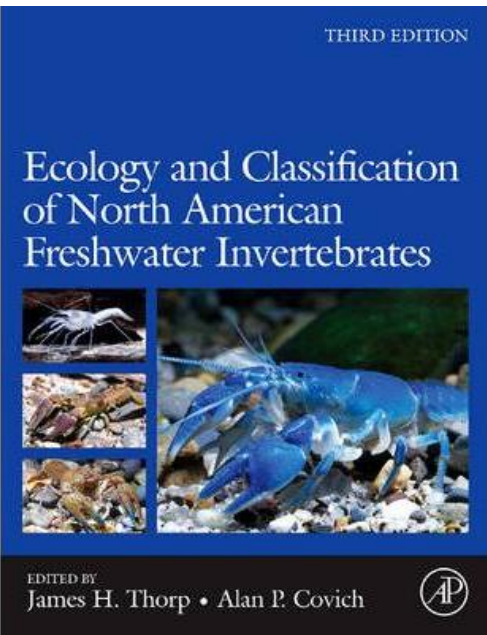
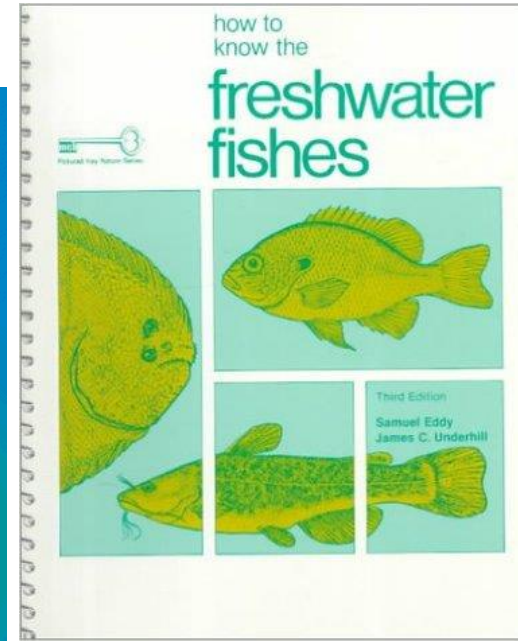
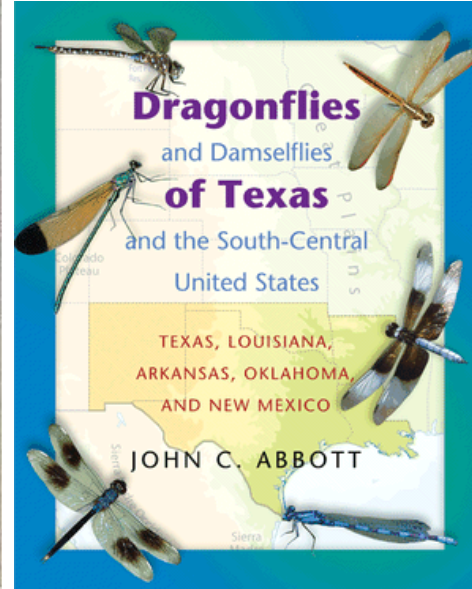
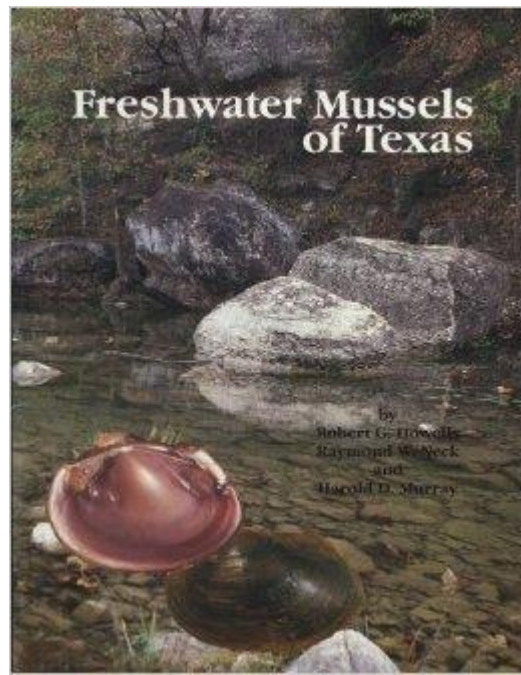
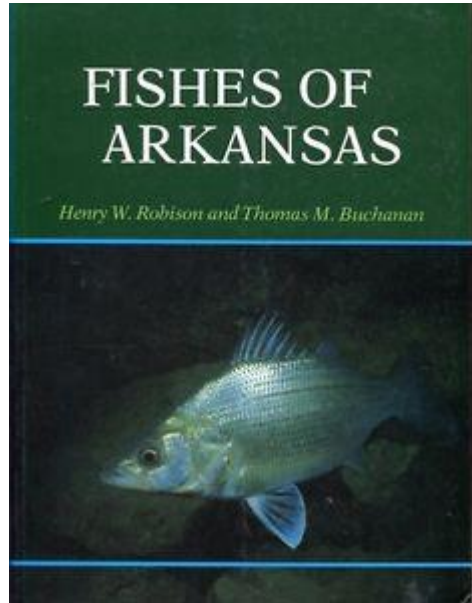
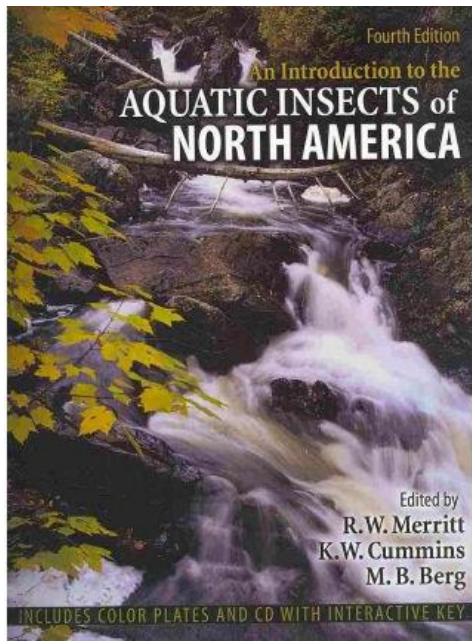


