Preliminary Results of American Eel Sampling Efforts in Gulf of Mexico Drainages of Texas

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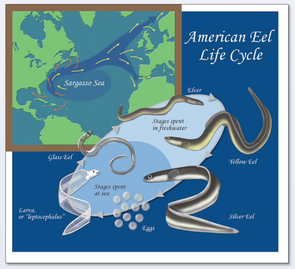
Introduction

American Eel *Anguilla rostrata* has a unique and complex life history that is fairly well-studied on the eastern coast of the United States, but few studies have been done on Gulf of Mexico drainages. To inform conservation and management decisions, efforts to better understand the population structure, seasonal dynamics, and life history of American Eel are underway. The primary objectives of our efforts are to assess the current and historical distribution and abundance, habitat use, movement patterns, parasite occurrence, diet and population structure of American Eel across all life stages in Gulf of Mexico drainages of Texas.



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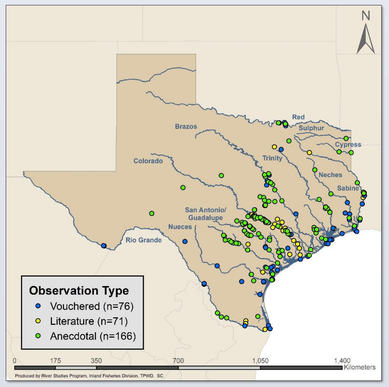
Historical Distribution



- Total of 336 records
  - 80 museum vouchered (76 with location data)
  - 84 literature (71)
  - 172 anecdotal (166)
- Anecdotal records from social media were primarily from Facebook and iNaturalist posts
- Records indicate eels occur or have occurred in all major Texas river basins except for the Canadian River in the Panhandle (Fig. 1)

Figure 1. Historical records of American Eel by observation type (number of observations with locations).

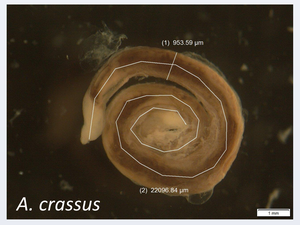
Specimen Collections

We procured 114 American Eel from natural resource agencies, university researchers, citizen scientists, and other partners. Six eel were provided by citizens including one putative silver eel.

Specimens were obtained though opportunistic events (e.g., dewatering activities downstream of reservoirs and wastewater treatment plant maintenance operations), targeted sampling, and seining and electrofishing for other fishes.

Data Collection & Laboratory Analysis

We took length, weight, estimated sex, extracted tissues for genetics and metal analysis, otoliths for aging & microchemistry, and stomachs for gut contents. Swimbladders were examined for *Anguillicoloides crassus*, a nematode parasite native to Japanese Eel *A. japonica*.



Demographics & Parasites

- 113 yellow & 1 silver eel collected from 34 sites across 10 river basins and several coastal tributaries (Fig. 2); most were females
- Total length ranged from 153–1059 mm; weight ranged from 5–2750 grams; length-weight relationships did not differ by basin (Fig. 3)
- Eel parasitized with *A. crassus* were collected at 3 sites (Fig. 2); of the 96 eel swimbladders assessed for *A. crassus*, 12 were parasitized; *A. crassus* counts per individual ranged from 1–9 with higher counts in the Sabine River (≤10 including LDWF eels; Fig. 4)
- Proportion of parasitized eels and parasite counts were higher for individuals ranging from 151–300 mm (Fig. 4)

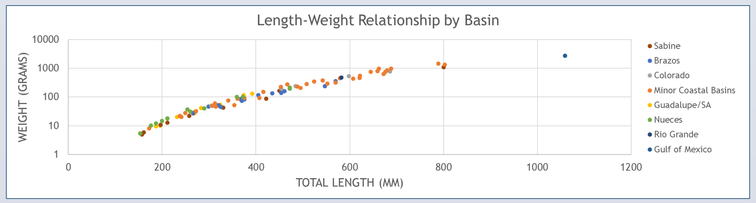


Figure 3. Length-weight relationship of American Eel (n=96) used for this project grouped by basin.

