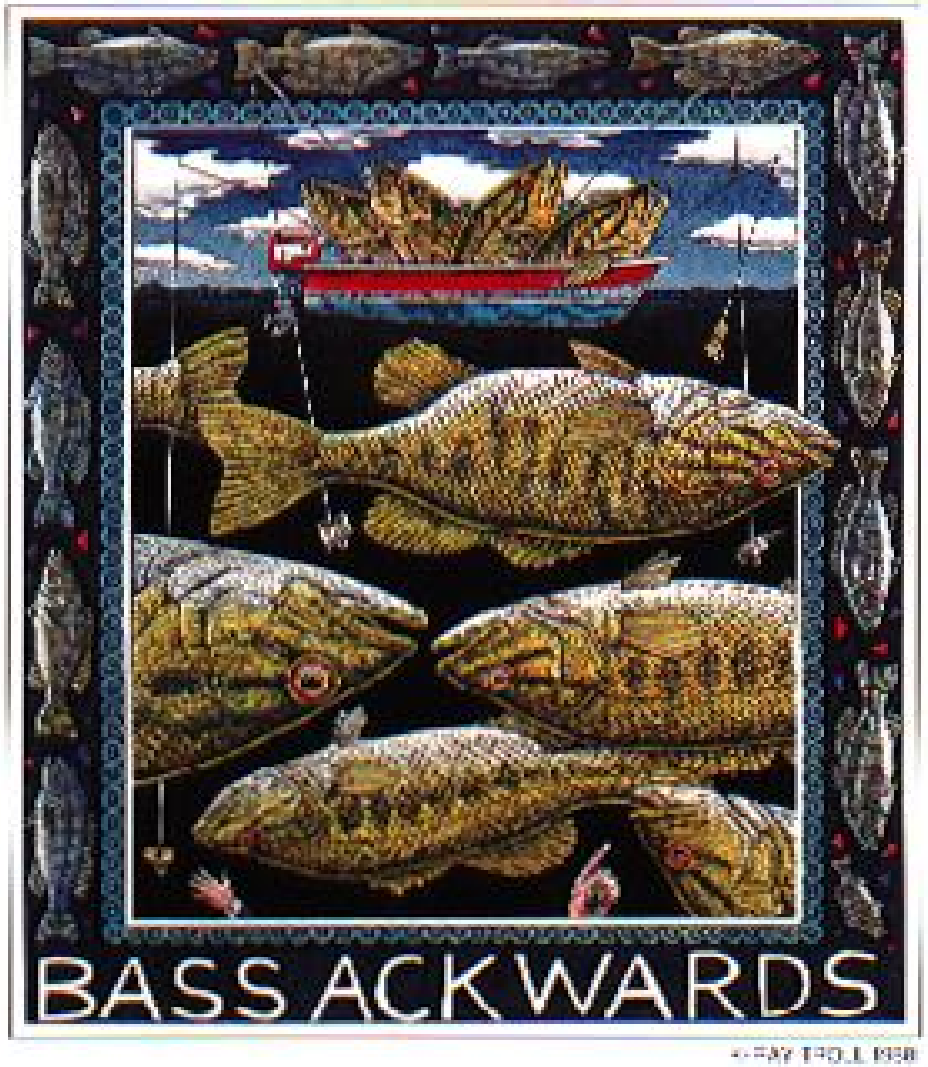

BASS ACKWARDS

Trinity River Project BBEST Meeting Briefing

George Guillen

Environmental Institute of Houston

August 13, 2009

Current Tasks

- Final Compilation and evaluation of:
  - water quality, flow data – CRP/TCEQ/USGS
  - Hydrology studies
  - Geomorphology studies
  - Benthic invert studies
  - Wildlife
- Coordinate input with TPWD and SJRA (Osting)
- Mussel data requested from TPWD & published records.
- Sufficient data to move forward on focal biological components /indicator selection (fishes).

Current Tasks

- Complete final database and bibliography (current work)
- Coordinate development of focal biological components, geomorphological and water quality indicators, ***that are sensitive to flow***, with SJRA, staff of state agencies, and BBEST,
- Provide output to Instream flow hydrological modeling team (Crespo) as Biological Overlay to guide modeling efforts and determining flow regimes. & Validation?
- Time constraints, workgroups?

Current Tools/Products

1. An Access® OBDC compliant database AND an EndNote® annotated bibliography has been created. Ongoing updates occurring. Key Word searchable (e.g. fish, invertebrates, flow, water quality, geomorphology)
2. EndNote exportable to Excel and Access
3. These files and associated formats will allow utilization of this data in development of focal biological components and associated analyses.

Bibliography

- EndNote references – annotated
- All references have been scanned into PDF format files for future use.

EndNote X (Bld 2114) - [Trinity River Library]

File Edit References Tools Window Help

Annotated

Call Number	Author	Year	Title	Journal	Ref Type	URL
511	Wellmeyer	2005	Quantifying downstream impacts of impoundment on flow regime and channel planform, lower Trinity River,...	Geomorph...	Journal Arti...	http://www.science...
512	Wen	2008	The role of organic carbon, iron, and aluminium oxyhydroxides as trace metal carriers: Comparison betwe...	Marine Che...	Journal Arti...	http://www.science...
513	Warnken	2004	Biogeochemical behavior of organic carbon in the Trinity River downstream of a large reservoir lake in Tex...	Science of ...	Journal Arti...	http://www.science...
514	Tang	2002	Distribution and partitioning of trace metals (Cd, Cu, Ni, Pb, Zn) in Galveston bay waters	Marine Che...	Journal Arti...	<Go to ISI>://0001...
515	Hill	1987	Seston Dynamics in Two Texas Prairie Streams	American ...	Journal Arti...	http://links.jstor.org/...
516	Atkinson	2001	Assessing Atrazine Pollution Potential to a Drinking Water Reservoir Using Remote Sensing and Geograp...	Aquatic Ec...	Journal Arti...	
517	Simon	1992	Description of Eggs, Larvae, and Early Juveniles of the Bigscale Logperch, Percina macrolepida Stevens...	The Southw...	Journal Arti...	<Go to ISI>://A199...
518	Neck	1990	Geological Substrate and Human Impact as Influences on Bivalves of Lake Lewisville, Trinity River, Texas	Nautilus	Journal Arti...	<Go to ISI>://A199...
519	Moon	2004	Stream flow estimation using spatially distributed rainfall in the Trinity River Basin, Texas	Transaction...	Journal Arti...	<Go to ISI>://0002...
520	Elder	1997	Grass carp (Ctenopharyngodon idella) in the Trinity River, Texas	Journal of F...	Journal Arti...	<Go to ISI>://A199...
521	Davis	1997	Revitalization of a northcentral Texas river, as indicated by benthic macroinvertebrate communities	Hydrobiolo...	Journal Arti...	<Go to ISI>://A199...
522	Blackwell	1995	Suitability of Food Resources and Physicochemical Parameters in the Lower Trinity River, Texas for Paddl...	Journal of F...	Journal Arti...	<Go to ISI>://A199...
523	Walker	1973	PHYSICAL AND CHEMICAL LIMNOLOGY OF THE TRINITY RIVER, TEXAS, AND THE EFFECTS IMPO...		Thesis	http://proquest.umi....
524	Hubbs	1997	Changes in Fish Assemblages in East Texas Streams From 1953 to 1986	Texas Jour...	Journal Arti...	
525	Garnett	2008	Methods for sediment budgeting along the middle Trinity River		Thesis	http://proquest.umi....
526	Hagos	2007	Ground water level studies at Lagrave field monitoring wells and their sensitivity to recharge from rainfall an...		Thesis	http://proquest.umi....
527	Williams	2003	Modeling shallow autocompaction in coastal marshes using cesium-137 fallout: Preliminary results from th...	Journal of ...	Journal Arti...	<Go to ISI>://0001...
528	Phillips	2008	Antecedent alluvial morphology and sea-level controls on form-process transition zones in the lower Trinity ...	River Rese...	Journal Arti...	<Go to ISI>://0002...
529	Phillips	2003	Alluvial storage and the long-term stability of sediment yields	Basin Rese...	Journal Arti...	<Go to ISI>://0001...
530	Todd	2008	An assessment of Ground Penetrating Radar as a technique in quantifying sediment accumulation on the T...		Thesis	http://proquest.umi....
531	Adrian	2005	Local TV Investigates Who Is Polluting the Water	Nieman Re...	Journal Arti...	http://search.ebsco...
532	Ford	1995	PC-Based Decision-Support System for Trinity River, Texas	Journal of ...	Journal Arti...	http://search.ebsco...
533	VanMetre	1996	Identifying water-quality trends in the Trinity River, Texas, USA, 1969-1992, using sediment cores from Lak...	Environmen...	Journal Arti...	<Go to ISI>://A199...
534	Wen	1997	Colloidal and particulate silver in river and estuarine waters of Texas	Environmen...	Journal Arti...	<Go to ISI>://A199...
535	Alan Plumm...	1986	Trinity River Fish Kills Mitigation Study		Report	
536	Flicker	2008	Audubon View	Audubon	Journal Arti...	http://search.ebsco...
537	Arnold	1989	Effects of water quality, instream toxicity, and habitat variability on fish assemblages in the Trinity River, Te...		Thesis	http://proquest.umi....
538	Bolling	2003	Use of geographic information system and remote sensing technologies to describe mosquito population ...		Thesis	http://proquest.umi....
539	Celeste	2007	The Trinity War	DMagazine...	Magazine ...	

Simon, T. P. and J. B. Kaskey (1992). "Description of Eggs, Larvae, and Early Juveniles of the Bigscale Logperch, *Percina macrolepida* Stevenson, from the West Fork of the Trinity River Basin, Texas." The Southwestern Naturalist **37**(1): 28-34.

Specimens of larval and early juvenile *Percina macrolepida* from Eagle Mountain Lake, Trinity River drainage, were examined with emphasis on meristic, morphometric, and pigmentary characteristics. Adhesive eggs, 1.1 to 1.4 mm in diameter, were found attached to stems or leaves of aquatic macrophytes. Larvae hatched at 4.9 mm total length and had between 22 and 26 preanal and 17 to 20 postanal myomeres. In these characteristics, the bigscale logperch resemebles other members of the darter subgenus *Percina*. Aspects of the early life history are summarized and compared with literature accounts of other sympatric percid species.

Showing 314 out of 314 references. Hide Preview

EXAMPLE

Reference Type: Report

Record Number: 470

Author: CDM

Year: 2003

Title: Trinity River Vision: Evaluation of the Trinity River Floodway Channel Realignment

Institution: Tarrant Regional Water District and Texas Water Development Board

Pages: 157

Date: April 29, 2003

Type: Final Report

Short Title: Trinity River Vision: Evaluation of the Trinity River Floodway Channel Realignment

Call Number: 621

Abstract: This report addresses the technical feasibility and financial obligation of creating a bypass channel to handle flood flows and to create a quiescent river segment on the Trinity adjacent to downtown Fort Worth. The quiescent river segment would begin at the confluence of the Clear Fork and the West Fork of the Trinity River to just upstream (south) of the Northside Drive Bridge. This area is within the Central City river segment of the Trinity River Vision Master Plan.

Progress to Date

- A total of 358 references located and entered.
- 166 references contain some information on fish populations/fisheries data. May include other data (e.g. flow & water quality)
- Remaining references contain data on aquatic wildlife, vegetation, benthos, hydrology, geomorphology, water quality

Trinity River Biological Data

- To date we have entered 6852 (*3705) unique records in the Access database.
- Record = collection event (unique time X location)
- Remaining biological, water quality, hydrology currently being entered.

Trinity River Biological Data

- Each record in the Access database contains (when available):
- reference, pub year, year study conducted, duration of study, species, catch, CPUE, # of species, collection method, effort, temp, Sp Cond., pH, D.O., selected water quality, secchi, velocity, flow, source of flow, meso habitat, ecoregion, lat., long., river mile, TCEQ segment, reservoir/waterbody, county, comment

Biological Data Matrix

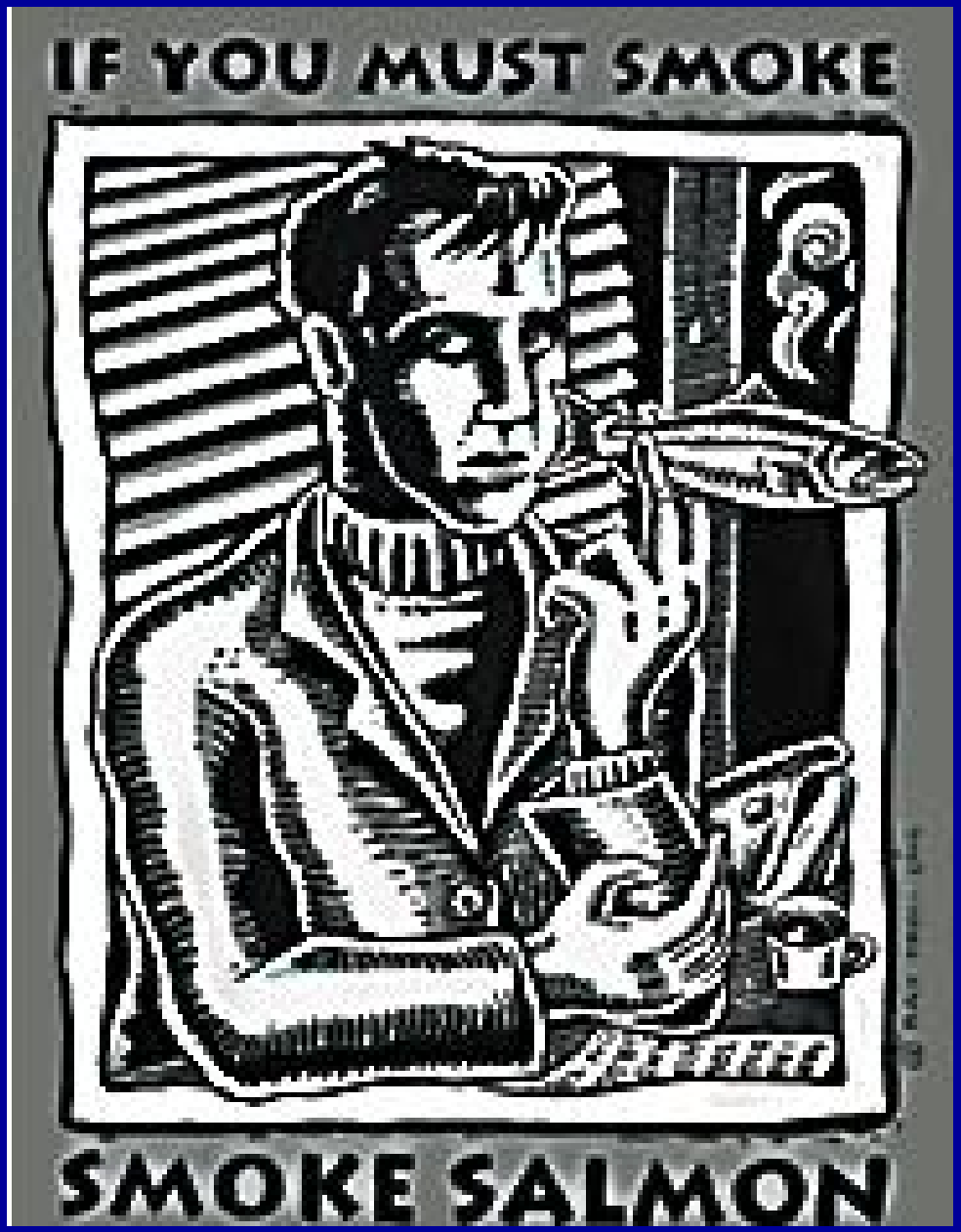
- Draft matrix – in Excel developed
- Species detected, environmental tolerances.
- Input from TPWD
- Literature Relationships
- Selection of focal biological components

