Section 6 (Texas Traditional) Report Review

Form emailed to FWS S6 coordinator (mm/dd/yyyy): 10/29/2012

TPWD signature date on report: 10/29/2012

Project Title: Data compilation, distribution models, conservation planning, and status survey for selected fishes of concern in Texas and region

Final or Interim Report? Interim

Grant #: TX-E-136-R

Reviewer Station: Arlington ESFO

Lead station concurs with the following comments: NA (reviewer from lead station)

Interim Report (check one):

- ☒ Acceptable (no comments)
- ☐ Needs revision prior to final report (see comments below)
- ☐ Incomplete (see comments below)

Final Report (check one):

- ☐ Acceptable (no comments)
- ☐ Needs revision (see comments below)
- ☐ Incomplete (see comments below)

Comments:

INTERIM REPORT

As Required by

THE ENDANGERED SPECIES PROGRAM

TEXAS

Grant No. TX E-136-R

Endangered and Threatened Species Conservation

Data compilation, distribution models, conservation planning, and status survey for selected fishes of concern in Texas and region

Prepared by:

Dr. Dean Hendrickson

Carter Smith
Executive Director

Clayton Wolf
Director, Wildlife

29 October 2012

INTERIM REPORT

STATE: ____Texas_____ GRANT NUMBER: ___TX E-136-R-1__

GRANT TITLE: Data compilation, distribution models, conservation planning, and status survey for selected fishes of concern in Texas and region

REPORTING PERIOD: ____1 Sep 11 to 30 Sep 12_

OBJECTIVE(S). To supply i.) standardized and georeferenced range-wide occurrence data for federally listed *N. girardi, & H. amarus*, and 4 state-listed species (*P. gracilis, M. tetranema, P. hubbsi, & P. maculata*), ii.) a status survey for two federal candidates for listing, *N. oxyrhynchus* and *N. buccula*, and iii.) fish conservation decision support products.

Segment Objectives:

Tasks:

Year 1. Sept. 1, 2011 - Aug. 31, 2012: Data compilation, standardization, georeferencing - compile occurrence data for species in Table 1 (Project Statement) from online sources and regional museum databases. Then will parse them into appropriate fields, synonymize taxa names with current accepted taxonomy (American Fisheries Society) and georeference them according to accepted protocols used in other large-scale georeferencing projects (Fishes of Texas, HerpNet, Ornis, Manis).

Jun.- Aug. 2012: Status survey - conduct status survey in the Brazos River for *N. buccula* and *N. oxyrhynchus* to provide baseline data for future monitoring program. At least 20 sites will be sampled on the main-stem Brazos (sample siting dependent on accessibility, land ownership, and overall suitability for efficient sampling). Sites will be sampled one time each and voucher specimens of all species collected will be deposited in the Texas Natural History Collection at University of Texas at Austin.

Year 2. Sept. 1, 2012 - Jan. 1, 2013: Species Distribution Models - produce SDMs over the 8 species' respective ranges using the Maxent program. Additional hydrologic variables obtained from the National Hydrography Dataset (mean annual flow & velocity, cumulative drainage, stream segment slope) will also be incorporated to explicitly account for fish responses to differing hydrologic conditions. A newly created continuous geographic variable based on drainage network connectivity and distance will be tested and incorporated into these models to approximate, and simultaneously evaluate, species-specific biogeographic and dispersal constraints.

Jan. 1, 2013 - Aug. 31, 2013: Conservation Area Network Planning - SDMs created for these 8 species will be incorporated into existing, conservation area network planning analyses utilizing the Tabu search algorithm implemented in the ConsNet 2.0 software package for systematic conservation area planning. We will produce a minimum of two sets of results. The first will be a zonation of waterscapes of Texas with respect to their conservation value for fishes, produced achieving targeted representation of species in minimal area. Second, we will produce nominal management areas when species targets vary according to conservation status, as well as uniform targets of 20% and 30% for comparative purposes (e.g., see Figure 2). The second set of plans will incorporate compactness of shape and connectivity (unique to ConsNet) as additional criteria optimized for ease of planning and management.

