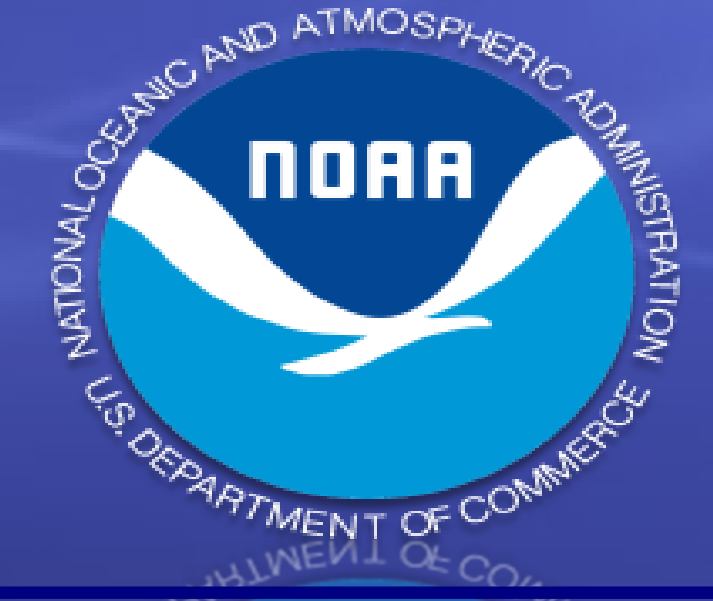


A Meta-Analysis of Invasive Lionfish Diet Throughout the Temperate And Tropical Western Atlantic

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Summary

Invasive lionfish (*Pterois volitans/miles*) have spread across much of the tropical and sub-tropical Western Atlantic, and their range continues to expand along the east coast of South America. Their diet is composed primarily of teleost fish, followed by shrimp and then other crustaceans. At local scales, lionfish have been shown to reduce benthic biomass as well as fish recruitment, biomass, and species richness, evenness, and diversity. However, evidence suggests that lionfish diet composition and their ecological impacts are not uniform between locations. The goal of this research is to fully characterize and compare lionfish diet throughout the invaded region. Our meta-analysis, which uses a combination of published and unpublished diet datasets, will help identify potential diet trends and prey preferences, and help determine relative ecological and commercial impacts of lionfish.

Lionfish Stomach Content Analysis Tool

To simplify and standardize our diet analyses, we created the Lionfish Stomach Content Analysis tool. The Tool is built within the NOAA Lionfish Database and uses Microsoft Access-based queries and Visual Basic Programming. Users can query a subset of the database based on a variety of parameters of interest (e.g., location), and can summarize and analyze the data in a number of user-defined ways (e.g., stomach and/or taxon-based summaries, and indices of prey importance).

