mussel, and riparian vegetation communities in the upper Neches River watershed. USFWS State Wildlife Grant TX T-56.

Trinity and San Jacinto Rivers and Galveston Bay

- *In Progress*. Middle Trinity River Instream Flow Study. Texas Instream Flow Program and Trinity River Authority.
- 2023. Smith, N. G., D. L. Buckmeier, B. P. Fleming, A. R. Grubh, M. D. Homer, and S. M. Robertson. Spatial variability in the fish assemblage of a large Texas river-reservoir ecosystem with implications for managing fish in regulated rivers. *North American Journal of Fisheries Management* 43:313-326. doi.org/10.1002/nafm.10804
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- 2021. Habitat use and movement ecology of Southern Flounder and Alligator Gar. USFWS State Wildlife Grant TX T-206.
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- 2015. Larval Fish in Trinity River Floodplains. (Do river-reservoir interface habitats serve as surrogate nursery habitats for floodplain-dependent riverine fishes?). Texas Tech University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-76.
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- 2014. Flow dependent species: life history and habitat associations in Texas Gulf Coast Rivers. Texas A&M and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-60 Project C.
 - 2016. Rodger, A., K. B. Mayes, and K. O. Winemiller. Larval fish abundance in relation to environmental variables in two Texas Gulf Coast rivers. *Journal of Freshwater Ecology*. 31(4):1-16. <https://doi.org/10.1080/02705060.2016.1216902>
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Colorado and Lavaca Rivers and Matagorda and Lavaca Bays

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- *In Progress*. Trajectory of habitat and fish assemblages in the Llano River watershed following a large-scale flood. Texas Parks and Wildlife Department.
- *In Progress*. Effects of a catastrophic flood on macroinvertebrate populations and hydrologic relationships with macroinvertebrate taxa in the Llano River. Texas Parks and Wildlife Department.
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- 2023. Acre, M. R., T. B. Grabowski, D. J. Leavitt, N. G. Smith, A. A. Pease, P. T. Bean, and P. D. Geeslin. Mismatch between temperature and discharge disrupts

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 - 2022. Goldsmith, A., J.M. Khan, C.R. Robertson, R. Lopez, and C.R. Randklev. Using upper thermal limits of *Lampsilis bracteata* (Texas fatmucket) from the North Llano and San Saba rivers, Texas to inform water management practices in the Edwards Plateau. Aquatic Conservation: Marine and Freshwater Ecosystems 32(1):85-97.
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Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays

- *In Progress*. Lower Guadalupe River Instream Flow Study. Texas Instream Flow Program, Guadalupe Blanco River Authority.
- *In Progress*. Acoustic Mapping and Quantification of Submerged Habitats in Aransas Bay, Texas. USFWS State Wildlife Grant TX T-238.
- *In Progress*. Multiscale thermal vulnerability for fishes in urbanizing, spring-influenced streams of central Texas. USFWS State Wildlife Grant TX T-242.
- 2022. Winemiller, K.O., M.C. Andrade, C.C. Arantes, T. Bokhutlo, L.M. Bower, E.R. Cunha, F.W., Keppeler, E.O. Lopez-Delgado, Y. Quintana, D.E. Saenz, K.B. Mayes, and C.R. Robertson. Can spatial food web subsidies associated with river hydrology and lateral connectivity be detected using stable isotopes? Food Webs <https://doi.org/10.1016/j.fooweb.2022.e002642021>. Habitat restoration site identification using acoustic surveys in the Mission-Aransas National Estuarine Research Area. Texas Parks and Wildlife, Mission-Aransas National Estuarine Research Reserve, and Texas A&M Corpus Christi.

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Nueces River and Corpus Christi and Baffin Bays

- 2019. Frio River biology and fluvial geomorphology study to determine impacts of sand and gravel activity. Texas Parks and Wildlife Department, Texas Water Development Board, and Texas A&M Forest Service. [River Studies Report No. 28](#).