Significant Deviations:

None.

Summary Of Progress:

Please see Attachment A.

Location: *Data provision and modeling*: University of Texas, Texas Natural History Collections (TNHC), 10100 Burnet Rd., PRC176 EAST/R4000, Austin, Texas 78758-4445. *Status survey*: Brazos River watershed, Texas USA.

Cost: Costs were not available at time of this report, they will be available upon completion of the Final Report and conclusion of the project.

Prepared by: Craig Farquhar Date: 29 October 2012

Approved by: _____ Date: 29 October 2012
C. Craig Farquhar

ATTACHMENT A

Interim Report: Data compilation, distribution models, conservation planning, and status survey for selected fishes of concern in Texas and region

P.I. – Dr. Dean A. Hendrickson, Curator of Ichthyology, University of Texas Austin, Texas Natural History Collections (TNHC), 10100 Burnet Rd., PRC176 EAST/R4000, Austin, Texas 78758-4445; tel: 512-471-9774; FAX 512-471-9775; deanhend@austin.utexas.edu

Co-P.I. - Dr. Sahotra Sarkar, Professor, Section of Integrative Biology, Division of Statistics and Scientific Computation, Department of Philosophy, University of Texas at Austin, 1 University Station, #C02930, Austin, TX 78712-1180; Phone: 512-232-7122; FAX: 512-471-7068; **sarkar@austin.utexas.edu**

Reporting period: 1 Oct 2011 – 30 Sep 2012

Summary of Progress:

Data compilation, standardization, georeferencing

We have compiled a database of 13,090 North American occurrence records relevant to the project's target species (*Notropis buccula*, *N. oxyrhynchus*, *N. girardi*, *Hybognathus amarus*, *Platygobio gracilis*, *Macrhybopsis tetranema*, *Pteronotropis hubbsi*, and *Percina maculata*). These records come directly from major online data providers (FishNet2, FishBase, Global Biological Information Foundation, and Fishes of Texas Project) and are based on records held in 41 independent institutions. Considerable time was spent compiling these records into a single data file and formatting and normalizing them to be made searchable as a single resource. As expected, many records are effectively duplicates resulting from records having been harvested by more than one data provider. Such records often differ in subtle ways, but are not always easily determined to be true duplicates via automated methods. We will soon begin the manual process of synonymizing duplicates.

We prioritized our georeferencing effort to focus primarily on those records with precise textual descriptions that are likely to result in low error radii as required for species distribution modeling (necessary for later steps in our proposed work). To date we have georeferenced 6,474 records and determined that another 1,247 cannot be georeferenced due to vague locality descriptions, internal conflicts or complete lack of locality details. Georeferencing will continue into the next reporting period, but we expect many of the remaining 5,369 records will prove to have error radii greater than 1km (our standard maximum error for use in modeling since this matches the scale of environmental layers used in modeling) or be too vague for georeferencing.

Standardization of the data is well underway. We've standardized all dates to six separate fields (begin and ending dates further parsed into month, day and year) and all taxa names. We found frequent misspellings of names and historical names, all of which have now been synonomized to our current accepted FoTX taxonomy.

Status survey

We recently completed sampling of 20 sites on the mainstem Brazos River from just below Possum Kingdom reservoir to near Bryan, Texas (Figure 1), using only gears and methods appropriate for targeting *Notropis buccula* and *N. oxyrhynchus*. This study area was chosen in consultation with USFWS (Arlington Office) and Texas Parks and Wildlife since it is a reach where recent records of these two species are lacking and thus in need of exhaustive sampling to determine their current status. Based on life history studies from populations of these two species above Possum Kingdom Reservoir (Marks, 1999) both species are likely to have spawned shortly before our survey and we thus anticipated they might occur at the time of our sampling primarily as small individuals. We used a combination of seines of various sizes (1/4''X50'; 3/16''X10'; and 1/8''X15') to ensure capture of the entire cyprinid diversity and sampled using the smallest mesh seine (1/8 ") at all sites to ensure capture of the small (young-of-year) cyprinids present at all sites and abundant at most. Measures of survey effort were recorded in the field, including seine type, length and number of seine hauls, number of people sampling and total time spent sampling.