Identification and Reference Materials

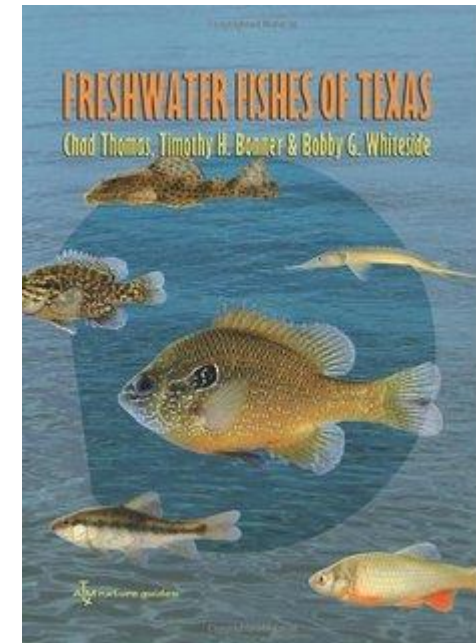
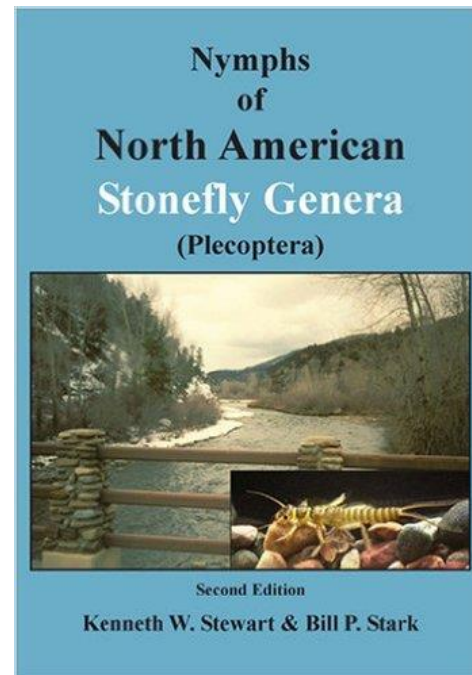
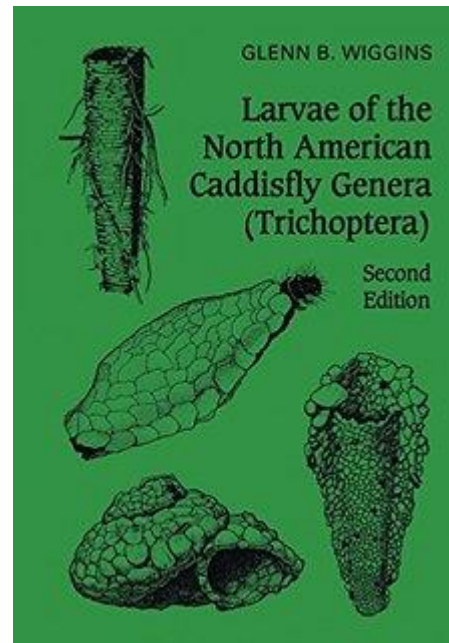