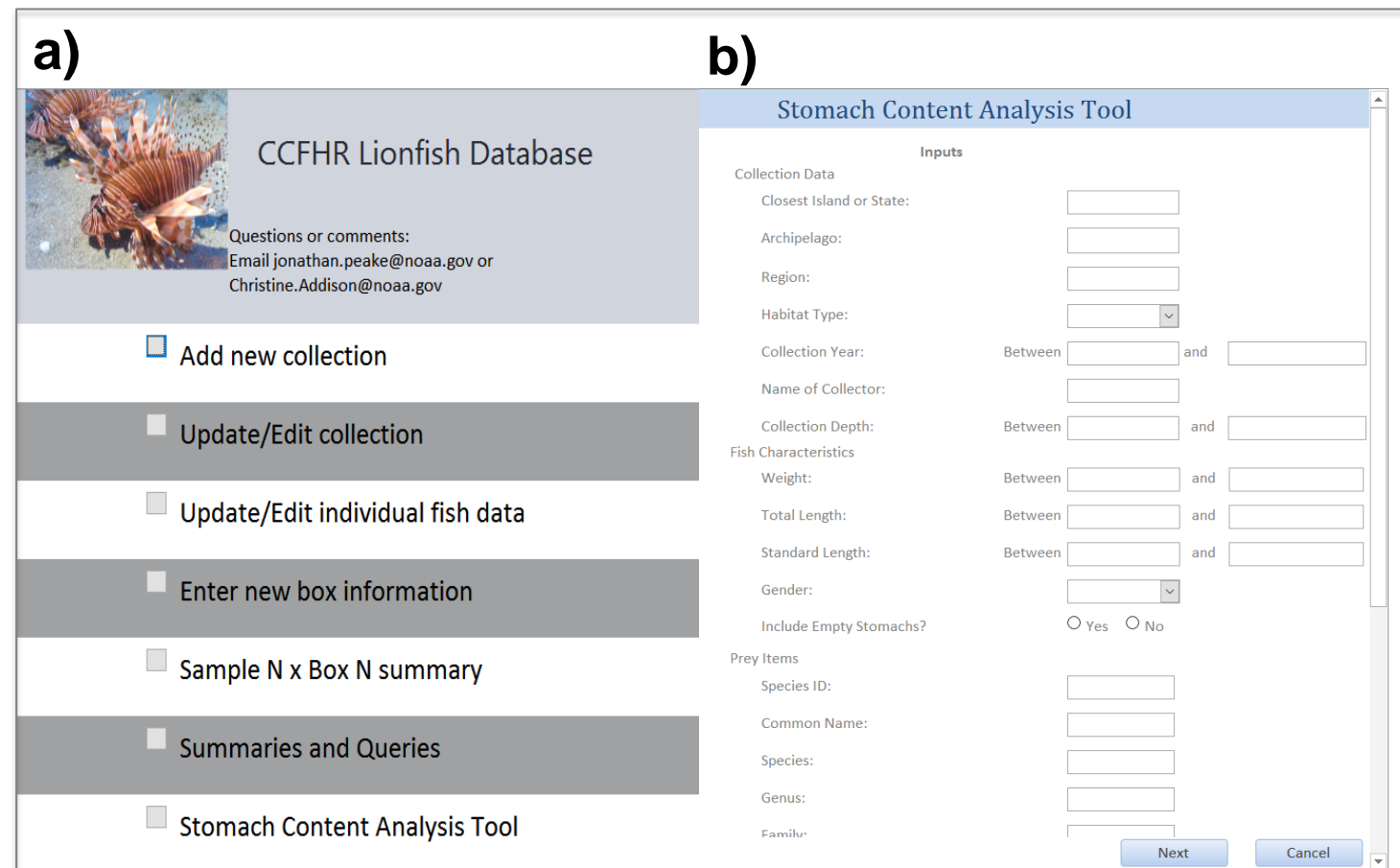


Figure 1: Homepage of NOAA Lionfish Database (a) and Stomach Content Analysis Tool (b).

Methods

Data was obtained from 6 locations: North Carolina (1 dataset), Bahamas (2), Florida (2), Caribbean Mexico (2), Costa Rica (1), and Gulf of Mexico (1 dataset). Information was obtained on lionfish size, weight, and stomach contents including prey identification, weight or volume, number per sample, lengths, and prey digestion level. All data was formatted and imported into the NOAA Lionfish Database. Calculation of Indices of Relative Importance (IRI) and other analytical values were performed using the Lionfish Stomach Content Analysis Tool. Statistical and correlation analyses were performed using R Statistical Software.