Collection of large numbers of small specimens (at some sites filling 5-gallon buckets) and known difficulties of field identifications, especially for small cyprinids, prompted us to perform nearly all identifications of these difficult-to-identify specimens in the lab with microscopes and consistent lighting. Only very easily identified species, representing an estimated <1% of individuals collected, were enumerated and released in the field. Vouchered collections were preserved in buffered 10% formalin, accessioned into the Texas Natural History Collections (Accession #'s 2012-35 through 2012-38 and 2012-42 and 2012-43) and are currently being sorted and identified by project staff. To date we have sorted, identified and cataloged 6 sites and provide those data in Table 1.

Noteworthy preliminary findings from the survey include:

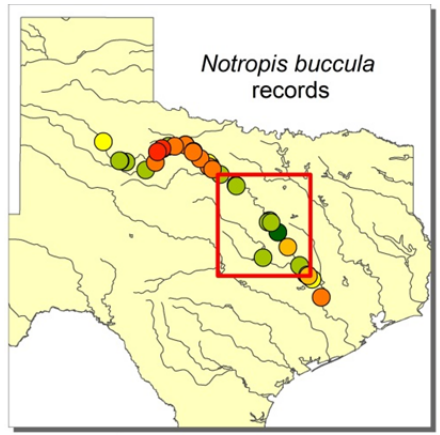
1. No target species (*N. buccula* & *N. oxyrhynchus*) were seen in the field, but lab identifications remain to be completed.
2. The introduced species, *Cyprinodon variegatus*, was found at most sites above Lake Whitney in large numbers, but was often difficult to collect due to their ability to retreat into cobble substrates.
3. The introduced species, *Fundulus grandis*, was found at most sites above Waco, often inhabiting riffles (not available in their native marine/estuarine habitat).
4. Field observations above Lake Whitney revealed a total of 5 cyprinid species: *Cyprinus carpio, Cyprinella venusta, Cyprinella lutrensis, Pimephales vigilax,* and *Campostoma anomolum.* Additional cyprinid species seen below Lake Whitney include *Macrhybopsis hyostoma* and *Notropis volucellus.* These findings will be updated following examination of specimens in the lab.
5. The native species, *Pimephales vigilax*, *Cyprinella lutrensis* and *C. venusta* were dominant at most sites throughout the survey area.
6. Non-native species captured included *Cyprinus carpio, Lepomis auritus, Cyprinodon variegatus, Fundulus grandis,* and one specimen of *Oreochromis aureus.*
7. The known range of *Poecilia latipinna* was extended by this survey to include the Brazos River upstream to Bryan. This species had previously been taken in the Brazos only from the mainstem near Rosharon in the lowest reaches of the river, but had been known from other locations in the Brazos drainage, including the San Gabriel River, which is thermally buffered by plentiful springs, and a small isolated roadside pond near College Station.
8. Our preliminary finding of lower-than-expected fish diversity, non-natives, and consistently low abundance above Waco may be an effect of relatively recent changes in controlled releases from Lake Whitney, Lake Granbury, and Possum Kingdom Reservoir.

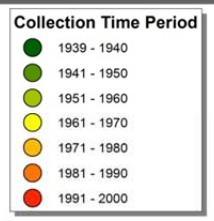
Table 1. Records catalogued from the Brazos river survey as part of this project to date(Sept 26, 2012).