Lauren Pulliam
TCEQ Water Quality Planning Division
Surface Water Quality Monitoring Team



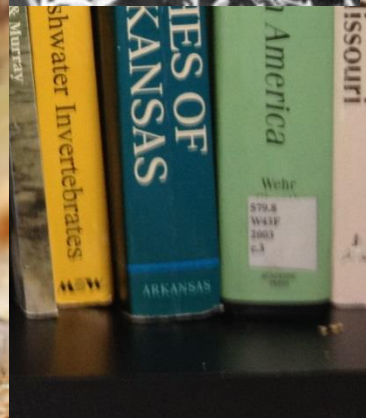
THE **TEXAS ACADEMY OF SCIENCE**
 AN ANNOTATED CHECKLIST OF THE FRESHWATER FISHES OF TEXAS, WITH KEYS TO IDENTIFICATION OF SPECIES

CLARK HUBBS
 ROBERT J. EDWARDS
 GARY P. GARRETT



Taxonomy tomes...

- Excellent keys and reference information and essential in any taxonomic library
- Colorful descriptions:
 - “Dumpy little fellows...”
 - “Hairy nymph squats amid black ooze on the bottom of stagnant pools”
- Limitation: static, taxonomy changes not reflected in older editions
- Online resources...



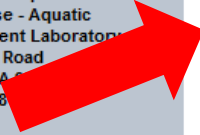
Aquatic Bioassessment Laboratory

- [Lab Program](#)
- [Data Collection](#)
- [Research Program](#)
- [Bioassessment Enforcement](#)
- [Staff](#)

Resources

- [Current Protocols](#)
- [Standard Taxonomic Effort List \(PDF\)](#)
- [CA EDAS Database](#)
- [Benthic Macroinvertebrate Digital Reference Collections](#)

CDFW Office of Spill Prevention and Response - Aquatic Bioassessment Laboratory
 2005 Nimbus Road
 Gold River, CA
 (916) 358-2858
 Email ABL








Digital Reference Collection of California Benthic Invertebrates



[Family Level](#) | [Level 1 Taxonomy](#) | [Level 2 Taxonomy](#)

Note: Many pages are still under construction. We will update our content as quickly as possible. If you find a page that is missing or incomplete, please check back at a later date. Direct any questions or comments to Dan Pickard at dpickard@csuchico.edu.

| Orders | Habitus Photo (click thumbnail for larger image) | Distinguishing characteristics |
|-------------------------------|---|---|
| Ephemeroptera |  | Three "tails" or cerci, with gills on abdomen (either dorsal or lateral, usually plate-like) and one tarsal claw. |
| Odonata |  | Mask-like labium; gills are internalized within the abdomen (Dragonflies) or external on the end of the abdomen (Damselflies). |
| Plecoptera |  | Two "tails" or cerci; gills (either plumose or finger-like) present on thorax, or on thorax and first few abdominal segments, two tarsal claws. |
| Hemiptera |  | "Half wings" – first set of wings half membranous and half sclerotized (looks like an "X"); piercing-sucking mouthparts |
| Megaloptera |  | Well-developed mandibles, four-segmented antennae. Head and abdomen are patterned; the head is also quadrate. Two claws on thoracic legs. Segmented lateral gills on abdomen. |

