

Baseline Assessment of Fish Assemblages within the Rio Grande

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1. Introduction

The Rio Grande is a major river located in the Toledo District in Southern Belize and forms an important part of the Maya Mountain Marine Corridor. The river originates in the high Maya Mountains, located to the west of the district, down to the Port Honduras Marine Reserve on the eastern coast of southern Belize. The Rio Grande is utilised in various ways by people, from providing an important source for drinking water and fishing resources for local communities to providing hydroelectricity for the national grid. Despite the wide variety of anthropogenic impacts acting upon the river system, the Rio Grande is still considered to represent an ecologically healthy river, supporting a diverse assemblage of fauna and flora both in terrestrial and marine environments.

This project was aim to provide a pilot study for the current fish assemblages residing within the head waters of the Rio Grande. These data will provide local conservation authorities and researchers background information on the state of the river's fish communities and provide baseline data for future research and conservation work.

2. Methodology

Fish assemblages were sampled at 8 selected locations along the Rio Grande. Each section was selected at random using RivEx Software to ensure unbiased sampling and comprised of 200 m lengths of 2 and 3 Order Rivers/ streams present within the Rio Grande headwaters. To reflect variations in aquatic habitats and the potential wide variety of fish within the river a total of two riffle sites, two pooling sites and two run sites were identified and sampled using netting techniques (described below).

An initial visual survey of each site was undertaken. This survey involved the identification of fish from adjacent river banks, for a total period of 10 minutes. Following the completion of the visual survey, a drag and/or cast net was used. Both nets comprised a mesh size of approximately 1/2 inch (1.2 cm) were used within riffle, pool and run sites to obtain small to medium sized fish. The cast net was also be used to catch fish residing within riffles and shallow pooling areas.

Fish behaviour and occurrence are known to vary during the course of a day; therefore samples were taken throughout the day within a set time window (see Table 1 below). A total of three sampling periods were undertaken for each site identified within a section of the river.

Sampling periods
0600 – 1000
1200 – 1600
2000 - 0000

Table 1: Allocated time windows (sampling periods) to undertake sampling

During any given sampling period of a site, five passes of the drag net (within pools and runs) and 5 attempts with the cast net were undertaken within shallow pool and riffle areas, with a total of 10 throws made.

3. Analysis

Each individual fish caught during the sampling periods was recorded and returned to the river. Sampling data included identification down to species level, life stage, total length and total fork length. If required fishes were retained within a portable water tank to allow the processing of large numbers of individuals (i.e. during netting) to prevent injuring and killing of specimens.

4. Discussion

Recent work on fish assemblages in Belize is extremely limited. However, past studies covering the entire continental waters of Belize have identified thirty-eight different families (Greenwood and Thomerson 1997). More recent studies conducted by Esselman (2001) and Esselman (2009) have also shown there to be a diverse range of fish species present within the waters of Belize. Table 2 lists the names of freshwater fish identified during survey by Esselman (2009). Table 3 lists the names of freshwater fish identified during current survey in Rio Grande. Graph 1 shows the number of individuals per species. The species with the highest abundance was Belize silversides with 293 individuals. The species with the lowest abundance was Green River Goby and Brazilian Mojarra. Graph 2 shows the number of fish species per site in the Rio Grande watershed. The site with the highest diversity was Lower Columbia with 10 species. The site with the lowest diversity was Upper Na Lum Ca. A total of 763 fishes were sampled in this assessment. According to Greenwood et. al. 1997, Peten Molly was only collected twice in Belize prior to Esselman 2001., We collected 5 individuals in the Salamanca Site.