Brazos River and Associated Bay and Estuary System

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- 2022. Measuring and predicting movement ecology for imperiled Great Plains fishes in Texas. Texas A&M University and Texas Parks and Wildlife Department. USFWS Section 6 Grant E-197.
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- 2016. Fish habitat suitability criteria development for the Lower Brazos River. Texas Parks and Wildlife Department. Texas Water Development Board Contract 1300011590. [Final Report](#).
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- 2016. Riparian assessments on the Guadalupe and Brazos rivers. Environmental Conservation Alliance, Inc. and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1248311359. [Final Report](#).
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- 2015. Reproductive ecology and population dynamics of fishes in the upper Brazos River. Texas Tech University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-47-1.
- 2015. Perkin, J. S., K. B. Gido, A. R. Cooper, T. F. Turner, M. J. Osborne, E. R. Johnson, and K. B. Mayes. Fragmentation and dewatering transform Great Plains stream fish communities. *Ecological Monographs* 85:73–92.
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Rio Grande, Rio Grande Estuary, and Lower Laguna Madre

- *In Progress*. Devils River fish assemblage, fish habitat, and hydrologic monitoring. Texas Parks and Wildlife Department and The Nature Conservancy. Internal Funding.
- *In Progress*. Devils River Gain-Loss Study. Texas Parks and Wildlife Department, The Nature Conservancy, The Devils River Conservancy, and Texas Water Development Board. Internal funding.
- *In Progress*. Fish assemblages of the Rio Grande between Eagle Pass and Laredo, Texas. University of Texas Rio Grande and Texas Parks and Wildlife Department. USFWS Section 6 Grant F21AP03608.

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- *In Progress*. Hydrologic Monitoring of Priority Habitats in the Devils River. University of Texas-Bureau of Economic Geology and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-212-R-1.
- *In Progress*. Evaluation of population persistence for *Popenaias popeii*, Texas Hornshell, in the Devils River. Texas A&M University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-260-R-1.
- 2023. Thermal tolerance of *Popenaias popeii* (Texas Hornshell) from the Rio Grande, Texas. Texas A&M University and Texas Parks and Wildlife Department. USFWS Section 6 Grant E-191.
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- 2018. Monitoring the effects of groundwater level on spring and stream discharge, stream temperature, and habitat for *Dionda diaboli* in the Devils River. University of Texas and Texas Parks and Wildlife Department. USFWS Section 6 Grant E-173.
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- 2014. An evaluation of the relationship between stream flow and habitat availability for the Devils River Minnow. Texas State University and Texas Parks and Wildlife Department. USFWS Section 6 Grant TX E-115.

Cypress Basin

- *In Progress*. Cypress Basin fish and mussel monitoring related to the Sustainable Rivers Program. Texas Parks and Wildlife Department, Caddo Lake Institute, and The Nature Conservancy.

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- *In Progress.* Cypress Basin riparian productivity and environmental flow management: trend analysis and paired-watershed assessment. Texas Conservation Science, Inc. and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-218.

Attachment: Texas Parks and Wildlife Department science-based efforts for informing the environmental flows adaptive management process

Statewide, Multi-Basin, or Species-specific

- *Ongoing*. Fishes of Texas. Federal, state, and other funding sources. 2002-present.
 - 2022. Hendrickson, Dean A., and Adam E. Cohen. 2022. Fishes of Texas Project Database (Version 3.0). <http://doi.org/10.17603/C3WC70>.
- *Ongoing*. Mussels of Texas. Federal, state, and other funding sources. 2017-present.
 - 2020. C. R. Randklev, N.B. Ford, M. Fisher, R. Anderson, C.R. Robertson, M. Hart, J. Khan and R. Lopez. Mussels of Texas Project Database, Version 1.0.
- *In Progress*. Identifying environmental thresholds for fish species and communities in Texas. Baylor University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-234.
- *In Progress*. Gap Sampling within the Texas Native Fish Conservation Areas Network. University of Texas and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-180.
 - *In Progress*. Little River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Sulphur River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. San Bernard River watershed bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Lavaca-Navidad River Watershed bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Lower Colorado River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Pecos River Basin bioassessment. Texas Parks and Wildlife Department and University of Texas.
 - *In Progress*. Upper Rio Grande Basin in Texas bioassessment. Texas Parks and Wildlife Department and University of Texas.
- *In Progress*. Effects of a catastrophic flood on macroinvertebrate populations, hydrologic relationships with macroinvertebrate taxa, and Guadalupe Bass recruitment in two central Texas rivers (Blanco River and Colorado River). Texas Parks and Wildlife Department.
- *In Progress*. Developing and validating bioenergetics models for Guadalupe Bass. University of Texas at San Antonio and Texas Parks and Wildlife Department. State Wildlife Grant.
- *In Progress*. Quantification of physiological performance and other functional traits of plains fishes in support of mechanistic management and conservation. University of North Texas and Texas Parks and Wildlife Department. USFWS Section 6 F22AP03119.
- *In Progress*. Habitat (Oyster Beds, Seagrass, Soft Bottom) Mapping Using TOP15 Aerial Imagery. State Wildlife Grant TX-168-R-1.