California Digital Reference Collection

<http://www.dfg.ca.gov/abl/Reference/California/>

Guide is incomplete, but still a useful resource

Ephemeroptera



Ameletidae



Ametropodidae



Baetidae



Baetiscidae



Caenidae



Ephemerellidae



Ephemeridae



Heptageniidae



Isonychiidae



Leptoxyphidae



Leptophlebiidae



Oligoneuriidae



Polymitarcyidae



Siphonuridae

Digital Reference Collection of California Benthic Invertebrates

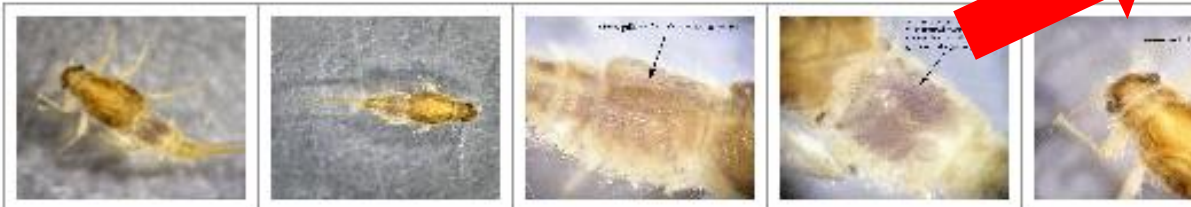
[California Digital Reference Collection Home](#) | [Family Level](#) | [Level 1 Taxonomy](#)

Jump to:

[Ephemeroptera](#) [Odonata](#) [Plecoptera](#) [Hemiptera](#) [Megaloptera](#) [Neuroptera](#) [Trichoptera](#) [Lepidoptera](#)