Geomorphology Data Compilaiton

- USGS rating curves and cross sectional data – Dallas/Ft Worth Office and Houston hard copies
- Literature compilation of geomorphology studies in basin

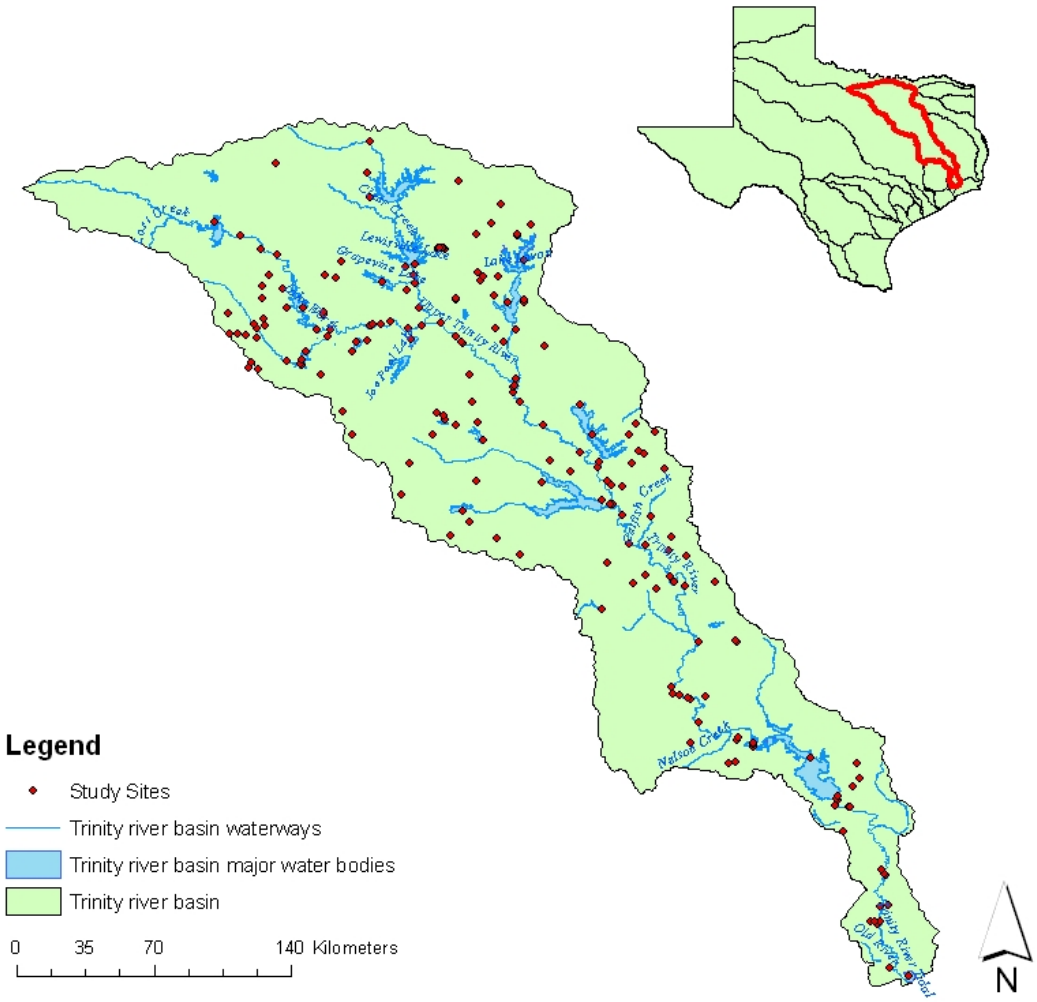
Water Quality Data Compilation & Analysis

- Nutrient/TSS Loading to Estuary
- Water quality vs. Flow
- TCEQ- SWQM, CRP, USGS, GBEP HARC data

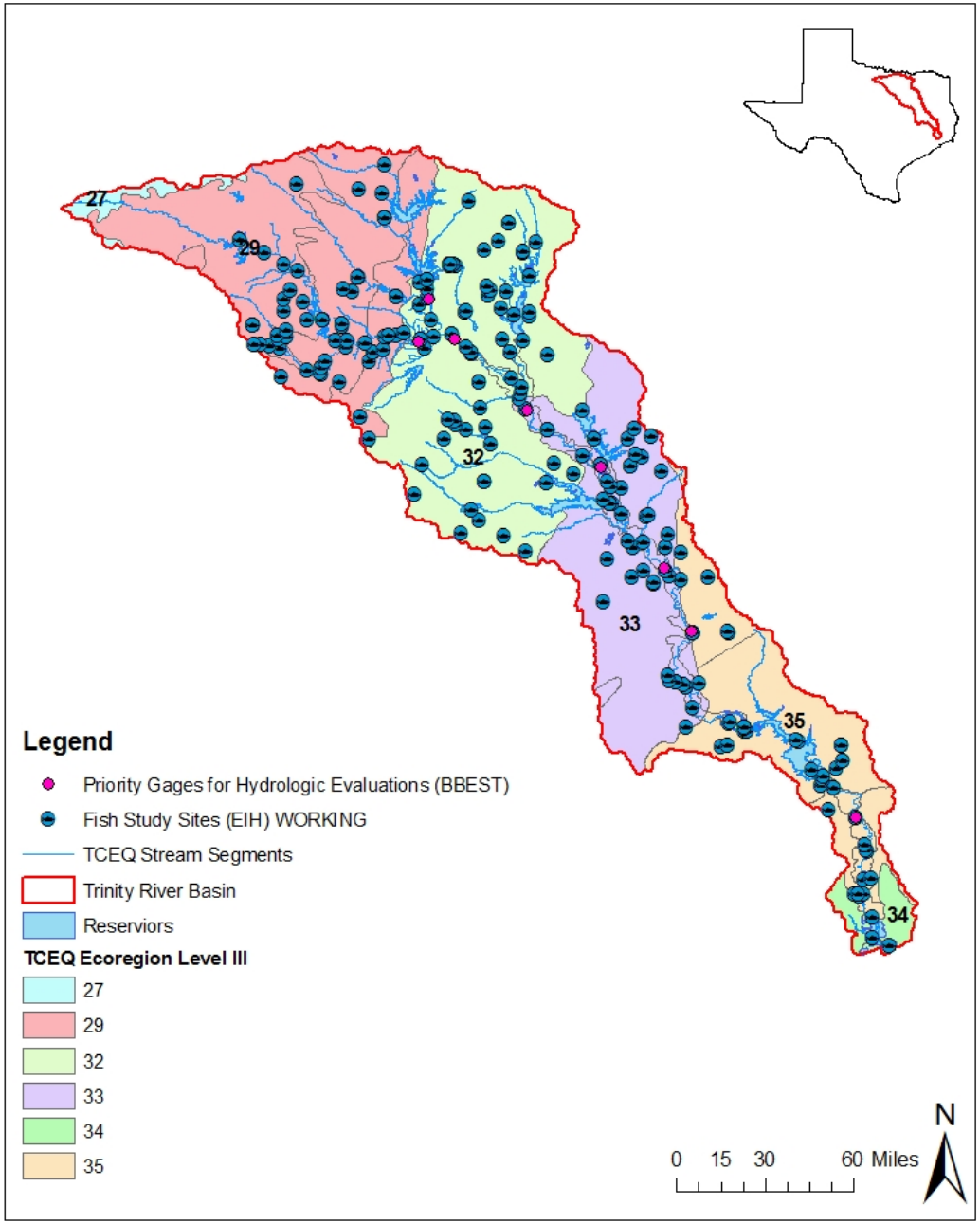

IF YOU MUST SMOKE
SMOKE SALMON

Some Results

Figure 1


Legend
Study Sites
Trinity river basin waterways
Trinity river basin major water bodies
Trinity river basin
0
35
70
140 Kilometers
N

Priority Gage Sites Fish Sampling Locations by TCEQ Level III Ecoregions



Hydrologic Unit Codes of the Trinity River Basin

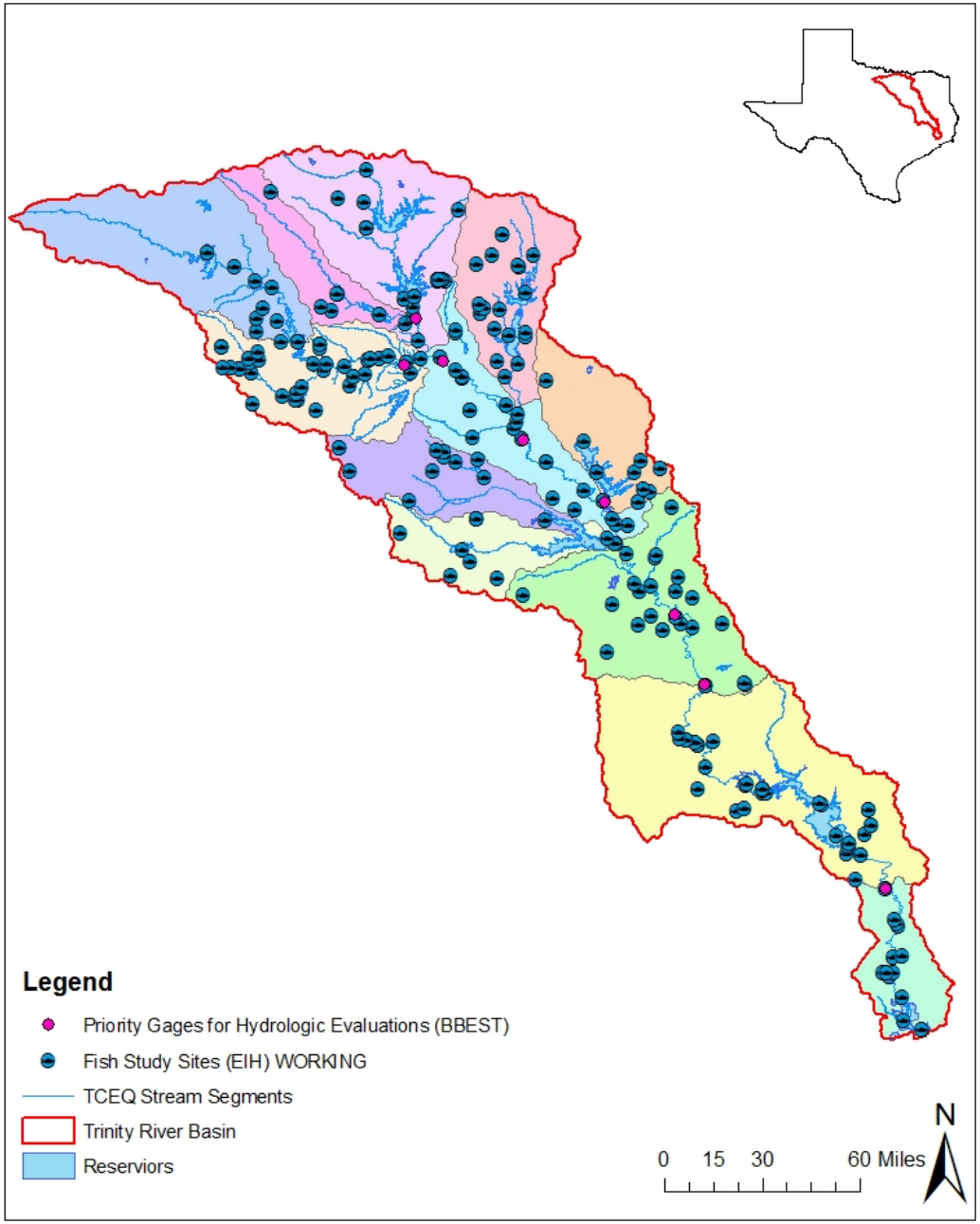


Figure 2. Temporal distribution (by decade) of fish **studies** conducted in the Trinity River Basin. (n) = 113