- 2022. Kiser, A.H., J.M. Khan, C.R. Robertson, R. Lopez, and C.R. Randklev. The effect of flow and mussel species traits on the occurrence of rare mussels: a case study within select rivers of the West Gulf Coastal Plain. *Aquatic Conservation: Marine and Freshwater Ecosystems* 32(1): DOI: 10.1002/aqc.3747.
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- 2021. Protecting and Restoring Environmental Flows and Water Levels in Texas. Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-160.
 - Literature Review and Subsequent Analyses of Flow-ecology Relationships for SGCN Fishes in Texas. Baylor University.
 - Geospatial Tool and Flow Alteration Analysis. Texas Conservation Science, Inc.
 - Development of flow-ecology based flow protection and restoration targets in support of the Great Plains Environmental Flow Information Toolkit (GPEFIT). The Nature Conservancy of Texas and Texas A&M University.
 - 2019. Valente, J., D. Bradsby, K. B. Mayes, C. Loeffler, L. Hamlin, D. Geeslin, K. Horndeski, D. Young, J. Trungale, R. Smith, K. Garmany, and T. Hayes. 2019. Developing a geospatial decision support tool for protecting and restoring environmental flows in Texas rivers and streams. Pages 253–267 *in* D. C. Dauwalter, T. W. Birdsong, and G. P. Garrett, editors. *Multispecies and watershed approaches to freshwater fish conservation*. American Fisheries Society, Symposium 91. Bethesda, Maryland.
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- 2019. Recruitment dynamics and reproductive ecology of Blue Sucker in Texas, with a focus on the Big Bend region of the Rio Grande. Texas Tech University, Texas State University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-136.
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Sabine and Neches Rivers and Sabine Lake Bay

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- *In Progress*. Fish and freshwater mussel community assessments in off-channel habitats of the Sabine River drainage. Texas State University and Texas Parks and Wildlife Department. Texas Parks and Wildlife Department Contract CA-0005436.
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Trinity and San Jacinto Rivers and Galveston Bay

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Colorado and Lavaca Rivers and Matagorda and Lavaca Bays

- *In Progress*. Evaluating resilience and vulnerability of fish assemblage structure to intermittent flow. Texas Tech University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-243.
- *In Progress*. Trajectory of habitat and fish assemblages in the Llano River watershed following a large-scale flood. Texas Parks and Wildlife Department.
- *In Progress*. Effects of a catastrophic flood on macroinvertebrate populations and hydrologic relationships with macroinvertebrate taxa in the Llano River. Texas Parks and Wildlife Department.
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Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays

- *In Progress*. Lower Guadalupe River Instream Flow Study. Texas Instream Flow Program, Guadalupe Blanco River Authority.
- *In Progress*. Acoustic Mapping and Quantification of Submerged Habitats in Aransas Bay, Texas. USFWS State Wildlife Grant TX T-238.
- *In Progress*. Multiscale thermal vulnerability for fishes in urbanizing, spring-influenced streams of central Texas. USFWS State Wildlife Grant TX T-242.
- 2022. Winemiller, K.O., M.C. Andrade, C.C. Arantes, T. Bokhutlo, L.M. Bower, E.R. Cunha, F.W., Keppeler, E.O. Lopez-Delgado, Y. Quintana, D.E. Saenz, K.B. Mayes, and C.R. Robertson. Can spatial food web subsidies associated with river hydrology and lateral connectivity be detected using stable isotopes? *Food Webs* <https://doi.org/10.1016/j.fooweb.2022.e002642021>. Habitat restoration site identification using acoustic surveys in the Mission-Aransas National Estuarine Research Area. Texas Parks and Wildlife, Mission-Aransas National Estuarine Research Reserve, and Texas A&M Corpus Christi.
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- 2018. Floodplain inundation analysis of the lower Guadalupe River: linking hydrology and floodplain-dependent resources. Texas State University and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1448311791. [Final Report](#).
 - 2023. Meitzen, K. M., C. R. Robertson, J. L. Jensen, D. J. Daugherty, T. B. Hardy, and K. B. Mayes. Applying floodplain inundation modeling to estimate suitable spawning habitat and recruitment success for Alligator Gar in the Guadalupe River, Texas. *Hydrology* 10:123.
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 - 2017. Instream flow study of the lower San Antonio River and lower Cibolo Creek. Texas Instream Flow Program and San Antonio River Authority. [Final Report](#).
 - 2017. Potential influence of exchanges between the lower Guadalupe River and oxbow lakes on food web dynamics. Texas A&M University and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1448311791. [Final Report](#).
 - 2016. Riparian assessments on the Guadalupe and Brazos rivers. Environmental Conservation Alliance, Inc. and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1248311359. [Final Report](#).
 - 2014. Supplemental biological data collection, Lower Guadalupe River priority instream flow study. Guadalupe-Blanco River Authority and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1248311360. [Final Report](#).
 - 2014. Fish assemblage and water quality in the San Antonio River, Texas, between Floresville and Goliad. Texas Parks and Wildlife Department and San Antonio River Authority. [River Studies Report No. 22](#).