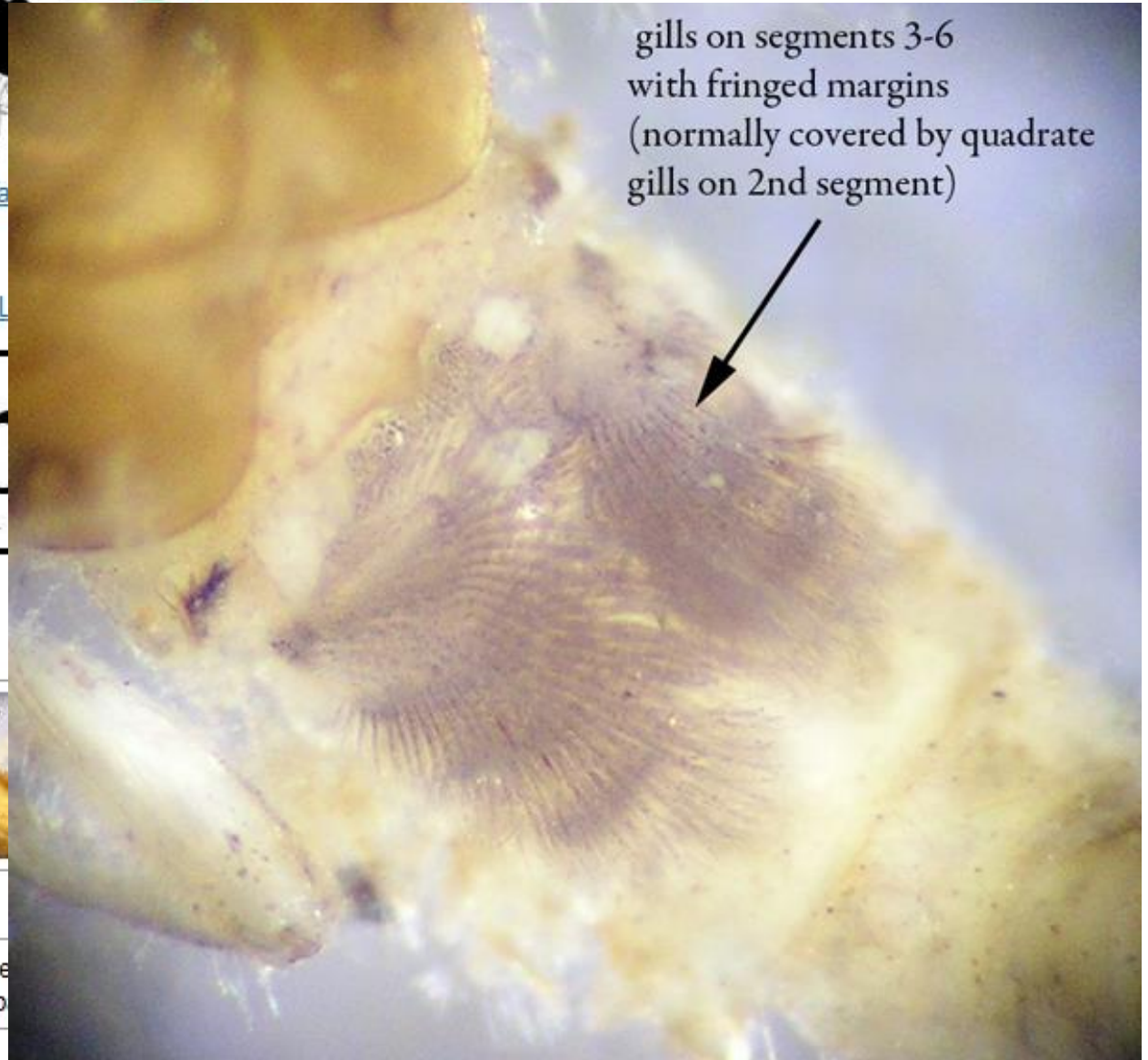
Ephemeroptera

Caenidae



| | |
|----------------|--|
| Key Characters | Quadrate operculate gills on segments 2 not fused medially, gills on segments 3-6 with fringed margins (normally covered by quadrate gills on 2nd segment). Hind wing present. |
| Tolerance | 7 |
| Distribution | CA, OR, WA, AZ, Baja |

Aquatic



BLANCO WATER ATLAS

[home](#) / [physical watershed](#) / [watershed influences](#) /

INSECTS/INVERTEBRATES IDENTIFICATION

*Photos provided by Pete Diaz

Order Ephemeroptera



Ephemeroptera Tricorythidae *Tricorythodes curvatus*



Ephemeroptera Tricorythidae *Leptohyphes vacupernis*



Ephemeroptera Tricorythidae *Leptohyphes* instar stages



Ephemeroptera Tricorythidae *Leptohyphes*



Ephemeroptera Leptophlebiidae *Traverella*



Ephemeroptera Leptophlebiidae *Thraulodes*



Ephemeroptera Leptophlebiidae *Paraleptophlebia*



Ephemeroptera Leptophlebiidae *Neochoroterpes*



Ephemeroptera Leptophlebiidae *Leptophlebia bradleyi*



Ephemeroptera Leptophlebiidae *Farrodes*



Ephemeroptera Leptophlebiidae *Choroterpes*



Ephemeroptera Isonychiidae *Isonychia*

<https://blancowateratlas.wordpress.com/biodiversity-guide/animals/insectsinvertebrates/insectsinvertebrates/>

The following websites provide updated distribution data of validated species of mayflies in Texas.

Kondratieff, Boris C. (coordinator). 2000. Mayflies of the United States. Jamestown, NY: American Fisheries Society.

McCafferty, P. 1995-2011. Mayfly Central: The Mayflies of North America. Purdue University.

AMETROPODIDAE

Ametropus sp.

BAETIDAE

Acentrella sp.

Acerpenna sp.

Amaletus sp.

Americabaetis sp.

Apobaetis sp.

Baetis sp.

Baetodes sp.

Callibaetis sp.

Camelobaetidius sp.

Centroptilum sp.

Cloeodes sp.

Cloeon sp.

Diphetero sp.

Fallceon sp.

Labiobaetis sp.

Paracloeodes sp.

Plauditus sp.

Procloeon sp.

Pseudocentroptiloides sp.

Pseudocloeon sp.

The Aquatic Invertebrates of Texas

Ephemeroptera

(mayflies)

BAETIDAE

Camelobaetidius sp.

Species reported
from Texas:

[*Camelobaetidius kickapoo*](#)

[*Camelobaetidius mexicanus*](#)

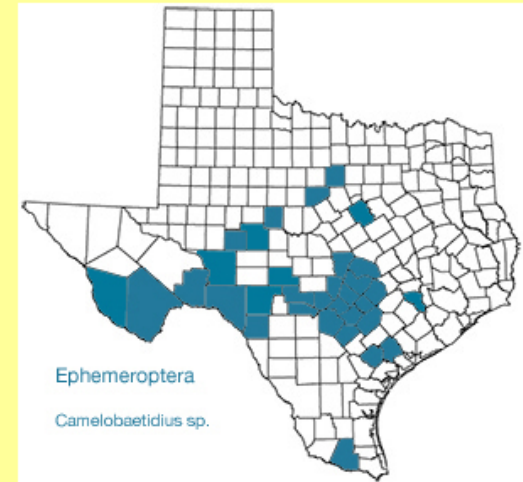
[*Camelobaetidius variabilis*](#)

[*Camelobaetidius waltzi*](#)

notes:

*nymphs in rocky streams that are silty at least part of the year (Solanik 1996)

*collector-gatherers (Solanik 1996)



Distribution Citations

1994 Decanini

1996 Hansen

1997 Stringer & Nelson

1999 City of Austin

1999 Levine

[2000 Abbott]