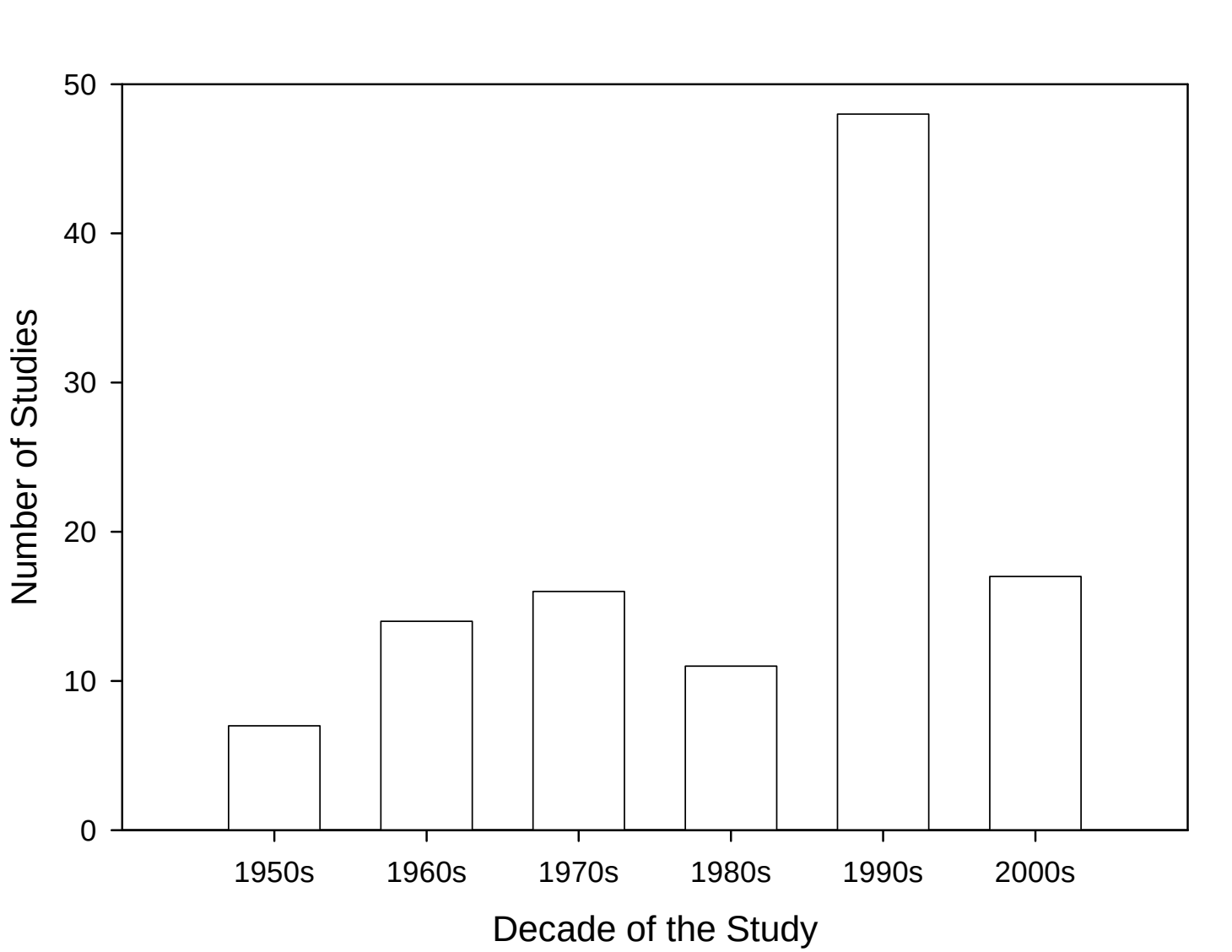


Figure 3. Temporal distribution (by decade) of **sites** in fish studies conducted in the Trinity River Basin. (n) = 284

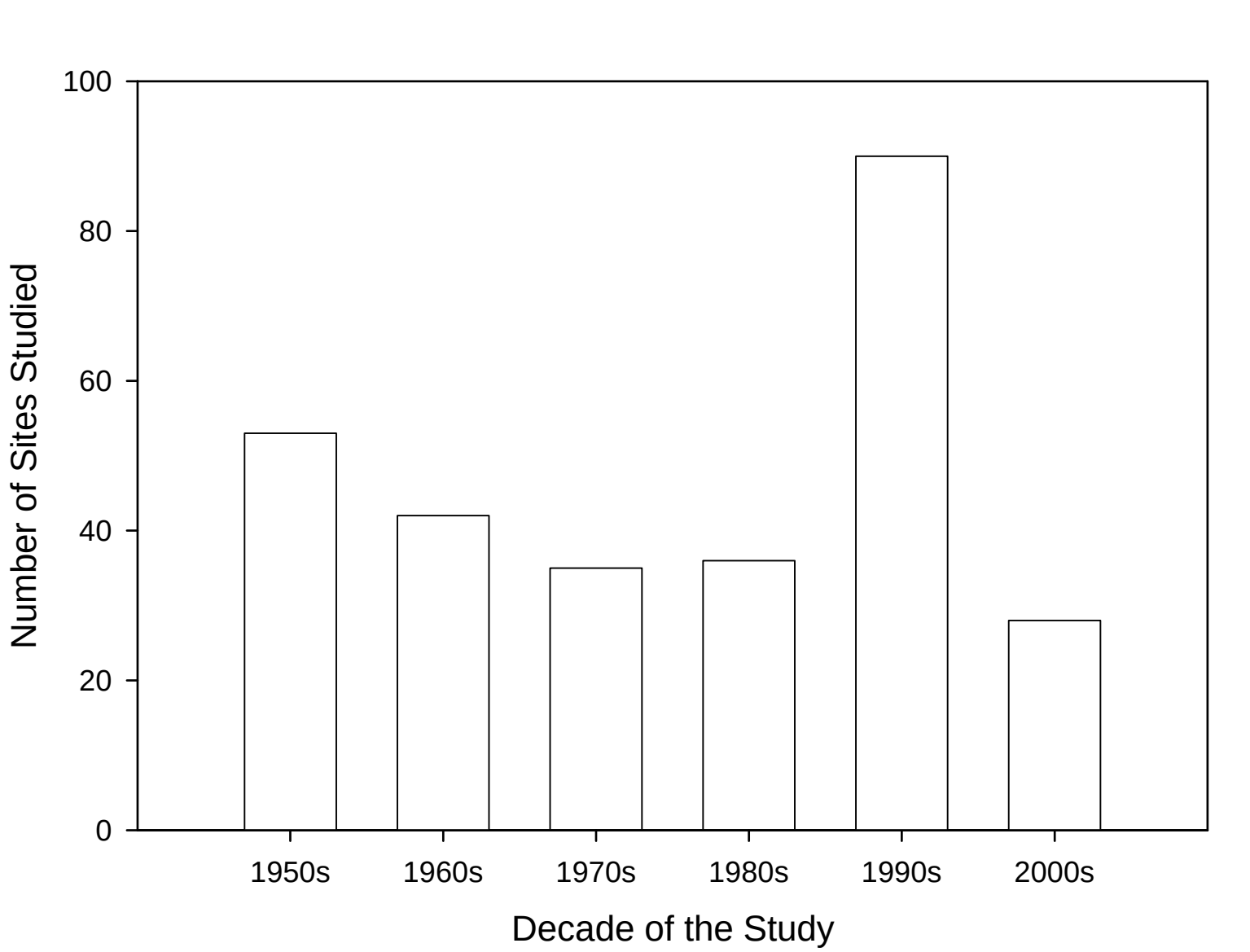


Figure 4. Number of studies that used each gear type. Some studies used multiple gear types and may be represented in multiple gear type groupings. Excludes fish kill data. (n) = 170

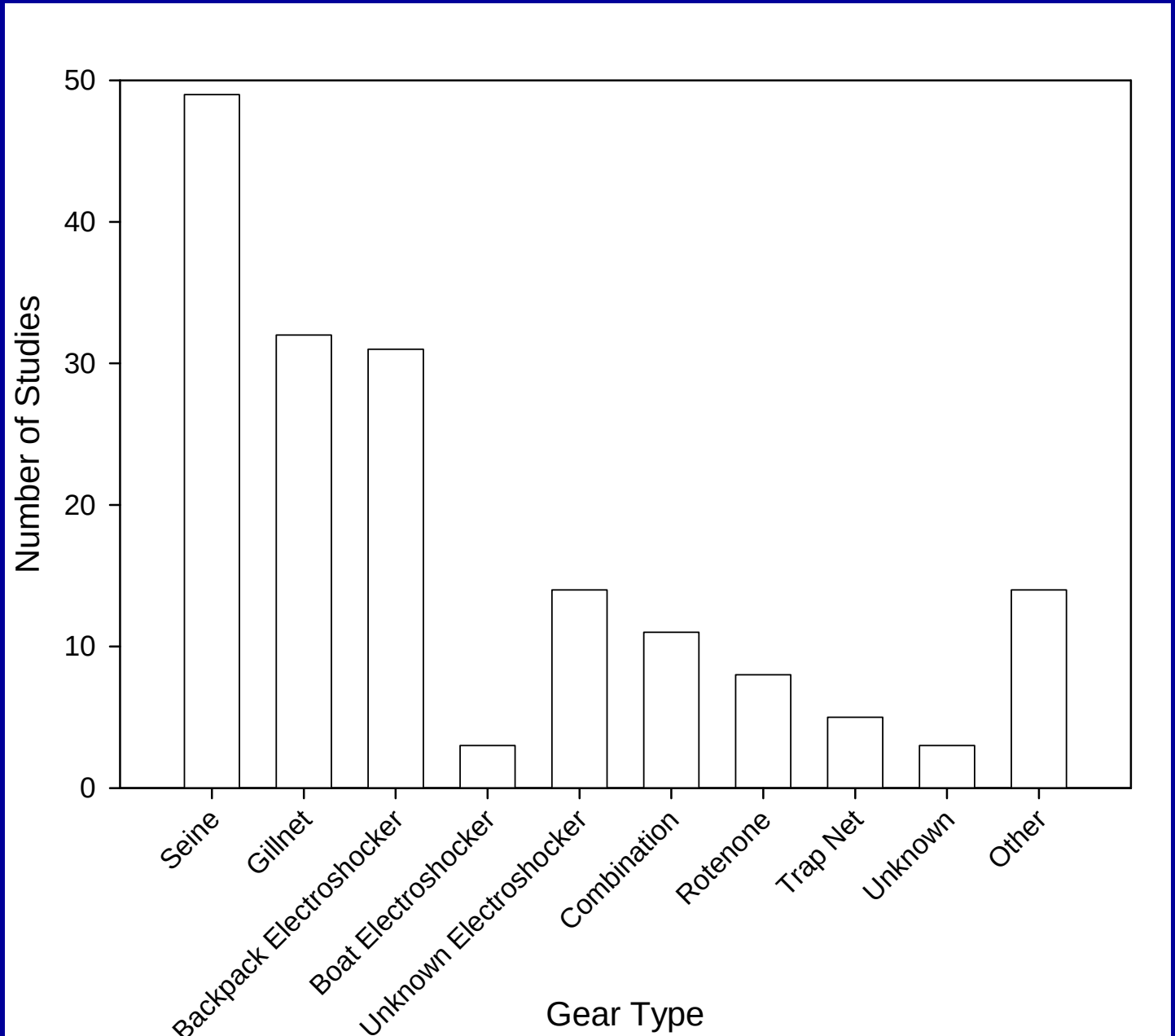


Figure 5. Percent of studies that used each gear type, representing only studies that reported catch. Some studies used multiple gear types and may be represented in multiple gear type groupings. (n) = 170

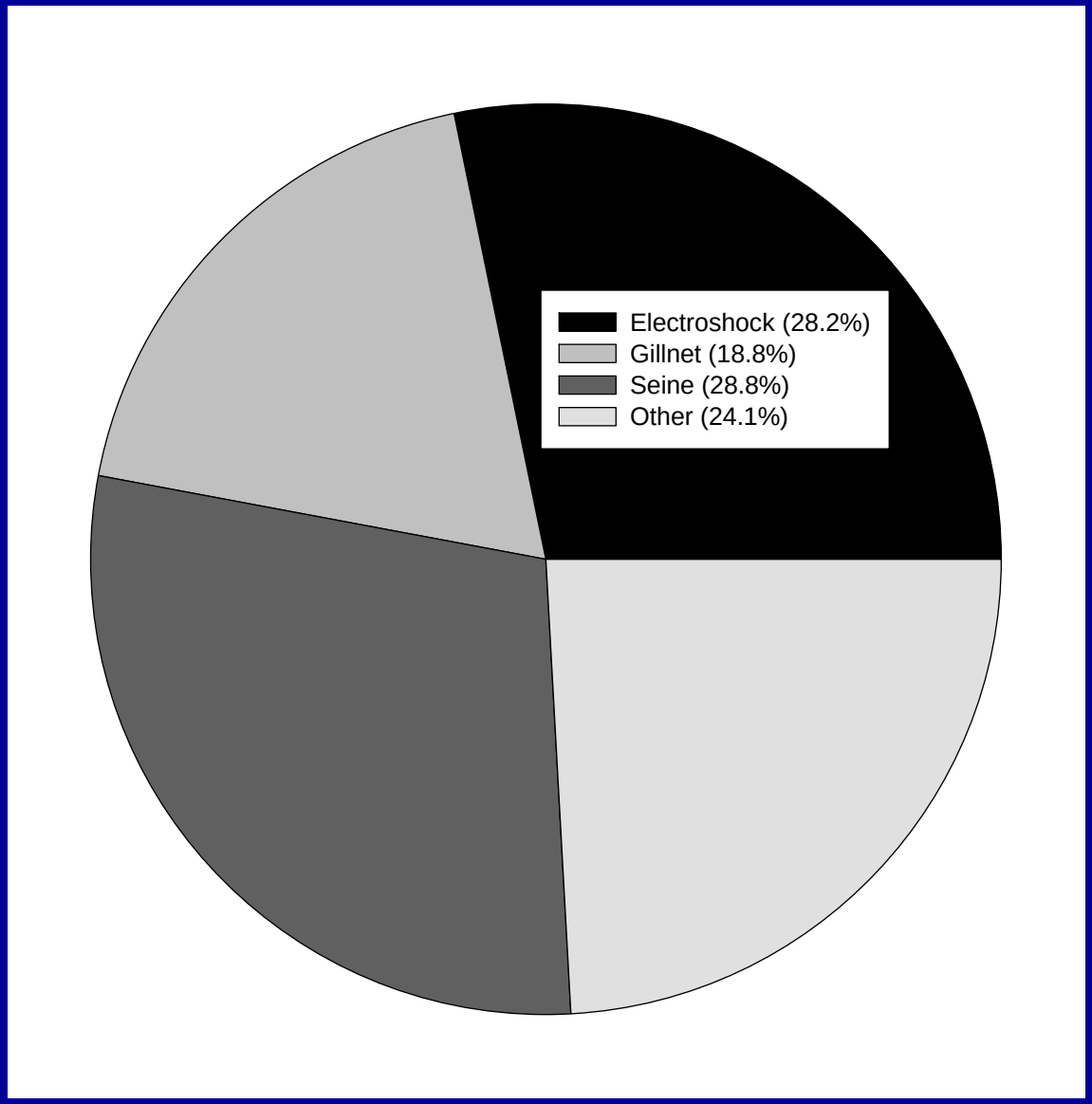


Figure 6. Percent catch of fishes by river mile groups for all fish studies conducted on the Trinity River Basin. Tributary river miles were determined as the confluence of the tributary and the main stem of the Trinity River. % Catch is represented in log scale. (n) = 196

