

REAL FISHER

Ecological importance of *Auxis* spp. as prey for Dolphin and Wahoo

DEPARTMENT OF ENVIRONMENTAL QUALITY

Marine Fisheries

SAFMC Habitat AP | Steve Poland | 11/6/2018



Overview

Pelagic Food Web in the SAB

• Auxis spp.

Important prey in Dolphin/Wahoo diets

- Poland thesis seasonal and size contribution
- Rudershausen annual contribution

Questions?



Prey Groups

- 1. Sargassum associated prey
 - Filefish, pufferfish, juvenile jacks, swimming crabs
- 2. Surface schooling prey
 - Flying fish
- 3. Schooling prey not assoc. with surface
 - Bullet tuna, round herring, jacks, cephalopods
- 4. Small aggregations of crustaceans
 - Amphipods, stomatopods, isopods





Auxis spp.

Two species occur in the Atlantic:

- A. thazard (Frigate tuna)
- A. rochei (Bullet tuna)

Life history information is limited

- Up to 50 cm; typically <35 cm
- Schooling fish, feeds on invertebrates and small fish



Collette and Aadland, 1996



Stock size and dynamics is unknown

Trophic Dynamics of Large Pelagic Fish Predators in the U.S. South Atlantic

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Objectives

- 1. Describe the diet of each species
- 2. Examine predator/prey size based trophic niches
- 3. Evaluate competitive interactions among the predators
- 4. Describe the structure of the U.S. South Atlantic



Methods-Fish Collection

- Logistics and costs necessitate the use of fisherydependent sampling
- Collection from regional billfish tournaments, charter and commercial operations



Methods – Stomach Content & Stable Isotope Analysis

- Stomach content analysis to describe seasonal, otogentic, and competitive relationships
- Individual prey counted, weighed and measured
- -Analysis:
 - Diet indicies and overlap, quantile regression

- SIA to evaluate community structure
- δ¹³C and δ¹⁵N values of predator and prey tissue
- Analysis:
 - Isotopic bi-plot and niche space, cluster analysis



Stomach contents

1,119 diets sampled

<u>Fish</u>

- 91 spp in 37 families
- <u>Cephalopods</u>
 - 21 spp in 14 families
- <u>Crustaceans</u>
 - 11 spp in 8 families

Gastropods

3 families





Summer

Fall

10%

0%

Spring





Fall

Summer

Spring

Dolphinfish

Most diverse diet among predators

- •109 genera identified
- Diets dominated by fish prey
 - Exocoetidae and Sargassum Assoc.
 species





Dolphinfish

Small relative prey dominated the diets

Increase in maximum prey size

 Maintained small prey items





Dolphinfish

Small relative prey dominated the diets

Increase in maximum prey size

- Maintained small prey items
- •Consume more prey not assoc. with Sargassum





Fish occurred in 97% of stomachs

Scombrids were dominant prey

Mostly bullet tuna





Consumed the largest prey relative to body size

Mean prey length 15.7 cm

Wahoo

- Increase in median and maximum prey
 - Large gape size and fast swim speed



Pelagic Community



Height





Conclusions

- Evidence of generalist foraging behavior among the predators
 - limited resources
- However, a few prey species contributed disproportionally higher to the diets
 - Shortfin squid, flying fish and bullet tuna
 - May indicate key forage base in pelagic habitats



Objectives

Interspecific comparisons - diet overlap

• Blue marlin, wahoo, yellowfin tuna, & dolphin

Temporal comparisons

- Interannual variation in diet
- Historic vs present diets

Spatial comparisons

• North Atlantic with other oceans



<u>Methods</u>

Four apex predators sampled from Big Rock fishing tournament (BRT)

- Large total length
 - (marlin=~3.6m; wahoo=~1.3m; YFT=1.1m; dolphin=1.3m)

Consistently second week of June

Sampled for ten years between 1998 & 2009

Gulf stream waters off North Carolina



<u>Analyses</u>

Principal Components Analysis (%PCA; de Crespin de Billy et al. 2000) for:

- Temporal comparisons
 - interannual
 - historic vs present
- Spatial comparisons
 - North Atlantic vs other oceans



Interspecific comparisons 1998-2009





Temporal comparisons - Interannual







Temporal comparisons – historic vs present







Temporal comparisons – historic vs present



Temporal comparisons

Substantial diet overlap between blue marlin and wahoo given reliance on mackerels (*Auxis* spp) across years

Consistently diverse diet from year to year and over multiple decades for dolphin

Spatial comparisons

Remarkable similarities in diet among oceans for blue marlin and dolphin



Further support that Auxis spp. play important role for oceanic apex predators

Results suggest:

- a stable pelagic food web and forage base in waters of Gulf Stream and/or
- strong selection for particular prey types



Questions?