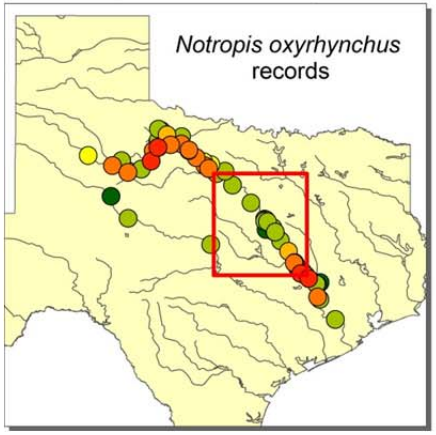
ACCN #	Field #	County	Locality name	Date	Catalog #	Genus	Species	Count	Prep Type
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51257	Menidia	beryllina	17	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51259	Lepomis	humilis	2	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51261	Lepomis	sp.	33	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51567	Micropterus	punctulatus	16	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51248	Cyprinella	lutrensis	336	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51250	Cyprinella	venusta	118	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51252	Fundulus	grandis	1	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51254	Pimephales	vigilax	70	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51256	Campostoma	anomalum	1	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51258	Lepomis	gulosus	4	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51260	Labidesthes	sicculus	8	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51262	Etheostoma	spectabile	10	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51249	Lepomis	megalotis	10	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51251	Gambusia	affinis	83	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51253	Cyprinodon	variegatus	1	Fluid
2012-35	AEC20120917-3	Palo Pinto County	Brazos River at SH4, near Rochelle's canoe rental, up and downstream up to 300m	17-09-2012	51255	Lepomis	macrochirus	9	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51579	Labidesthes	sicculus	12	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51581	Cyprinodon	variegatus	14	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51583	Pimephales	vigilax	120	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51568	Micropterus	dolomieu	3	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51585	Etheostoma	proeliare	4	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51570	Moxostoma	congestum	2	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51572	Cyprinella	venusta	192	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51574	Lepomis	gulosus	2	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51576	Pylodictis	olivaris	1	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51578	Fundulus	grandis	4	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51580	Campostoma	anomalum	1	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51582	Gambusia	affinis	70	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51584	Dorosoma	cepedianum	1	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51569	Lepomis	megalotis	43	Fluid

2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51571	Micropterus	punctulatus	9	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51573	Cyprinella	lutrensis	497	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51575	Menidia	beryllina	86	Fluid
2012-36	AEC20120918-2	Palo Pinto County	Brazos River at Worth Ranch (at Chick Bend)	18-09-2012	51577	Lepomis	macrochirus	2	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51467	Micropterus	dolomieu	4	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51469	Menidia	beryllina	12	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51458	Carpiodes	carpio	3	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51460	Cyprinella	lutrensis	2328	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51462	Cyprinella	venusta	77	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51464	Gambusia	affinis	255	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51466	Labidesthes	sicculus	4	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51468	Fundulus	grandis	13	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51470	Lepomis	megalotis	10	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51459	Pimephales	vigilax	163	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51461	Percina	sciera	1	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51463	Cyprinodon	variegatus	118	Fluid
2012-36	AEC20120918-5	Parker County	Brazos River at IH20	18-09-2012	51465	Lepomis	macrochirus	3	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51595	Cyprinella	venusta	7	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51597	Pimephales	vigilax	5	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51586	Lepisosteus	osseus	1	Dry Skeleton
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51588	Lepomis	megalotis	45	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51590	Pomoxis	annularis	5	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51592	Etheostoma	spectabile	14	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51594	Cyprinella	lutrensis	3	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51596	Percina	macrolepida	2	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51587	Lepomis	macrochirus	21	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51589	Micropterus	salmoides x punctulatus	30	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51591	Gambusia	affinis	119	Fluid
2012-37	AEC20120919-2	Hood County	Brazos River at Pecan Plantation Ranch, N	19-09-2012	51593	Lepomis	sp.	142	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51243	Morone	chrysops	1	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51245	Dorosoma	cepedianum	7	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51247	Ictalurus	punctatus	9	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51234	Menidia	beryllina	21	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51236	Etheostoma	spectabile	2	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51238	Lepomis	sp.	25	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51240	Cyprinodon	variegatus	768	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51242	Campostoma	anomalum	1	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51244	Lepomis	megalotis	17	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51246	Cyprinella	lutrensis	1008	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51517	Lepisosteus	oculatus	1	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51235	Lepomis	macrochirus	3	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51237	Gambusia	affinis	140	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51239	Pimephales	vigilax	54	Fluid
2012-37	AEC20120919-3	Somervell County	Brazos River at Camp Arrowhead (Cox Bend)	19-09-2012	51241	Cyprinella	venusta	75	Fluid
2012-38	AEC20120920-2	Somervell County	Brazos River at confluence with Paluxy River	20-09-2012	51513	Lepisosteus	osseus	1	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51606	Fundulus	grandis	21	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51608	Morone	chrysops	1	Fluid