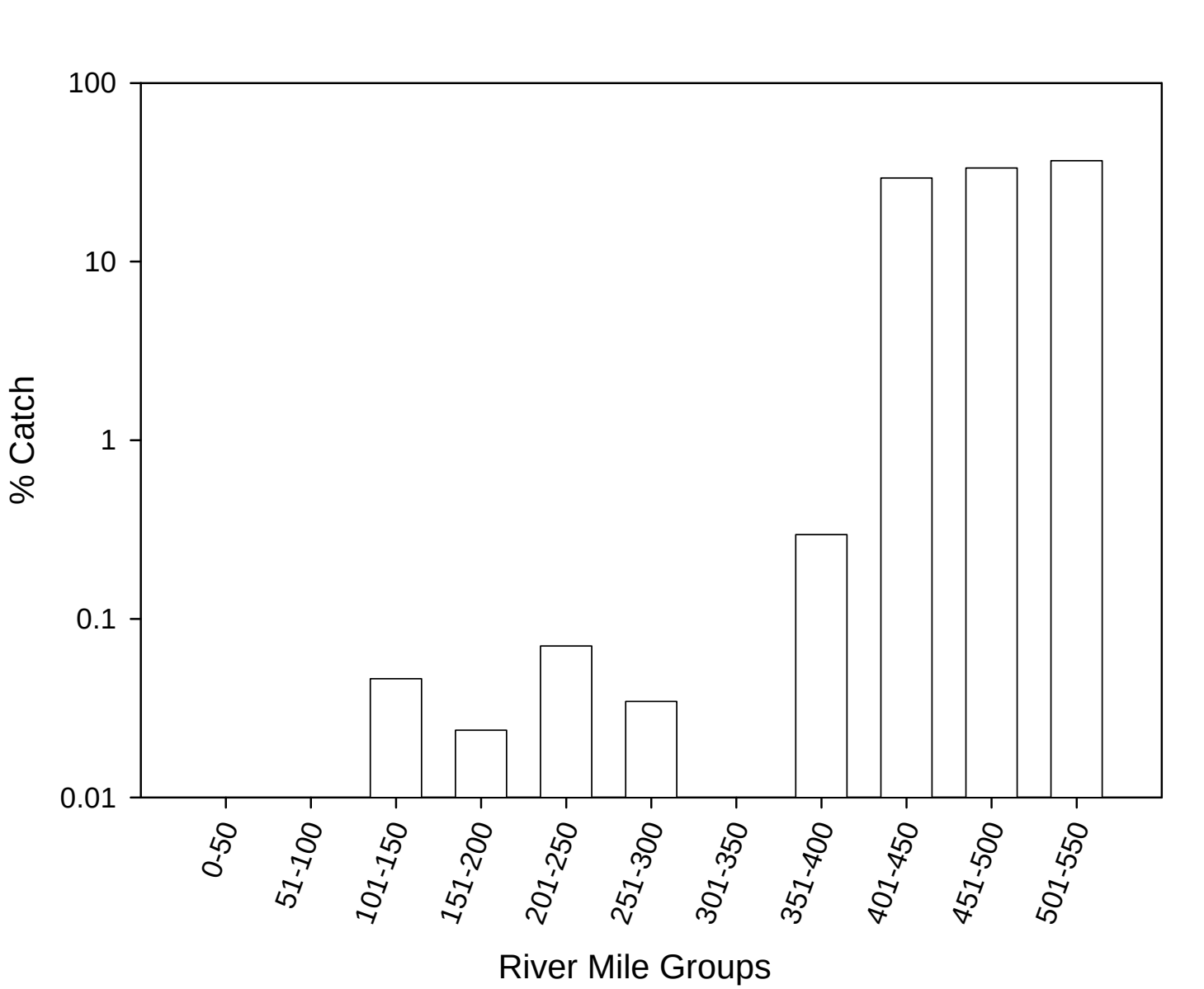


Figure 7. Species richness by river mile for all fish studies conducted on the Trinity River Basin. Tributary river miles were determined as the confluence of the tributary and the main stem of the Trinity River. (n) = 200

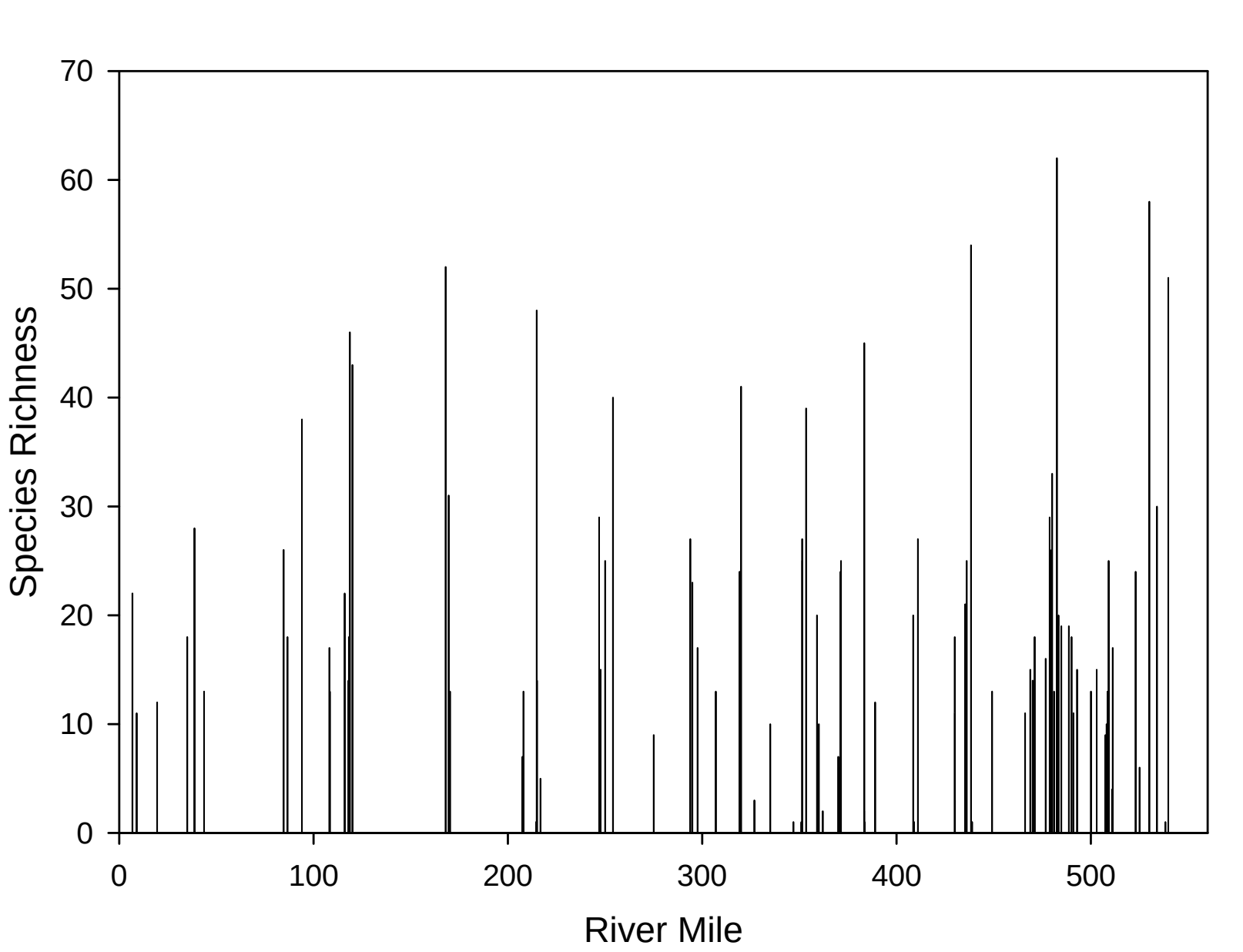


Figure 8. Percent Catch by TCEQ segment for all fish studies conducted on the Trinity River Basin. Break was inserted to better illustrate the catches that were less than 1% of the overall catch. TCEQ Segments are in numeric order, not necessarily reflecting geographic proximity. (n) = 173

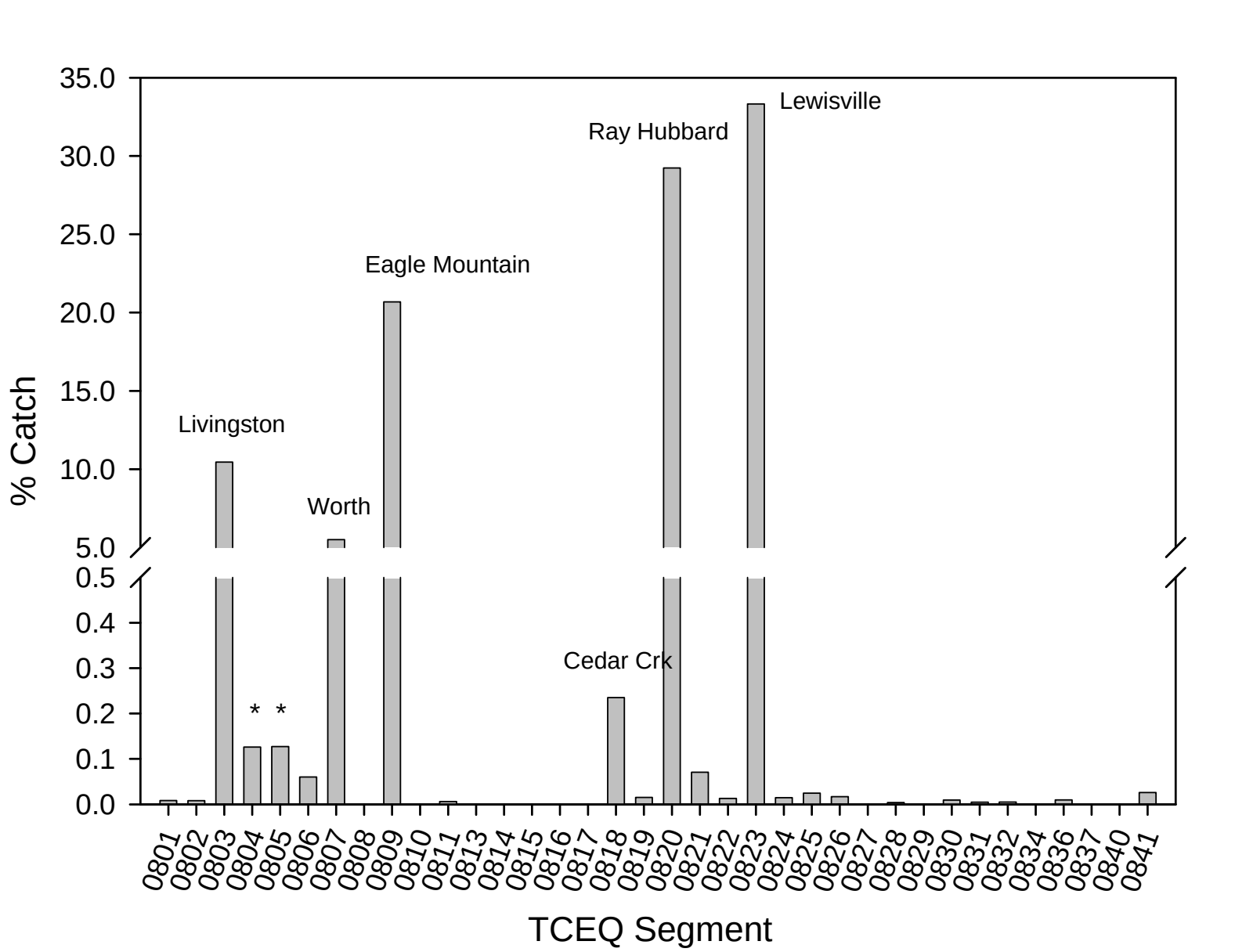


Figure 9. Species richness by TCEQ segment for all fish studies conducted on the Trinity River Basin. TCEQ Segments are in numeric order, not reflecting any geographic lineage. (n) = 173

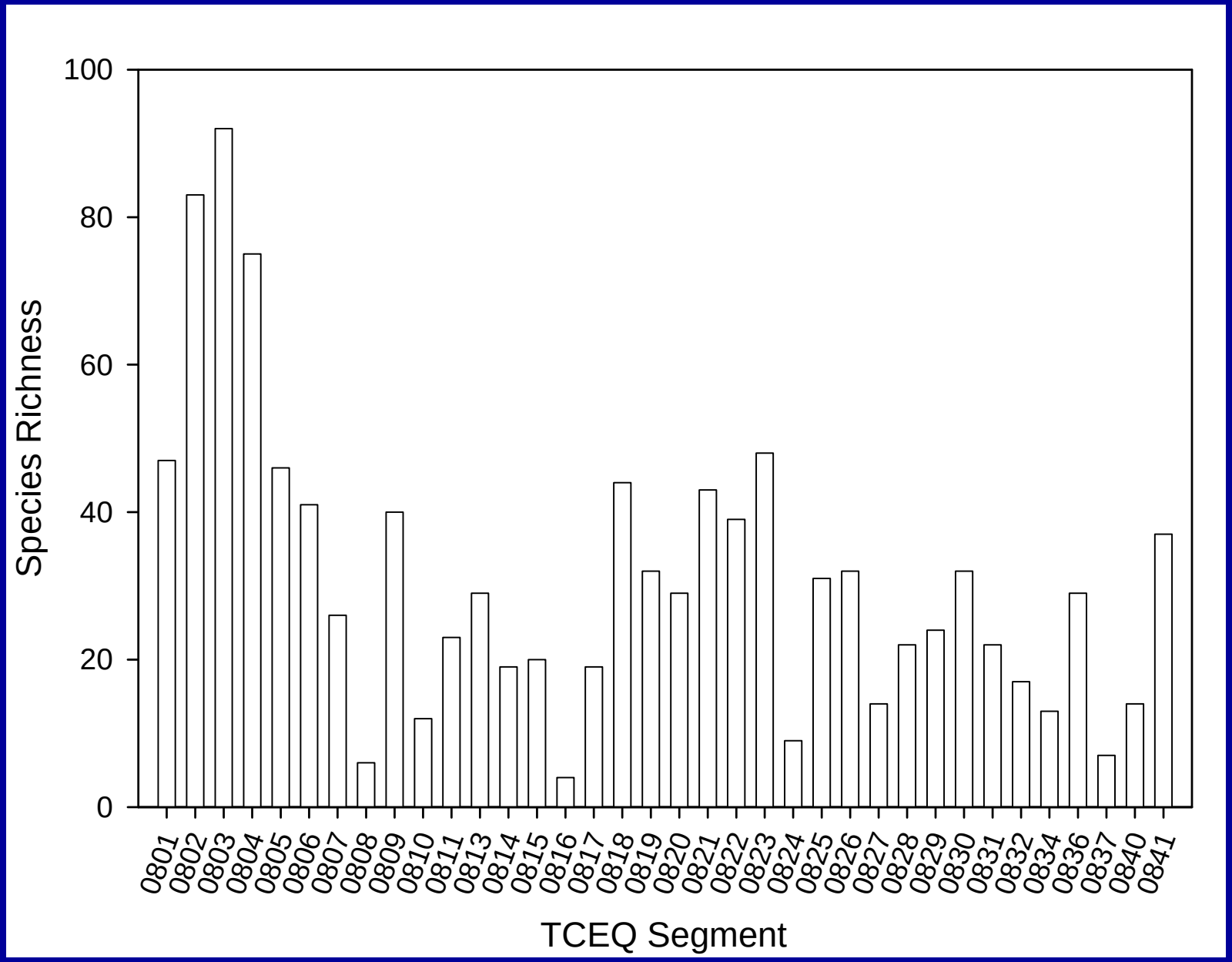


Figure 10. Total Catch of fishes by TCEQ level III Ecoregions for all fish studies conducted on the Trinity River Basin. Some studies were conducted in multiple ecoregions thus may be represented in multiple ecoregion groupings. (n) = 121