2000 Halloran

2002 Moring

*refs are for reports of genus only;
species refs not included here; []
indicate state record, no specific
county or locality indicated

copyright: Stephen W. Ziser
2010

[Mainpage](#) [E-mail](#)

<http://www.austincc.edu/sziser/txaqinverts/AITdistribrecords.html>



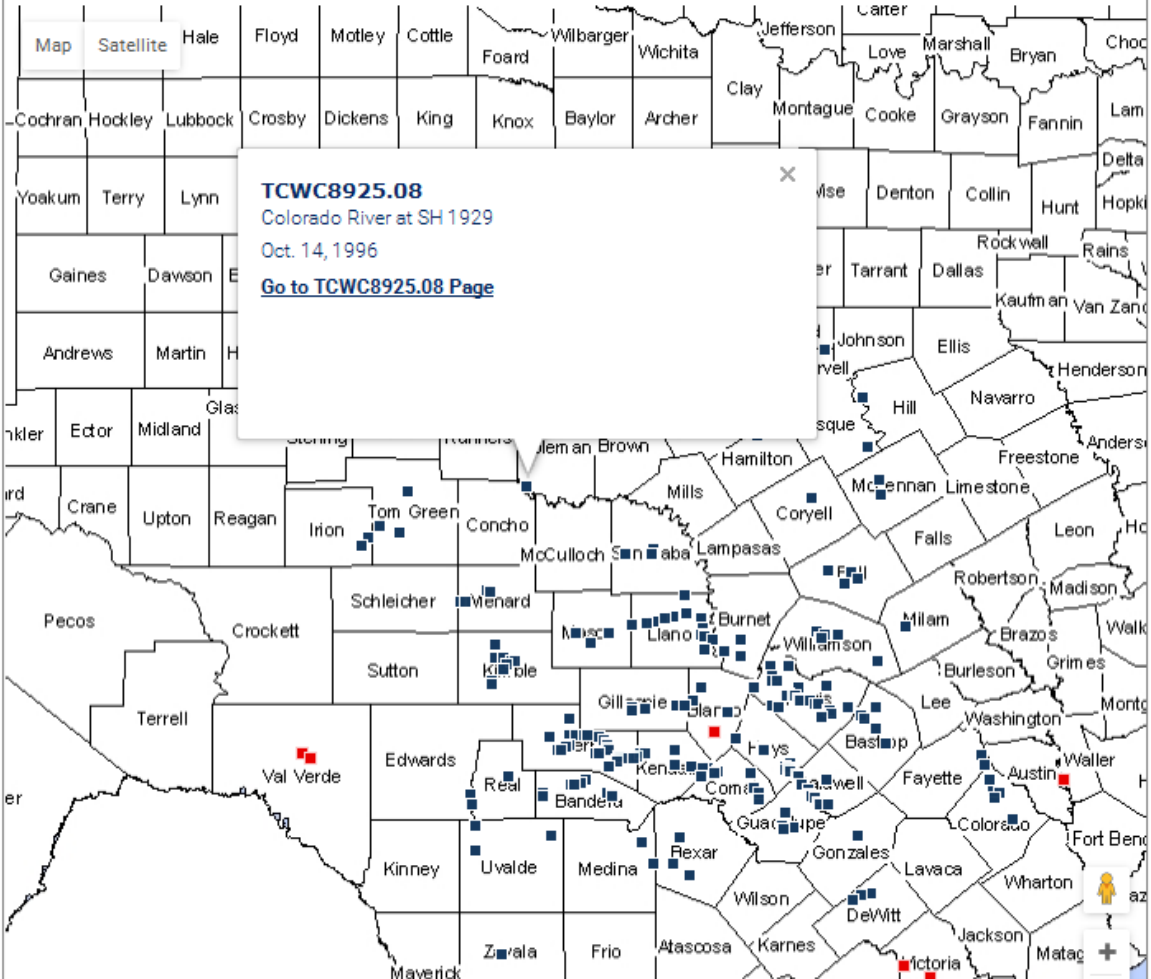
A Virtual Museum on the State's Fish Biodiversity

Maps

Map view of georeferenced records selected by criteria set in the right panel. Click dot for record details. Red dots are suspected erroneous records (see documentation). **Mouse over this text for help.**



Micropterus treculii (Guadalupe Bass)



Taxon

- Centrarchidae (Sunfishes) ▾
- Micropterus ▾
- treculii (Guadalupe Bass) ▾

Location

(must select species above)