Nueces River and Corpus Christi and Baffin Bays

- 2019. Frio River biology and fluvial geomorphology study to determine impacts of sand and gravel activity. Texas Parks and Wildlife Department, Texas Water Development Board, and Texas A&M Forest Service. [River Studies Report No. 28](#).

Brazos River and Associated Bay and Estuary System

- 2022. Measuring and predicting movement ecology for imperiled Great Plains fishes in Texas. Texas A&M University and Texas Parks and Wildlife Department. USFWS Section 6 Grant E-197.

- *In review*. Steffensmeier, Z. D., K. B. Mayes, and J. S. Perkin. Linking movement rate of pelagic-broadcast spawning fishes to river fragment length and conservation status. *Biological Conservation*.
- 2022. Alligator Gar Lateral Movements and Habitat Uses in the Lower Brazos River. Texas A&M University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-211.
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- 2019. Impacts of hydrologic alteration on imperiled Brazos River vertebrates. University of Texas Rio Grande Valley and Texas Parks and Wildlife Department. USFWS Section 6 grant TX E-187-R-1. [Final Report](#).
 - 2022. Taylor, C. M., and K. B. Mayes. Impact of hydrologic alteration on Brazos River pelagophilic minnows. *Transactions of the American Fisheries Society*. 151:474–486. DOI: 10.1002/tafs.10363
- 2018. Instream flow study of the middle and lower Brazos River. Texas Instream Flow Program. [Final Report](#).
- 2016. Fish habitat suitability criteria development for the Lower Brazos River. Texas Parks and Wildlife Department. Texas Water Development Board Contract 1300011590. [Final Report](#).
- 2016. Riparian productivity along the Lower Brazos River. Environmental Conservation Alliance and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1200011484. [Final Report](#).
- 2016. Riparian assessments on the Guadalupe and Brazos rivers. Environmental Conservation Alliance, Inc. and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1248311359. [Final Report](#).

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- 2015. Reproductive ecology and population dynamics of fishes in the upper Brazos River. Texas Tech University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-47-1.
- 2015. Perkin, J. S., K. B. Gido, A. R. Cooper, T. F. Turner, M. J. Osborne, E. R. Johnson, and K. B. Mayes. Fragmentation and dewatering transform Great Plains stream fish communities. *Ecological Monographs* 85:73–92.
- 2014. Reproductive ecology and population dynamics of fishes in the Upper Brazos. Texas Tech University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-47.
- 2014. Freshwater mussel (Family: Unionidae) data collection in the middle and lower Brazos River. Texas A&M University-Institute of Renewable Natural Resources and Texas Parks and Wildlife Department. Texas Water Development Board Contract 1104831145. [Final Report](#).
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Rio Grande, Rio Grande Estuary, and Lower Laguna Madre

- *In Progress*. Devils River fish assemblage, fish habitat, and hydrologic monitoring. Texas Parks and Wildlife Department and The Nature Conservancy. Internal Funding.
- *In Progress*. Devils River Gain-Loss Study. Texas Parks and Wildlife Department, The Nature Conservancy, The Devils River Conservancy, and Texas Water Development Board. Internal funding.
- *In Progress*. Fish assemblages of the Rio Grande between Eagle Pass and Laredo, Texas. University of Texas Rio Grande and Texas Parks and Wildlife Department. USFWS Section 6 Grant F21AP03608.
- *In Progress*. Hydrologic Monitoring of Priority Habitats in the Devils River. University of Texas-Bureau of Economic Geology and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-212-R-1.