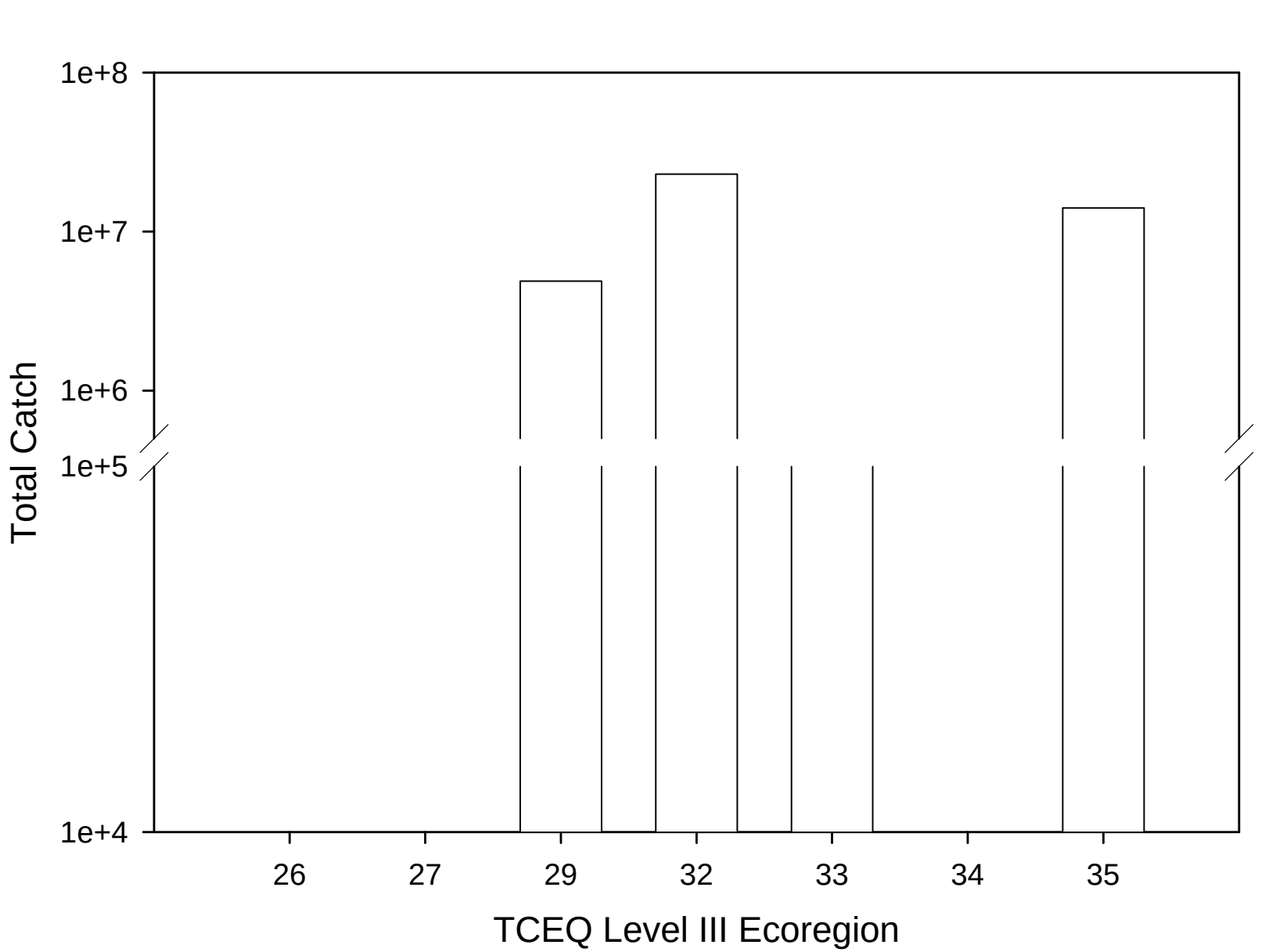


Figure 11. Species richness of fishes by TCEQ level III Ecoregions for all fish studies conducted on the Trinity River Basin. Some studies were conducted in multiple ecoregions thus may be represented in multiple ecoregion groupings. (n) = 121

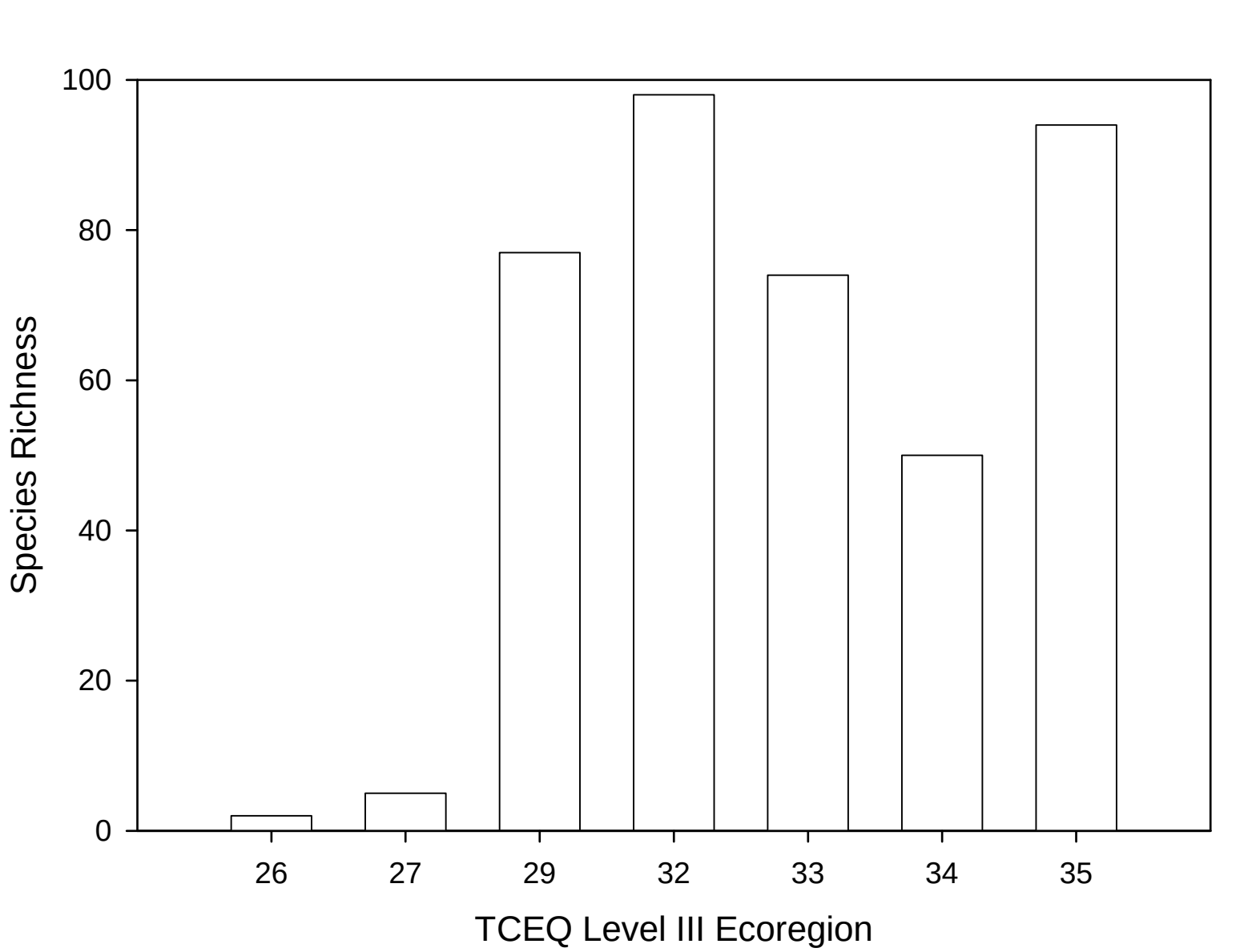


Figure 12.

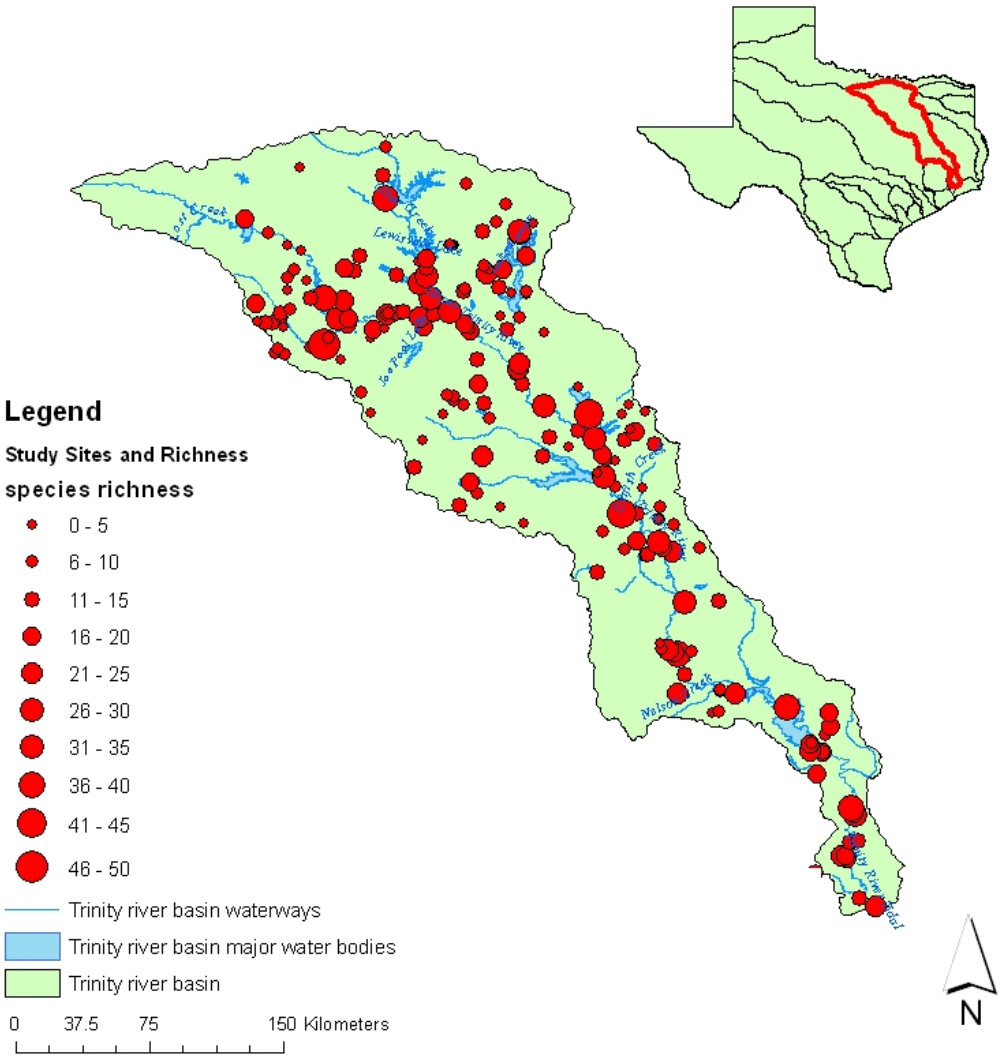

Legend
Study Sites and Richness
species richness
0 - 5
6 - 10
11 - 15
16 - 20
21 - 25
26 - 30
31 - 35
36 - 40
41 - 45
46 - 50
Trinity river basin waterways
Trinity river basin major water bodies
Trinity river basin
0
37.5
75
150 Kilometers
N

Figure 13. Dominant fish families by percent with all studies, sites, and gear types combined in the Trinity River basin.