2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51610	Ictalurus	punctatus	1	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51612	Micropterus	salmoides x punctulatus	4	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51614	Cyprinella	venusta	130	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51599	Menidia	beryllina	6	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51601	Cyprinodon	variegatus	6	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51603	Pimephales	vigilax	105	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51605	Lepomis	macrochirus	6	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51607	Pomoxis	annularis	4	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51609	Gambusia	affinis	3	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51611	Cyprinus	carpio	3	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51613	Cyprinella	lutrensis	786	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51598	Dorosoma	cepedianum	4	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51600	Lepomis	megalotis	3	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51602	Dorosoma	petenense	2	Fluid
2012-38	AEC20120920-3	Johnson/Bosque County Line	Brazos River at CR 1118 (near Brazos Point)	20-09-2012	51604	Lepomis	sp.	18	Fluid







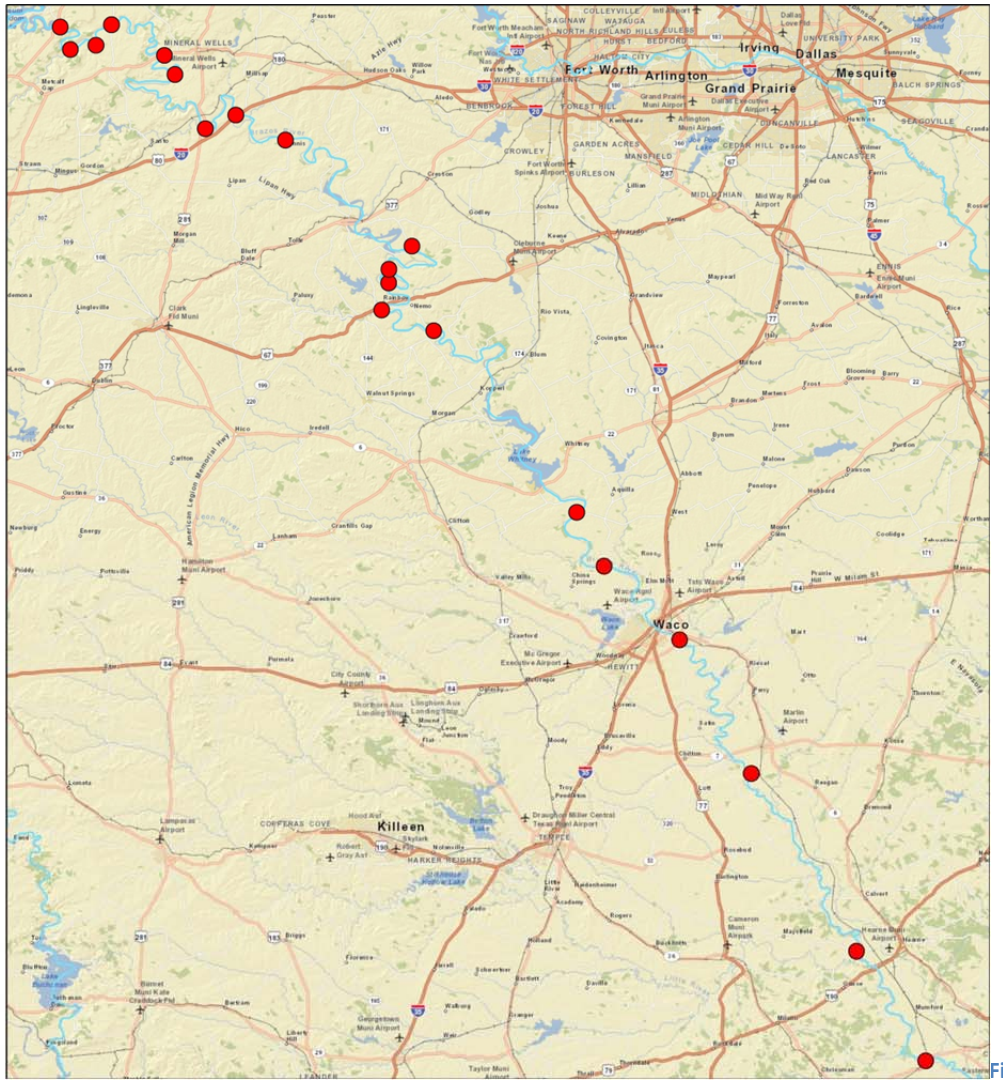


Figure 1. The insets indicate historic distributions of *N. buccula* and *N. oxyrhynchus* with more recent collections shown in red. The box in both insets indicates the extent of this study's survey (for 6 sites - see locality details in Table 1)..

Figure 1. Map of survey sites.

Species Distribution Models

With the full extent of the ranges of the target species now known on the basis of the comprehensive data compilation (above), we have begun the process of compiling and editing environmental data layers (Table 1) for running models at species-specific complete range-wide extents. As described in the proposal, once created on the basis of range-wide extent, models will be trimmed to the extent of the state of Texas before incorporation into conservation area network planning analyses (Jan. 1, 2013 – Aug. 31, 2013).