Scientific Name	Common Name
Agonostomus momticola	Mountain mullet
Amphilophus robertsoni	False firemouth
Anguilla rostrata	Americal eel
Astyanax aeneus	Billum/ central tetra
Atherinella sp.	Belize silversides
Awaous banana	Green river goby
Belonesox belizanus	Pike killifish
Brycon guatemalensis	Machaca
Centropomus ensiferus	Swordspine snook
Centropomus undecimalis	Snook
Cichlasoma bocourti	Chisel-tooth cichlid
Cichlasoma salvini	Yellowbelly cichlid
Cichlasoma urophthaimus	Crana/ maya cichlid
Daipiterus rhombeus	Silver mojarra
Dormitor maculatus	Fat sleeper
Dorosoma petenensis	Threadfin shad
Eleotris amblyopsis	Spinkycheek sleeper
Eucinostomus melanopterus	Flagfin mojarra
Eugerres brazilianus	Brizilian mojarra
Gambusia luma	Sleek mosquitofish
Gambusia sexradiata	Teardrop mosquitofish
Gobiomorus dormitor	Bigmouth sleeper
Heterandria bimaculata	Two spot livebearer
Hyporhamphus roberti	Central american halfbeak
Ictalurus furcatus	Baca/ blue catfish
Joturus pichardi	Hog mullet
Lutjanus griseus	Gray snapper
Lutjanus jocu	Dog snapper
Megalops atlanticus	Tarpon
Microphilus brachyurus	Opossum pipefish
Myrophis punctatus	Speaked worm eel
Ophisteron aenigmaticum	Obscure swamp eel
*Oreochromis niloticus	*Nile tilapia
Parachromis friedrichsthalii	Mus mus
Petenia splendida	Bay snook
Poecilia mexicana	Shortfin molly
* Introduced non-native species	

Table 2: List of fish species identified in Essleman (2009)

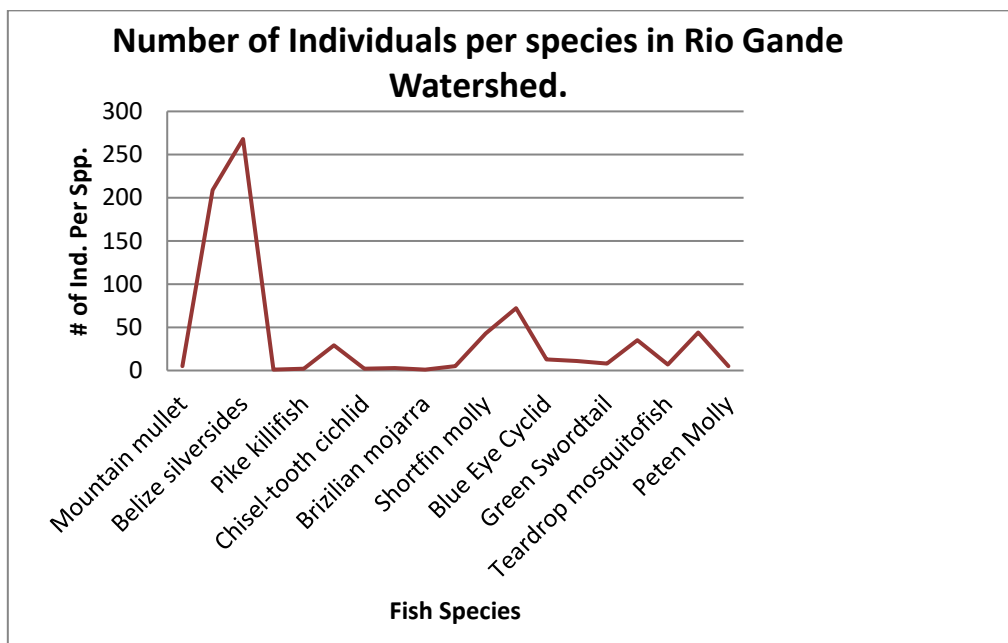
(table continues)

Scientific Name	Common Name
Poecilia petenensis	Peten molly
Poecilia teresea	Mountain molly
Pomadasys crocro	Burro grunt
Rhamadia guatemalensis	Guatemalan chulin
Rhamadia laticauda	Filespine chulin
Rivulus tenuis	Dogtooth rivulid
Rocia octofasciatum	Jack dempsey
Sciades assimilis	Cato/ mayan catfish
Strongylura timucu	Timucu
Thorichthys aureus	Golden firemouth cichlid
Thorichthys meeki	Firemouth cichlid
Vieja godmanii	Southern checkmark cichlid
Vieja intermedium	Checkmark cichlid
Vieja maculicauda	Tuba/ blackbelt cichlid
Vieja synspilum	Tuba/ redhead cichlid
Xiphophorus helleri	Green swordtail
Xiphophorus maculatus	Southern platyfish