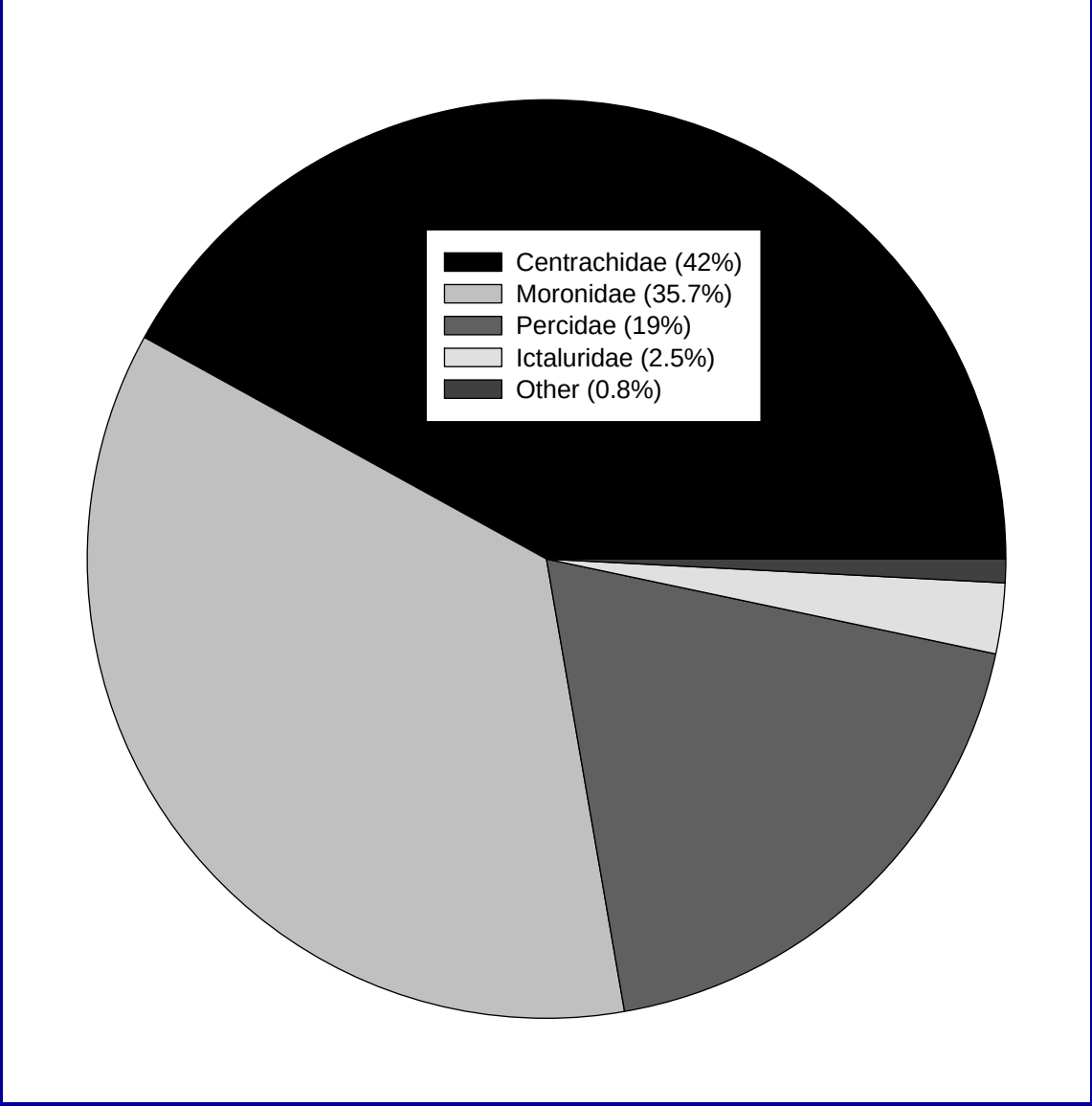
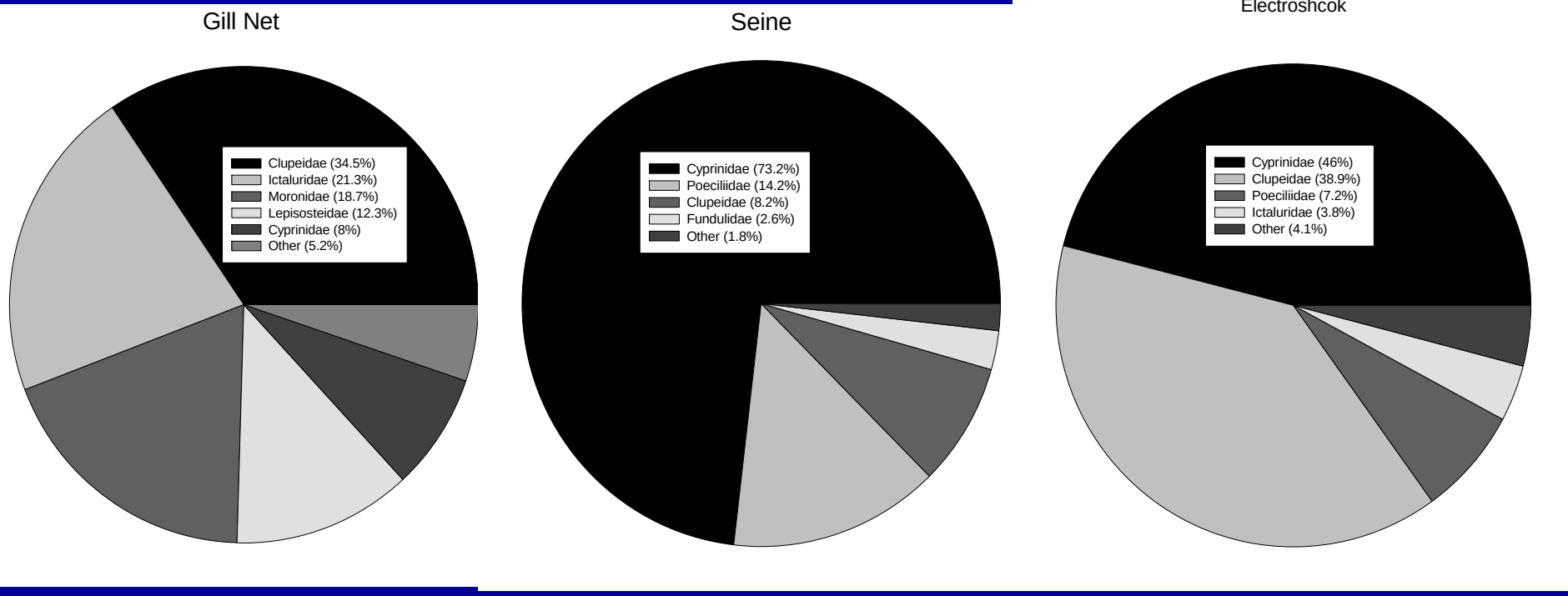


Figure 15. Dominant fish families by percent for the dominant gear types for the Trinity River basin.



Did we capture all the data???????

18/137 = 13% of total number of taxa observed by both studies were not “captured” by us.

25/137 = 18% of total number of taxa observed by both studies were not “listed” by Bonner.

92/137 = 67% of the taxa were observed by both surveys

Gear differences, estuarine species etc.

Total # of studies that provided flow data: 38

Total # of studies: 97

% of studies that provided flow data: 39%

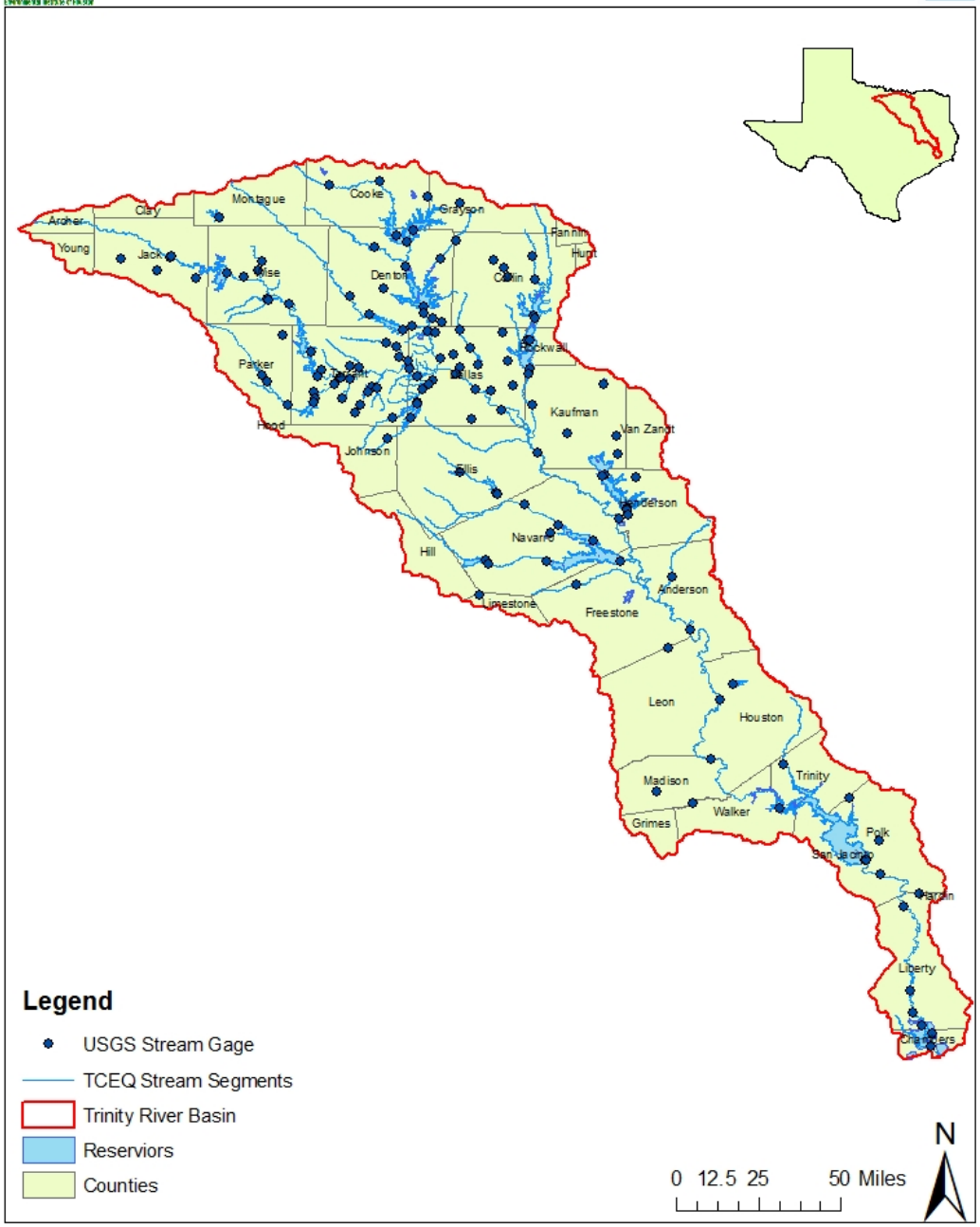
Some initial observations

- Many TPWD studies pre-1970's fisheries management – NOT community studies
- Water Quality related studies
- Little associated mesohabitat data
- Some with limited little flow data
- Flow vs. water quality vs. biota - limited
- Some jewels – Hubbs study (pre and post impoundments) – snap shots

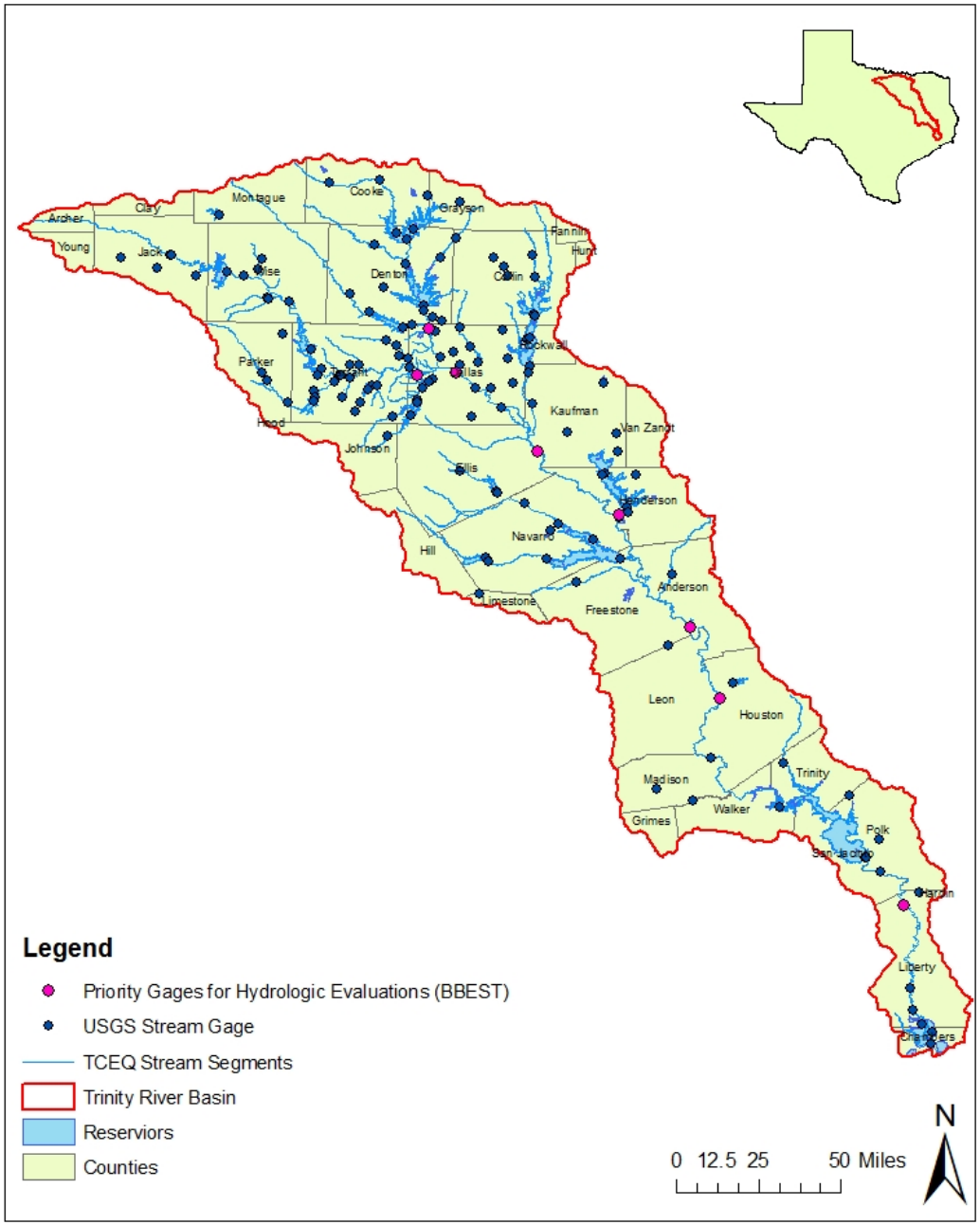
Current Work

- Identify key indicators (input: TPWD, BBEST, SJRA)
- Attempt to link fish and biota to hydrology and associated variables (flow, water quality, habitat) where possible.
- Using GIS to evaluate spatial proximity of biological data with nearest priority flow gages
- Create biological overlay, flow relationships?
- Other issues: riparian, wetland, wildlife resources, water quality, geomorphology??
- Sediment Loading, nutrient