Table 1. Environmental variables to be used in models.

Layer category	Description	Source
Topological	Aspect	1km DEM
Topological	Slope	1km DEM
Topological	compound topological index (ln(acc.flow/tan[slope]))	1km DEM
Topological	Altitude	1km DEM
Climate	annual mean temperature	Wordclim variable 1
Climate	mean diurnal range (mean of monthly (max temp - min temp))	Wordclim variable 2
Climate	isothermality (P2/P7)(*100)	Wordclim variable 3
Climate	(temperature seasonality (sd *100)	Wordclim variable 4
Climate	max temperature of warmest month	Wordclim variable 5
Climate	min temperature of coldest month	Wordclim variable 6
Climate	temperature annual range (P5-P6)	Wordclim variable 7
Climate	annual precipitation	Wordclim variable 12
Climate	precipitation of wettest month	Wordclim variable 13
Climate	precipitation of driest month	Wordclim variable 14
Climate	precipitation seasonality (coefficient of variation)	Wordclim variable 15
Climate	precipitation of wettest quarter	Wordclim variable 16
Climate	precipitation of driest quarter	Wordclim variable 17
Climate	precipitation of warmest quarter	Wordclim variable 18
Climate	precipitation of coldest quarter	Wordclim variable 19
Geographic	major river basins	Texas Water Development Board
Geographic	8-digit hydrologic unit code (HUC)	United States Geologic Survey
Hydrologic	cumulative drainage	National Hydrology Dataset plus
Hydrologic	mean annual flow	National Hydrology Dataset plus
Hydrologic	mean annual velocity	National Hydrology Dataset plus

Significant Deviations:

There have been no significant deviations from the planned work described in the proposal. All tasks planned for this reporting period were addressed.

Literature Cited:

Marks, D.E. 1999. Life history characteristics of the sharpnose shiner (*Notropis oxyrhynchus*) and the smalleye shiner (*Notropis buccula*) in the Brazos River, Texas. M.S. Thesis. Texas Tech University. 87 pp.