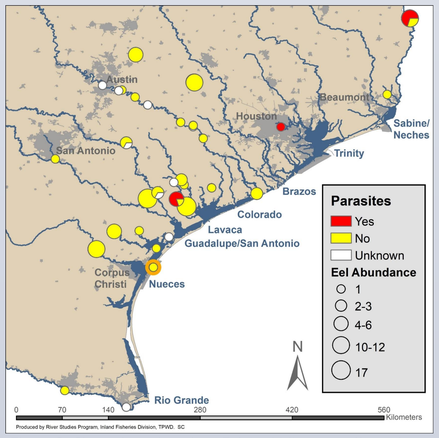
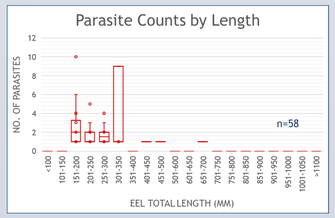


Figure 2. Sites where American Eel (n=114) were collected and used for this project with proportion of individuals parasitized with *A. crassus* displayed in red and one silver eel record noted by the orange circle.



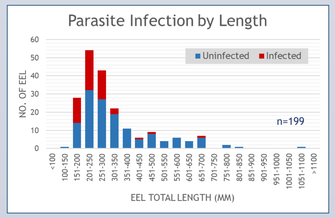


Figure 4. Frequency distributions showing parasite count by total length (top) and parasite infection by total length (bottom) of American Eel; data include LDWF eels collected downstream of Toledo Bend.

Glass Eel & Elver Sampling

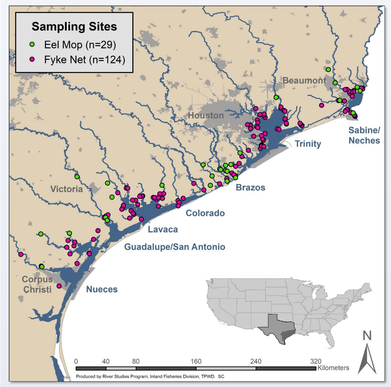
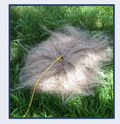


Figure 5. Sites where eel mops and fyke nets were deployed to sample for juvenile American Eel.

Eel Mops

- Deployed across 29 sites (Fig. 5)
- 4,510 nights and checked a total of 217 times (data for 18 out of 29 sites)
- Sampling time ranged from two weeks to 24 months
- Out of 217 mop checks, 65% yielded crabs, 50% shrimp, 31% insects/worms and 30% non-target fish



Fyke Nets

- Fyke nets were set 250 times across 124 sites (Fig. 5)
- Cumulative soak time for all sampling events was 4,627 hours
- Most abundant fish: Gulf Menhaden *Brevoortia patronus*, Bay Anchovy *Anchoa mitchilli*, Ladyfish *Elops saurus* and Atlantic Croaker *Micropogonias undulatus*

Summary & Future Work

1. Yellow eels still occur in all major Texas river basins that flow directly to Gulf of Mexico; no glass eel or elvers were collected; first record of silver eel in Texas
2. Opportunistic events contributed large proportion of specimens
3. First Texas records of non-native nematode, *A. crassus*, in wild eels; from three basins with greatest prevalence and intensity in Sabine
4. All specimen occurrence data are in the Fishes of Texas (FoTX) with specimens & derivatives (parasites, otoliths, etc.) in TNHCi
   - FoTX - Hendrickson, Dean A. & Cohen, Adam E. (2015). Fishes of Texas Project Database (version 2.0). Texas Advanced Computing Center, University of Texas at Austin. http://doi.org/10.17603/C3WC70
   - TNHCi - Hendrickson Dean A., Cohen, Adam E. & Casarez, Melissa J. (2020). University of Texas, Biodiversity Center, Ichthyology Collection (TNHCi). Version 5.78. University of Texas at Austin, Biodiversity Collections. https://doi.org/10.15468/h8gxdr
- Analyses of genetics, diet, otolith microchemistry/aging, as well as juvenile sampling & solicitation of anecdotal (historical and current) observations, continue.

Acknowledgements

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