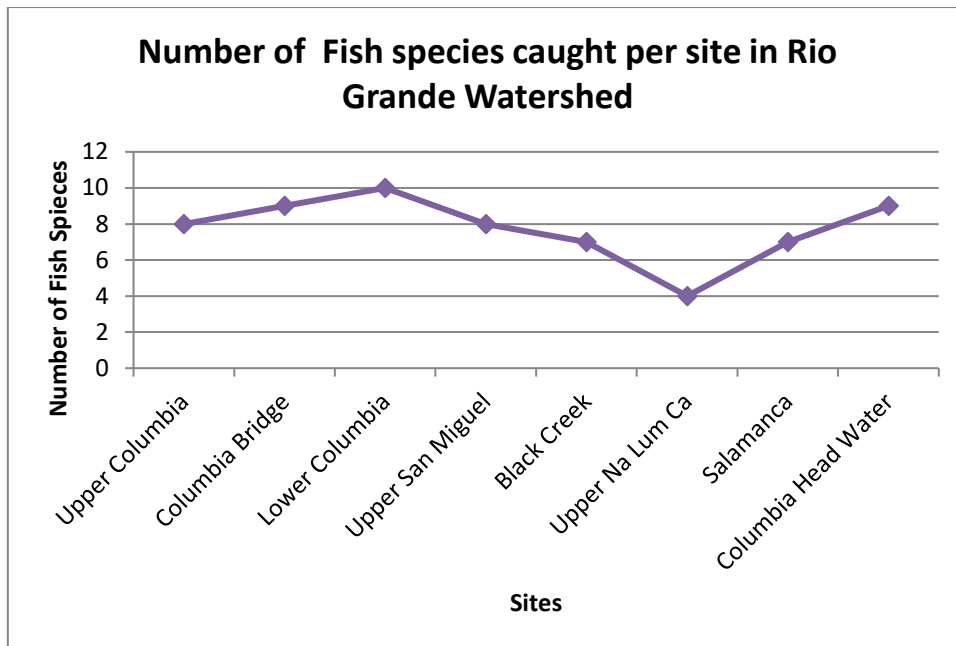
Table 2 (cont.): List of fish species identified in Essleman (2009)

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Astyanax aeneus	Billum/ central tetra
Atherinella sp.	Belize silversides
Awaous banana	Green river goby
Belonesox belizanus	Pike killifish
Brycon guatemalensis	Machaca
Cichiasoma bocourti	Chisel-tooth cichlid
Cichiasoma salvini	Yellowbelly cichlid
Cichiasoma urophthaimus	Crana/ maya cichlid
Eugerres brazilianus	Brizilian mojarra
Cichiasoma urophthaimus	Crana/ maya cichlid
Poecilia mexicana	Shortfin molly
Hyphessobrycon compressus	Mayan Tetra
Cichlasoma spilurum	Blue Eye Cyclid
Cichlasoma aureum	Golden Fire Mouth Cyclid
Xiphophorus helleri	Green Swordtail
Gambusia luma	Sleek mosquitofish
Heterandria bimaculata	Two spot livebearer

Table 3: List of fish species identified in Rio Grande (2010)



Graph1: Number of Individuals per species in Rio Grande Watershed



Graph 2: Number of Fish species caught per site in Rio Grande Watershed

References

Esselman P.C. (2001) 'The Monkey River Baseline Study: Basic and Applied Research for Monitoring and Assessment in Southern Belize'. Masters Thesis. University of Georgia, Athens, Georgia.

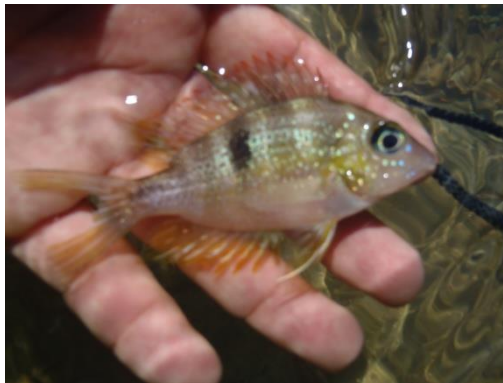
Esselman P.C. (2009) 'Fish Communities and Conservation of Aquatic Landscapes in Northeastern Mesoamerica'. Doctorate Thesis, University of Michigan.

Greenwood D.W., and Thomerson J.E. (1997) 'Fishes of Continental Waters of Belize'. University Press of Florida

Appendices:

Golden Firemouth Cyclid

Cichlasoma aureum



Rangers collecting data for the Fish Baseline Assessment in Upper San Miguel



Mountain Mullet

Agonostomus monticola



Rangers sampling at the Upper Columbia Site