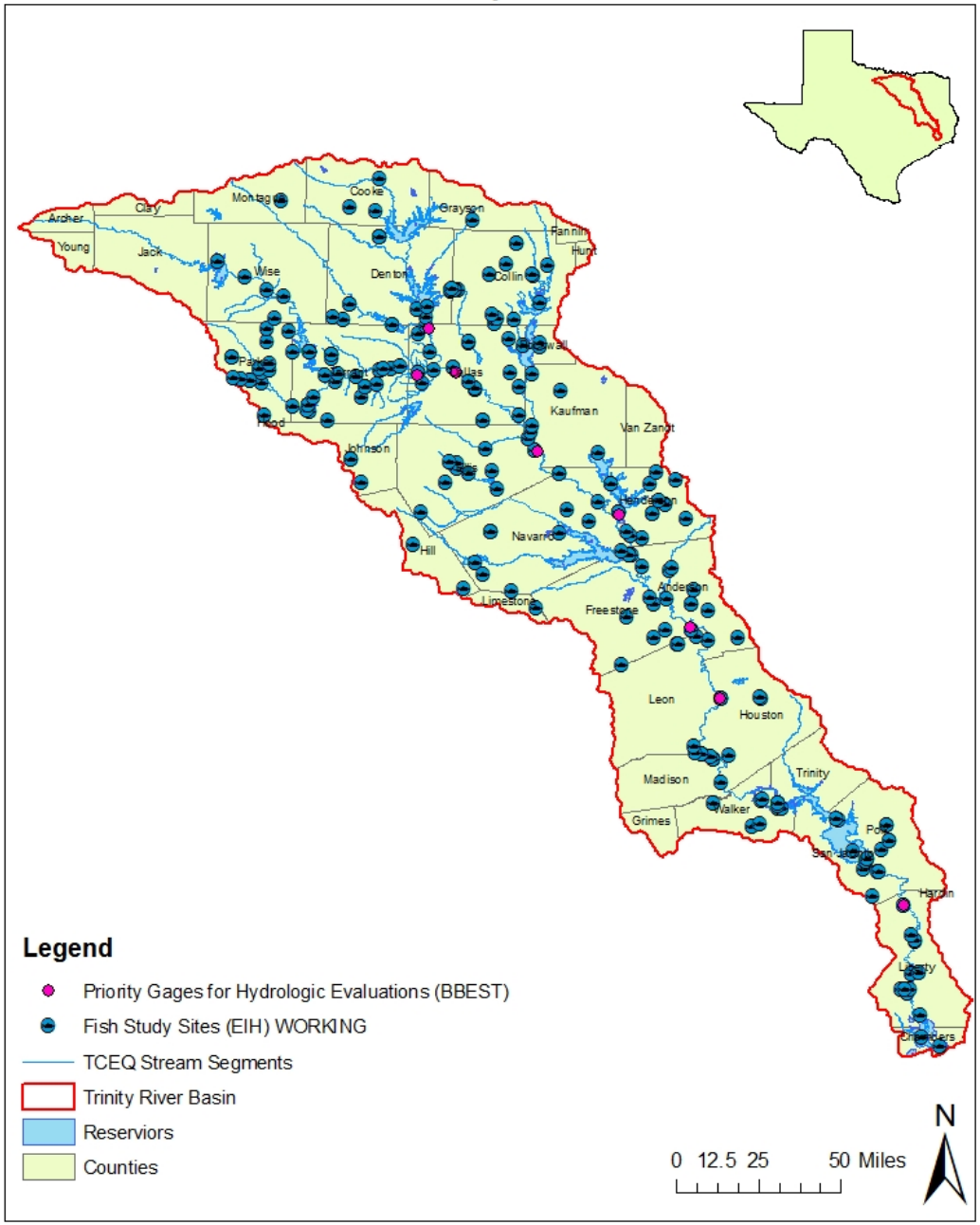
USGS Stream Gage Sites in the Trinity River Basin



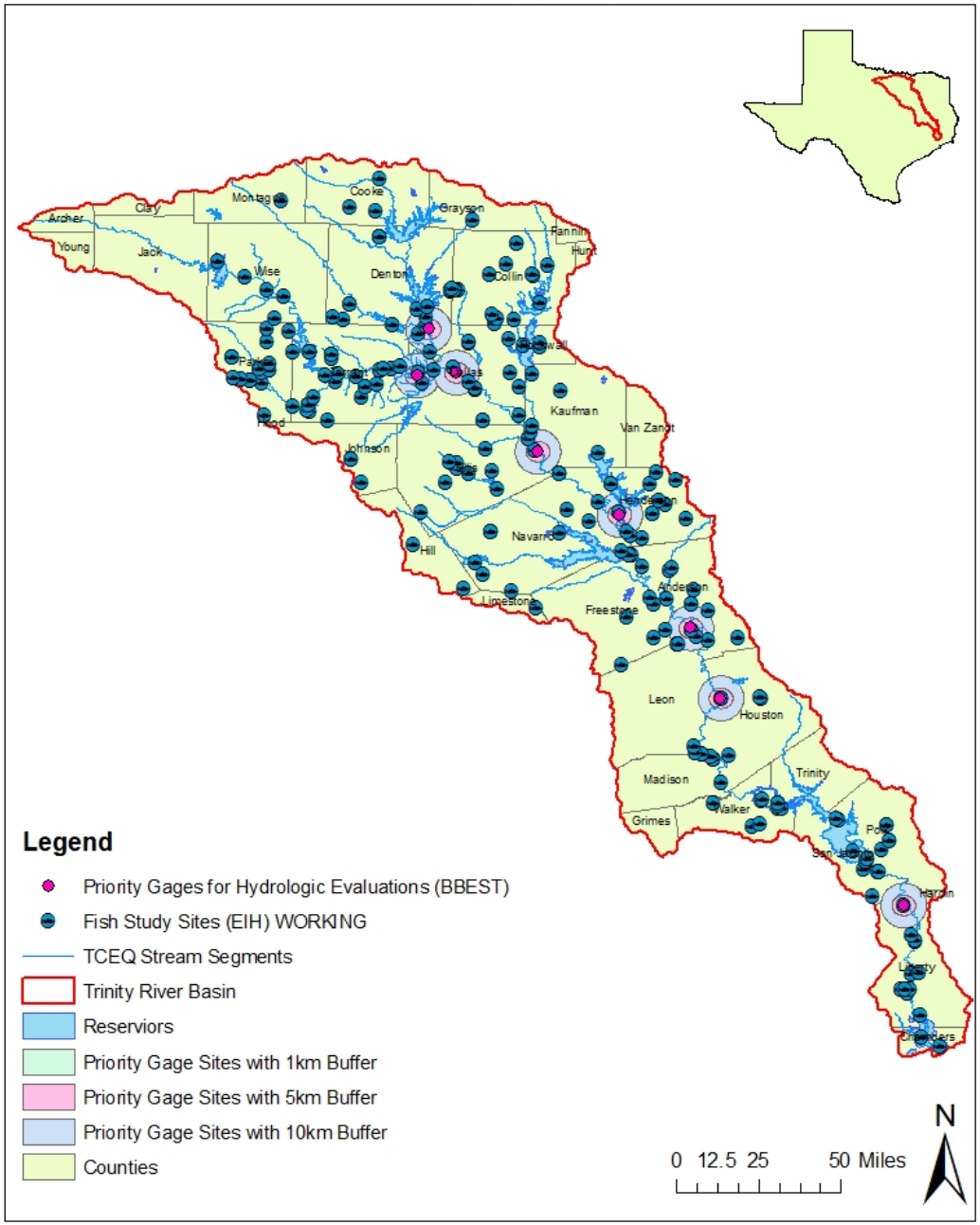
Priority Gage Sites for Hydrologic Evaluations in the Trinity River Basin



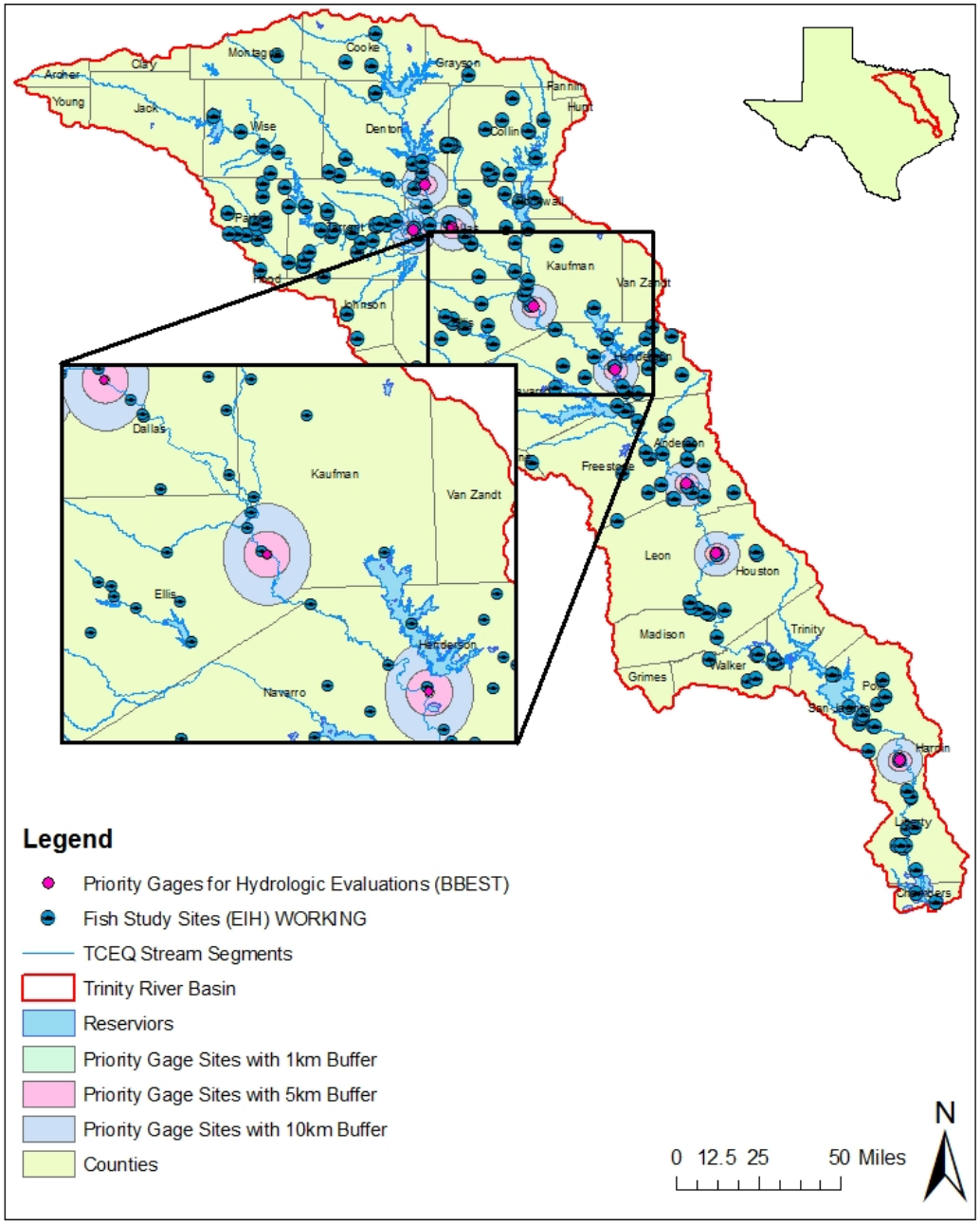
Priority Gage Sites and Fish Study Locations in the Trinity River Basin



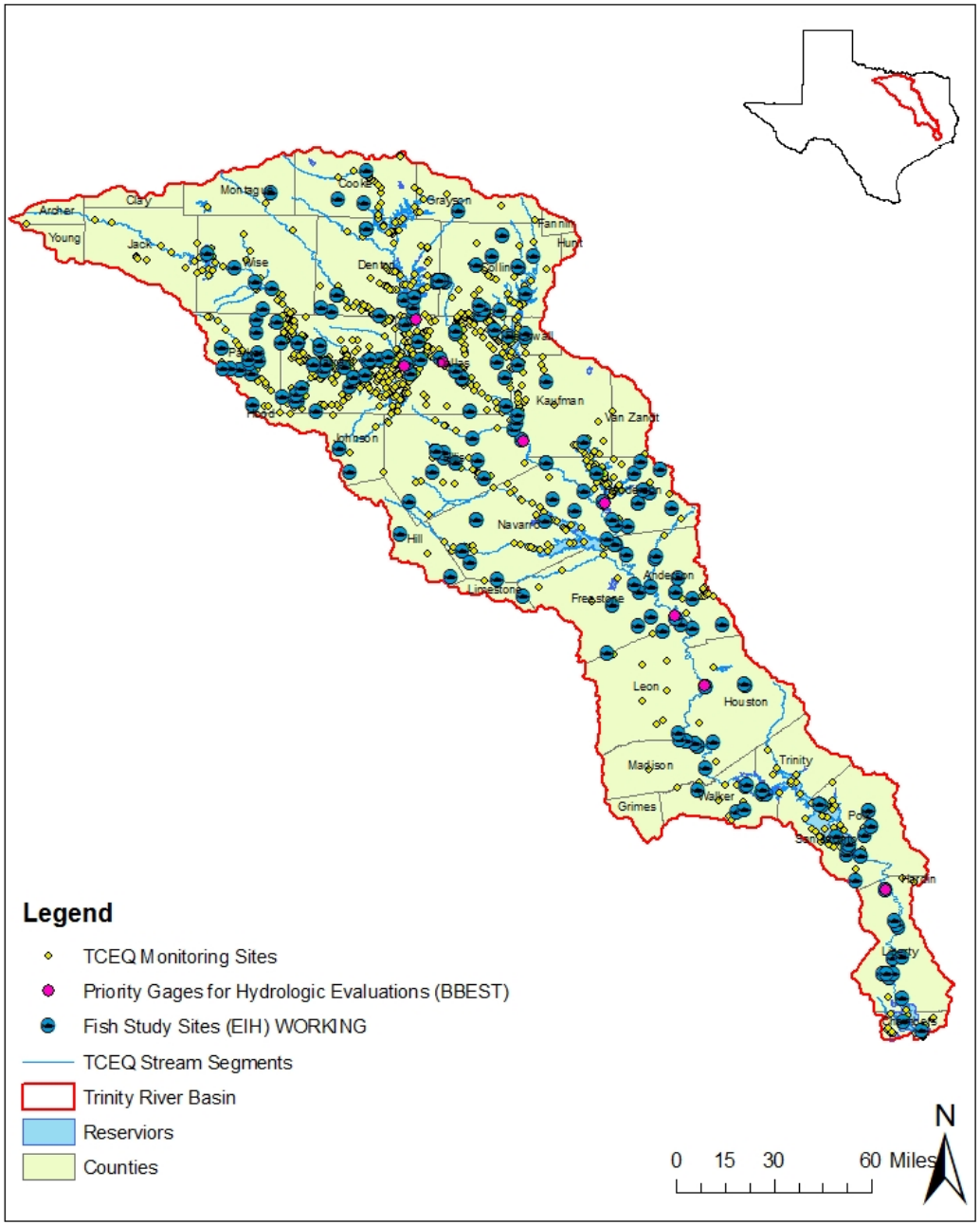
Priority Gage Sites with 1km, 5km, and 10km buffer in the Trinity River Basin



