

Aquatic ecology, wetlands and listed-species compliance — with the permits held in house.

Arrowhead Ecology Group is a Texas environmental consulting firm working across freshwater mussel and fish surveys, wetland delineation, threatened and endangered species clearance, and quantitative analysis. We author and execute Aquatic Resource Relocation Plans under our own federal and state permits, and we back field work with PhD-level modeling rather than outsourcing it.

CORE SERVICES

Mussel & fish surveys, relocations & ARRP

- Aquatic Resource Relocation Plan authoring and execution — 42+ ARRPs delivered since 2020
- Phase 1 / Phase 2 and multiple-pass depletion salvage per the 2024 USFWS–TPWD joint protocols
- SCUBA, tactile snorkel and wading crews; TPWD Introduction Permit coordination and reporting
- 175,700+ mussels and 1,000,000+ fish sampled and identified

Wetland delineation & WOTUS

- Certified Wetland Delineator in-house — 50+ delineations since 2021
- Routine determinations, desktop reviews and WOTUS applicability analysis
- USACE-format reporting suitable for permitting submittal

Threatened & endangered species reviews

- Desktop review, field reconnaissance and agency-ready reporting
- Federally listed aquatic species; Tricolored Bat culvert assessments
- Detections triggering salvage requirements and USFWS informal conference

Environmental analysis & automation

- Species distribution and habitat suitability modeling for listed species
- Machine learning and LLM workflows for large regulatory datasets
- GIS automation, ArcGIS Pro toolboxes and reproducible analysis pipelines

WHY CLIENTS COME BACK

- Field, permitting and analysis under one roof — one contract instead of a prime plus two subs.
- We hold the permits. Federal and state authorizations sit with us, so the regulated work is not subcontracted and schedules are not hostage to a third party.
- PhD-level quantitative capability applied to routine compliance work — the same firm that runs the dive crew builds the habitat model.
- Repeat federal engagement: two consecutive USFWS rulemaking analyses for the same technical lead.

CLIENTS & PRIME CONTRACTORS

LCRA · GBRA · USACE Fort Worth District · TxDOT · USFWS · Sabine River Authority · Texas Comptroller of Public Accounts · Zara Environmental · LJA Environmental · Mott MacDonald · Horizon Environmental · KPA Engineers · SKG Engineering

AT A GLANCE

42+

ARRPs authored & executed

50+

wetland delineations

175,700+

mussels sampled

1,000,000+

fish sampled

14

peer-reviewed publications

\$1M+

competitive research funding

PERMITS & CERTIFICATIONS

USFWS Section 10(a)(1)(A) Recovery Permit — ESPER11327677

TPWD Scientific Research Permit — SPR-0620-074

Certified Wetland Delineator (CWD)

USCG Operator of Uninspected Passenger Vessels (OUPV)

SCUBA certified — research diving

TxDOT Small Business Enterprise (SBE) designated firm

CONTACT

Cody A. Craig, PhD

Principal

903-235-5195

info@arrowheadecology.com
arrowheadecology.com

103 W. Turbo Dr.
San Antonio, TX 78216

BUSINESS

Arrowhead Ecology Group, LLC
Texas LLC, established 2020
TxDOT Small Business Enterprise
NAICS 541620 — Environmental Consulting Services



Lake Placid Raw Water Intake

LJA Environmental · Guadalupe River, Guadalupe County

ARRP and mussel survey across two areas of direct impact totaling 1,385 m², SCUBA at 14–18 ft with a dam-proximity safety protocol. 319 live mussels relocated — far above the 8 recorded in the 2024 survey nearer the dam. Habitat for three federally endangered species; permitted under NWP 58.

Waco Central Wastewater Treatment Plant

U.S. Army Corps of Engineers, Fort Worth District · Brazos River

Multiple-pass depletion salvage over a 4,915 m² zone in 76 cells; 8,258 minutes (~138 person-hours) of search effort. 283 live mussels of 8 species relocated, including four state-listed Brazos Heelsplitter individually tagged before release.

NG3 Bland Lake Lateral Pipeline

Mott MacDonald · Sabine River Basin, Shelby County

41.3-mile, 36-inch natural gas lateral crossing 12 streams. Mussel ARRP followed by a fish ARRP under a single contract — multi-discipline delivery through TPWD final approval.

Fayette Power Project intake

LCRA via Zara Environmental · Colorado River, Fayette County

Recurring annual salvage under LCRA's Candidate Conservation Agreement with Assurances. 2025 cycle: 1,590 m² in 53 cells, 28.8 person-hours, 121 mussels relocated; federally endangered Texas Pimpleback shell documented in the salvage zone.

Lake Dunlap, McQueeney & Placid dam restoration

GBRA via LJA Environmental and Horizon Environmental

Multi-year, multi-lake program. Authored and executed phased fish and mussel ARRPs across successive coffer dam configurations and dewatering schedules.

TxDOT bridge program — multiple crossings

Zara Environmental · statewide

Phase 1 and 2 ARRP execution at Big Sandy Creek, SH 71 and IH-10 at the Colorado River, Mill Creek and SH-59. Texas Heelsplitter and Texas Pigtoe detections triggered salvage surveys and USFWS informal conference.

USFWS grizzly bear rulemaking — comment analysis

U.S. Fish and Wildlife Service · 2025 and 2026

Processed up to 25,000 and then 10,000 public comments on ESA proposed rules using AI, large language model and machine learning workflows. Two consecutive engagements for the same technical lead.

Golden-cheeked Warbler habitat metamodel

Zara Environmental · Paluxy assessment area

Reliability-weighted synthesis of published habitat models on a 30 m grid, with field validation against survey detections and a delivered ArcGIS package.

TECHNICAL CAPABILITY

Modeling	Species distribution models, habitat suitability, niche hypervolume, Bayesian hierarchical models, random forest, gradient boosting, neural networks
Software	R · Python · ArcGIS Pro, ArcMap, ArcGIS Online, QGIS · Adobe Illustrator · SigmaPlot
Automation	Reproducible analysis pipelines, ArcGIS Pro toolboxes, LLM-assisted classification, de-duplication and thematic synthesis at scale

PRINCIPAL

Cody A. Craig, PhD

PhD Aquatic Resources & Integrative Biology, Texas State University (2020) · MS Aquatic Resources, Texas State University (2014) · BS Wildlife & Fisheries Sciences, Texas Tech University (2012) · 14 peer-reviewed publications and one book chapter