Preliminary Results

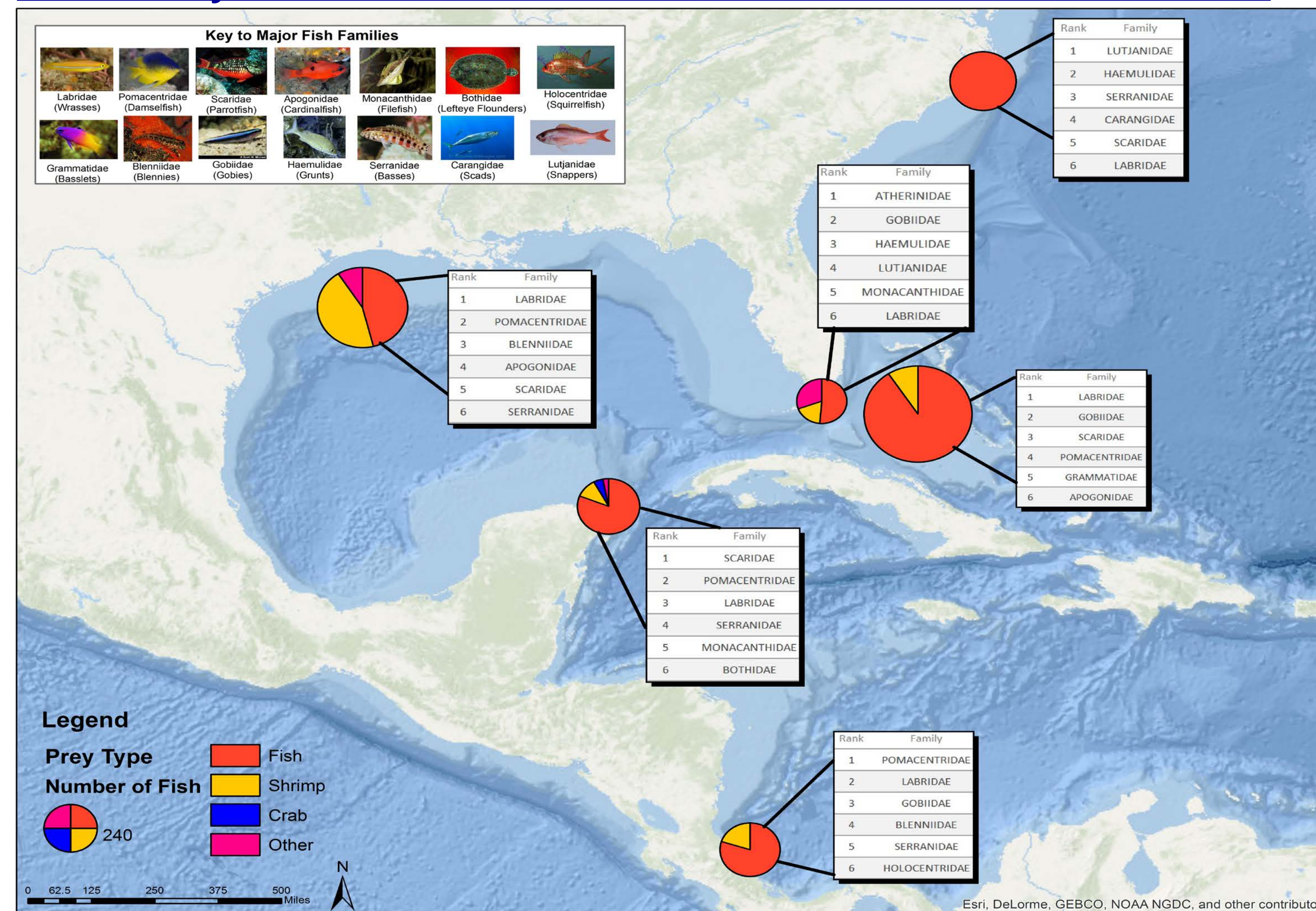


Figure 2: Distribution of Lionfish Prey Items by Location. Pie chart size is proportionate to the number of stomachs analyzed: Bahamas (965), Northern Gulf of Mexico (676), North Carolina (360), Mexico (321), Costa Rica (298), Florida (208). Percentages and fish family rankings based on IRI (Bahamas, North Carolina, Mexico, Costa Rica) or %N (Gulf of Mexico, Florida) if data on prey weight were unavailable.

Table 1: Correlations and trends in lionfish diet (SL=standard length)

Regression	Pearson's		Spearman's Kendall's	
	Coefficient	Rho	Tau	
SL on Number of Prey Items	-.042*	.1005***	.0760***	
SL on Total Prey Weight	.019	.1742***	.1243***	
SL on Average Prey Weight	.1097***	.1123***	.0766***	
SL on Number of Shrimp Prey	.0138	.1207***	.0949***	
SL on Weight of Shrimp Prey	.0345	.0109	.0084	
SL on Number of Fish Prey	-.0206	.0333	.0262*	
Latitude on Number of Prey in stomach	.0575***	.2118***	.1730***	
Latitude on Total Prey Weight	.2549***	.2357***	.1716***	

Table 2: Population and diet differences by location

Analysis	Kruskal-Wallis Rank Sum Test	
Lionfish Standard Length	***	
Number of Prey Items	*	Significance: * = p<0.05
Total Prey Weight	***	** = p<0.01
Average Prey Weight	***	*** = p<0.001

Results Continued

- 3,934 stomachs analyzed, of which 2,828 contained prey (28.1% empty)
- 107 species from 38 families identified from 8,180 prey items
- Fish make up majority of the diet (89.7% IRI) followed by shrimp (9.2% IRI)
- Fish families vary in presence and importance
- Families of high ecological and economic importance abundant in lionfish diet
- Parrotfish (key grazers) most important in Mexico, but fifth most important in Gulf and NC
- Snapper (key commercial fishery) most important in NC, but fourth most important in Florida

Next Steps

- Collect datasets at GCFI!
- Further develop diet metrics for comparison

Acknowledgments

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