- *In Progress*. Evaluation of population persistence for *Popenaias popeii*, Texas Hornshell, in the Devils River. Texas A&M University and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-260-R-1.
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 - 2023. Rangaswami, X.L., A.M. Goldsmith, J.M. Khan, C.R. Robertson, R. Lopez, and C.R. Randklev. Thermal tolerance of *Popenaias popeii* (Texas Hornshell) and their host fish from the Rio Grande basin, Texas. *Scientific Reports* 13: Article 4603.
- 2022. Airborne Lidar Bathymetry Survey and Aquatic Habitat Evaluation for Devils River Minnow and Texas Hornshell Mussel in the Devils River. University of Texas-Bureau of Economic Geology and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-174.
 - 2020. Saylam, K., A.R. Averett, L. Costard, B.D. Wolaver, and S. Robertson. Multi-sensor approach to improve bathymetric lidar mapping of semi-arid groundwater-dependent streams: Devils River, Texas. *Remote Sensing* 2020:1–24.
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 - 2020. Caldwell, T.G., B.D. Wolaver, T. Bongiovanni, J.P. Pierre, S. Robertson, C. Abolt, and B.R. Scanlon. Spring discharge and thermal regime of a groundwater dependent ecosystem in an arid karst environment. *Journal of Hydrology* 587:1–14.
- 2018. Randklev, C.R., T. Miller, M. Hart, J. Morton, N. A. Johnson, K. Skow, K. Inoue, E.T. Tsakiris, S. Oetker, R. Smith, C. Robertson, and R. Lopez. A semi-arid river in distress: contributing factors and recovery solutions for three imperiled freshwater mussels (Family Unionidae) endemic to the Rio Grande basin in North America. *Science of the Total Environment* 631-632:733-744.
- 2014. An evaluation of the relationship between stream flow and habitat availability for the Devils River Minnow. Texas State University and Texas Parks and Wildlife Department. USFWS Section 6 Grant TX E-115.

Cypress Basin

- *In Progress*. Cypress Basin fish and mussel monitoring related to the Sustainable Rivers Program. Texas Parks and Wildlife Department, Caddo Lake Institute, and The Nature Conservancy.
- *In Progress*. Cypress Basin riparian productivity and environmental flow management: trend analysis and paired-watershed assessment. Texas Conservation Science, Inc. and Texas Parks and Wildlife Department. USFWS State Wildlife Grant TX T-218.

Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Bobby Janecka, *Commissioner*
Kelly Keel, *Interim Executive Director*



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 8, 2023

Dr. David Yoskowitz, Executive Director
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, Texas 78744-3291



Re: Biennial Report to the Environmental Flows Advisory Group

Dear Dr. Yoskowitz:

The Texas Commission on Environmental Quality (TCEQ), Texas Water Development Board (TWDB), and Texas Parks and Wildlife Department (TPWD) are all tasked with supporting the environmental flows adaptive management process by providing technical assistance to the Science Advisory Committee (SAC) and the Basin and Bay Expert Science Teams (BBEST), as requested. TCEQ has additional responsibilities for providing administrative and technical support to the Environmental Flows Advisory Group (Advisory Group) and SAC. TCEQ is also charged with adopting and revising the environmental flow standards.

Senate Bill 1397, 88th Legislative Session, TCEQ's Sunset Bill, further tasked TCEQ with providing a biennial report to the Advisory Group. TCEQ's biennial report must include input from TPWD and TWDB on their activities related to environmental flow standards and recommendations for the statewide workplan for the adaptive management process that will be developed by the Advisory Group. The purpose of this letter is to request that TPWD submit input for the biennial report to TCEQ by October 16, 2023. This will allow TCEQ to meet its statutory obligation to submit the biennial report to the Advisory Group by January 1, 2024.

TCEQ looks forward to working with TWDB and TPWD to provide continued support to the environmental flows adaptive management process. If you have any questions, please contact Kim Nygren, Deputy Director of the Water Availability Division, at 512-239-4644 or kim.nygren@tceq.texas.gov.

Sincerely,

A handwritten signature in black ink that reads "K Keel".

Kelly Keel
Interim Executive Director



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