- Any County -- ▾
- Any Natural Region -- ▾
- Any Basin -- ▾
- Any HUC -- ▾

370 Records

(with links to record details)

- [TNHC41939](#)
31.133653 °N, -98.809279 °W
- [KU5982](#)
29.86270125 °N, -97.88659241 °W
- [TNHC31740](#)
29.25609581 °N, -98.56969901 °W
- [TNHC32304](#)
29.25609581 °N, -98.56969901 °W
- [TNHC41081](#)
30.30671385 °N, -97.91107218 °W
- [TNHC41090](#)



A Virtual Museum on the State's Fish Biodiversity

Etheostoma gracile

Slough Darter

Life Life
Kingdom Animalia
Phylum Chordata
Class Actinopterygii
Order Perciformes
Family Percidae (Perches)
Genus *Etheostoma*
Species *Etheostoma gracile* (Slough Darter)

Description

All text below is derived from a [January 2013 copy of Dr. Timothy Bonner's website at Texas State University](#). That content was derived primarily from published literature. We are aware of some conflicts with the museum record and the content below will evolve as the new, expanded UT and Texas State Fishes of Texas project team members are able to update it. We invite collaborations to improve and expand the species account content. Please contact us if you wish to help, or if you discover flaws in our species account content that you can address.

Type Locality

Rio Seco near Ft. Inge, Texas (Girard 1860).

Etymology/Derivation of Scientific Name

Etheostoma, from the Greek, *etheo*, "to strain," and *stoma*, "mouth;" *gracile*, Latin, meaning "slender" or "thin" (Pflieger 1997).

Synonymy

Beleosoma gracile Girard 1860:103.

Peocilichthys butlerianus Hay 1883:61.

Etheostoma gracile Cook 1959:207.

Characters

Maximum size: 50 mm SL (Page 1983).

Life colors: Yellow above, green saddles and wavy lines on back; bright green bars on side of male, green squares or mottling on female; yellow to white below; blue-gray edge and base, middle red band on 1st dorsal fin (faint on female); thin teardrop (Page and Burr 1991).

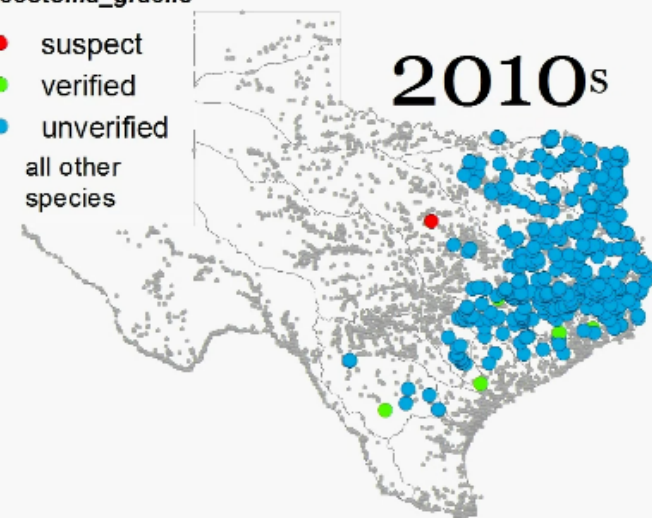


Credit: Chad Thomas, Texas State University

OCCURRENCES OVER TIME

Etheostoma gracile

- suspect
- verified
- unverified
- all other species




[Browse all records of this species](#) or download video in [MP4](#) or [WebM](#) format.

Texas Natural History Collections – Fish Collection



iNaturalist.org



Garner State Park & Frio River Bioblitz

May 15, 2014, 12:00 AM - May 16, 2014, 11:59 PM CDT

ADD OBSERVATIONS

Logos: TEXAS PARKS & WILDLIFE, Texas Natural History Collections, TEXAS NATURAL SCIENCE CENTER, THE UNIVERSITY OF TEXAS AT AUSTIN



Fishes of Texas

Photo: Jacob Stagg

ADD OBSERVATIONS

Logos: NATURE TRACKERS, TEXAS PARKS AND WILDLIFE, BIODIVERSITY COLLECTIONS, THE UNIVERSITY OF TEXAS AT AUSTIN



Village Creek BioBlitz

May 1, 2015 to May 3, 2015

ADD OBSERVATIONS


Logos: FISHES OF TEXAS, TEXAS PARKS AND WILDLIFE, Master Naturalist, NATIONAL SOCIETY OF NATURALISTS, Native Plant Society of Texas, ETHS, TEXAS NATURE TRACKERS