Priority Gage Sites with 1km, 5km, and 10km Buffer in the Trinity River Basin



TCEQ Water Monitoring Sites, Priority Gage Sites, and Fish Sampling Locations in the Trinity River Basin



Fish Classification & Life History

SPECIES	COMMON NAME	FAMILY	STATUS	Freq: Common(10%)	Trophic	Tolerance	Reprod Guild	TPWD Spp Concern	Rationale
Agonostomus monticola	mountain mullet	Mugilidae			O		??		
Alosa chrysochloris	skipjack herring	Clupeidae			P		A14		
Ambloplites rupestris	rock bass	Centrarchidae			P	I	B22		
Ameiurus melas	black bullhead	Ictaluridae			O	T	B27		
Ameiurus natalis	yellow bullhead	Ictaluridae			O		B27		
Ameirus nebulosus	brown bullhead	Ictaluridae	?				B27		
Amia calva	bowfin	Amiidae			P	T	B25		
Ammocrypta vivax	scaly sand darter	Percidae			IF		A16?		
Anchoa mitchilli	bay anchovy	Engraulidae	E		IF		???		
Anguilla rostrata	American eel	Anguillidae			P		NA		
Aphredoderus sayanus	pirate perch	Aphredoderidae			IF		C14		
Aplondinotus grunniens	freshwater drum	Sciaenidae			IF	T	A11	TR & SJR	large river spp, mussel glochidia host
Astyanax aeneus	Mexican tetra	Characidae			IF		??		
Atractosteus spatula	alligator gar	Lepisosteidae			P	T	A15	TR	concern, large rivers, backwater/floodplain habitats for reproduction

Reproductive Guilds - Balon

Guild	Name	Description
A1	**Open Sustratum Spawner**	
A11	Pelagophils	bouyant eggs, open spawners
A12	Lithopelagophils	rock, gravel spawners, pelagic free larvae
A13	Lithophils	rock gravel spawners, benthic larvae
A14	Phytolithophils	nonobligatory plant spawners, benthic larvae
A15	Phytophils	obligatory plant spawners, benthic larvae
A16	Psammophils	sand spawners, benthic larvae
A2	**Brood Hiders**	
A23	Lithophils	rock and gravel spawners, deposit eggs in redd or gravel, not guarded
A24	Speleophils	Cave spawning species, large adhesive eggs
B1	**Substratum choosers**	**female picks egg deposition site**
B13	Lithophils	rock spawning, adhesive eggs, pelagic larvae
B14	Phytophils	plant spawning, adhesive eggs, pelagic larvae
B2	**Nest Spawners**	**Nests built and guarded**
B22	Polyphils	misc substrate and material nesters
B23	Lithophils	rock and gravel nesters
B24	Ariadnophils	Glue making nesters
B25	Polyphils	plant material nesters
B27	Speleophils	hole nesters
C1	**External Bearers**	
C14	Gill chamber brooders	e.g. Gill chamber brooders
C2	**Internal Bearers**	
C24	Viviparious	e.g. Viviparous C24

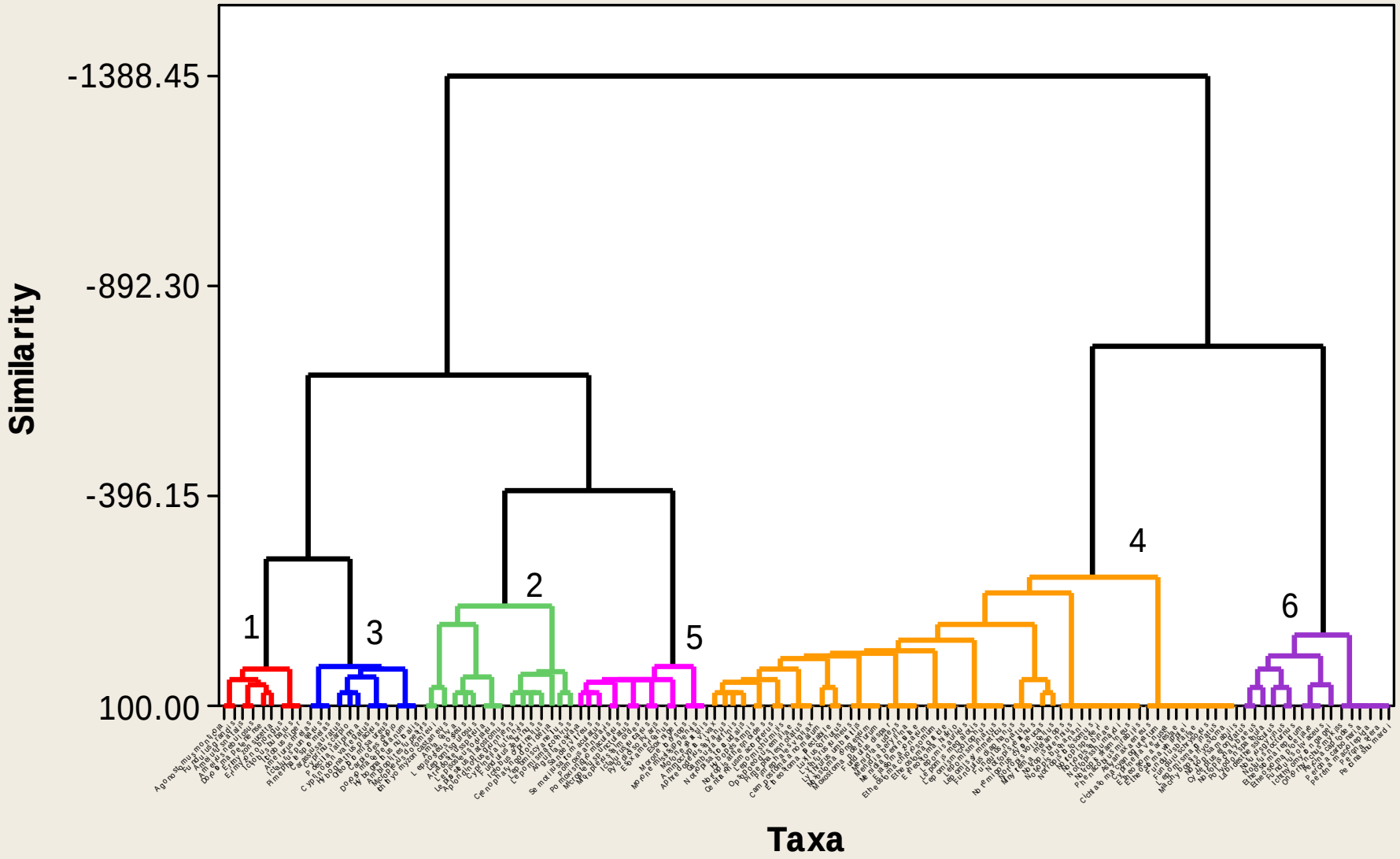
TCEQ Water Body Segments

Species	834	836	837	840	841	825	826	827
ALOSA CHRYSOCHLORIS	0	0	0	0	0	0	0	0
AMBLOPLITES RUPESTRIS	0	0	0	0	0	0	0	0
AMEIURUS MELAS	1	1	0	0	0	0	1	2
AMEIURUS NATALIS	0	2	0	0	4	0	2	1
AMEIURUS SPP.	0	0	0	0	0	0	1	0
AMIA CALVA	0	0	0	0	0	0	0	0
AMMOCRYPTA VIVAX	0	0	0	0	0	0	0	0
ANCHOA MITCHILLI	0	0	0	0	0	0	0	0
ANGUILLA ROSTRATA	0	0	0	0	0	1	0	0
APHREDODERUS SAYANUS	0	0	0	0	0	0	0	0
APLONDINOTUS GRUNNIENS	0	4	0	0	1	2	2	0
ASTYANAX AENEUS	0	0	0	0	0	0	0	0
ATRACTOSTEUS SPATULA	0	0	0	0	0	0	0	0
BREVOORTIA GUNTERI	0	0	0	0	0	0	0	0
BREVOORTIA PATRONUS	0	0	0	0	0	0	0	0
CAMPOSTOMA ANOMALUM	0	0	0	0	1	0	1	0
CARASSIUS AURATUS	0	0	0	0	0	0	0	0
CARPIODES CARPIO	2	1	0	0	3	3	2	0
CENTRARCHUS MACROPTERUS	0	0	0	0	0	0	0	0
CYPRINELLA LUTRENSIS	0	5	0	1	10	1	1	4

River Miles

Species	Q1_1	Median1	Q3_1	Minimum1	Maximum1	N1
ALOSA CHRYSOCHLORIS		117		116	118	2
AMBLOPLITES RUPESTRIS		530		530	530	1
AMEIURUS MELAS	254.1	429.9	492.9	94	539.8	77
AMEIURUS NATALIS	254.1	406.65	504.05	86.6	539.8	98
AMEIURUS SPP.	362	482.5	539.8	362	539.8	3
AMIA CALVA	104.575	161.6	280.325	94	359	6
AMMOCRYPTA VIVAX		143.35		118.7	168	2
ANCHOA MITCHILLI	7.35	9	28.5	6.8	35	4
ANGUILLA ROSTRATA		482.5		482.5	482.5	1
APHREDODERUS SAYANUS	118.7	207.85	303	38.7	383.4	14
APLONDINOTUS GRUNNIENS	254.1	429.97	484.8	6.8	539.8	91
ASTYANAX AENEUS		530		530	530	1
ATRACTOSTEUS SPATULA		307		307	307	1
BREVOORTIA GUNTERI		46.7		6.8	86.6	2
BREVOORTIA PATRONUS	9	19.5	27.25	9	35	5
CAMPOSTOMA ANOMALUM	415.35	466.1	530	118.7	533.9	22
CARASSIUS AURATUS		383.4		383.4	383.4	1
CARPIODES CARPIO	320	480	530	6.8	539.8	99
CENTRARCHUS MACROPTERUS		131		94	168	2
CYPRINELLA LUTRENSIS	297.6	438.3	490	6.8	539.8	175
CYPRINELLA VENUSTA	251.025	383.4	530	35	539.8	100
CYPRINODON VARIEGATUS		120		120	120	1

Species Assemblages based on Trophic, Tolerance and Reproductive Class



Group 1

SPECIES	COMMON NAME	FAMILY	Trophic	Tolerance	Reprod Guild	Cluster
Agonostomus monticola	mountain mullet	Mugilidae	O	N	??	1
Ameiurus natalis	yellow bullhead	Ictaluridae	O	N	B27	1
Ameirus nebulosus	brown bullhead	Ictaluridae	O	N	B27	1
Dorosoma petenense	threadfin shad	Clupeidae	O	N	A15	1
Erimyzon oblongus	creek chubsucker	Catostomic	O	N	A12	1
Erimyzon sucetta	lake chubsucker	Catostomic	O	N	A14	1
Fundulus grandis	Gulf killifish	Fundulidae	O	N	??	1
Ictiobus bubalus	smallmouth buffalo	Catostomic	O	N	A12	1
Ictiobus niger	black buffalo	Catostomic	O	N	A12	1

Group 5 Plant

SPECIES	COMMON NAME	FAMILY	Trophic	Tolerance	Reprod Guild	Cluster
Anguilla rostrata	American eel	Anguillidae	P	N	EST	5
Esox americanus	redfin pickerel	Esocidae	P	N	A15	5
Esox niger	chain pickerel	Esocidae	P	N	A15	5
Ictalurus furcatus	blue catfish	Ictaluridae	P	N	B27	5
Micropterus punctulatus	spotted bass	Centrarchi	P	N	B22	5
Micropterus salmoides	largemouth bass	Centrarchi	P	N	B22	5
Morone chrysops	white bass	Moronidae	P	N	A14	5
Morone mississippiensis	yellow bass	Moronidae	P	N	A14	5
Morone saxatilis	striped bass	Moronidae	P	N	A14	5
Pomoxis annularis	white crappie	Centrarchi	P	N	B25	5
Pomoxis nigromaculatus	black crappie	Centrarchi	P	N	B25	5
Pylodictis olivaris	flathead catfish	Ictaluridae	P	N	B27	5
Sander vitreus	walleye	Percidae	P	N	A12	5
Semotilus atromaculatus	creek chub	Cyprinidae	P	N	A23	5

Group 6 – Mostly Gravel spawners.

SPECIES	COMMON NAME	FAMILY	Trophic	Tolerance	Reprod Guild	Cluster
Cycleptus elongatus	blue sucker	Catostomic	IF	I	A12	6
Etheostoma lepidum	greenthroat darter	Percidae	IF	I	??	6
Etheostoma proeliare	cypress darter	Percidae	IF	I	??	6
Fundulus olivaceus	blackspotted topminnow	Fundulidae	IF	I	??	6
Ichthyomyzon gagei	southern brook lamprey	Petromyzo	NONE	I	??	6
Labidesthes sicculus	brook silverside	Atherinops	IF	I	A14	6
Notropis chalybaeus	ironcolor shiner	Cyprinidae	IF	I	A12	6
Noturus gyrinus	tadpole madtom	Ictaluridae	IF	I	B27	6
Noturus nocturnus	freckled madtom	Ictaluridae	IF	I	B27	6
Oncorhynchus mykiss	rainbow trout	Salmonida	IF	I	A23	6
Percina caprodes	logperch	Percidae	IF	I	A23	6
Percina carbonaria	Texas logperch	Percidae	IF	I	A23	6
Percina macrolepida	bigscale logperch	Percidae	IF	I	A23	6
Percina sciera	dusky darter	Percidae	IF	I	A23	6
Percina shumardi	river darter	Percidae	IF	I	A23	6
Polyodon spathula	paddlefish	Polyodontic	O	I	A12	6

Other Selection Criteria – focal species

- T&E (state and federal)
- Endemic to
- Unique host to listed bivalves
- Occurrence in river portion – GIS analysis
- Local fisheries?
- Habitat value – plants?

Challenges

- Limited data on other biota (benthos, plants, wildlife)
- Riparian functions?
- Geomorphology data, studies.
- Geomorphology overlay, recommendations?
- Water quality overlay? 7Q2?

LIFE'S A FISH
AND THEN YOU FRY

Baby Armored Catfish in White Oak Bayou