Freshwater Mussels of Texas

ADD OBSERVATIONS

Logos: NATURE TRACKERS, TEXAS PARKS AND WILDLIFE, TEXAS PARKS & WILDLIFE



Cypress Creek drainage in Texas bioblitz, fall 2014

September 1, 2014 to January 1, 2015

ADD OBSERVATIONS

iNaturalist.org

Event Stats

Totals

170

Observations »

53

Species »

Show

- Wild
- Verifiable
- Research Grade
- Needs ID
- Threatened
- Introduced
- Popular
- Has Sounds
- Has Photos

Description / Tags

blue, butterfly, etc.

More Filters ▾

Person

Username or user ID

Project

2431

Categories



Rank

High

Low

Sort By

Date Added

Desc

Photo Licensing

All

Reviewed

any yes no

Update Search

Reset Search Filters



Bluegill

(*Lepomis macrochirus*)

Research Grade



2

1y



Spotted Sucker

(*Minytrema melanops*)

Research Grade



1

1y



Warmouth Sunfish

(*Lepomis gulosus*)

Research Grade



2

1y



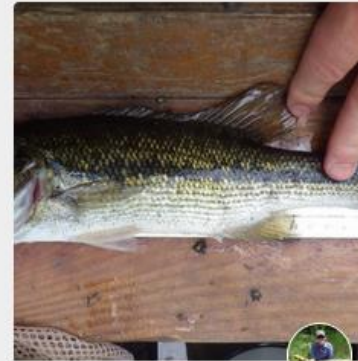
Texas Pigtoe

(*Fusconaia askewi*)



Tapered pondhorn

(*Uniomis declivis*)



Spotted Bass

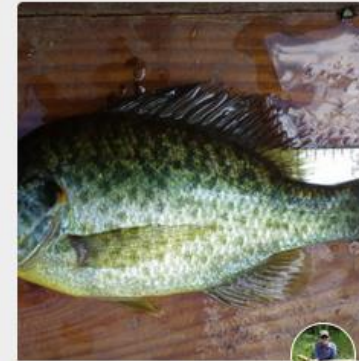
(*Micropterus punctulatus*)

Research Grade



1

1y



Redear Sunfish

(*Lepomis microlophus*)

Research Grade



1

1y



American Gizzard Shad

(*Dorosoma cepedianum*)



Deertoe

(*Truncilla truncata*)



Bleufer

(*Potamilus purpuratus*)



Spotted Gar


(*Lepisosteus oculatus*)



Pirate Perch

(*Aphredoderus sayanus*)

And many more...



[Home](#) [Instructions](#) [Use the Key](#) [Phylogeny](#) [Families](#) [Morphology](#)

[UNH Center for Freshwater Biology](#)

An Image-Based Key To Stream Insects



DIGITAL KEY TO AQUATIC INSECTS OF NORTH DAKOTA

VALLEY CITY STATE UNIVERSITY MACRO-INVERTEBRATE LAB

Freshwater Fishes Found in Texas



Black Basses

- [Largemouth bass](#)
- [Smallmouth bass](#)
- [Spotted bass](#)
- [Guadalupe bass](#)



[Bass Identification Guide](#)



MACROINVERTEBRATE IDENTIFICATION KEY

Macroinvertebrates are animals without a backbone that can be seen with the naked eye. These bottom-dwelling animals include crustaceans and worms but most are aquatic insects. Beetles, caddisflies, stoneflies, mayflies, hellgrammites, dragonflies, true flies, and some moths are among the groups of insects represented in streams. Macroinvertebrates are an important link in the food web between the producers (leaves, algae) and higher consumers such as fish.

Identification and Ecology of

Australian Freshwater Invertebrates

An interactive guide with colour digital imagery to assist in the identification of aquatic invertebrates.



Volunteer Stream Monitoring Interactive Verification Program (VSM-IVP)

New! Use this program to verify your aquatic insect identifications!



Additional taxonomy training options...

2016

Texas Mollusk Symposium



**Dallas, Texas
August 8 – 11**

TCEQ Benthic Macroinvertebrate Identification Course...TBD, stay tuned

TEXAS STATE

Office of Distance and Extended Learning

Continuing Education

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[Texas State > Office](#)

Texas Fish Identification

Instructors: Dr. Tim Bonner and Mr. Brad Littrell

Dates: Next Workshop Dates - To Be Determined