Examination of reproductive metrics for Black Drum from Louisiana coastal waters (*Pogonias cromis*)

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Abstract

Black Drum (*Pogonias cromis*) is a commercial species of economic importance and a popular recreational fish in the Gulf of Mexico. Fecundity estimates for Black Drum in the northern Gulf of Mexico have been documented previously from data collected in the late 1980s, but updated data are necessary to assess the contemporary reproductive metrics for this species. Reproductive metrics are important in understanding the effects of stock structure on the subsequent recruitment of fish to a fishery. If fecundity is not directly proportional to weight, fecundity can be a better predictor of recruitment than biomass. The economic importance of the Black Drum fishery to Louisiana and the need for updated reproductive metrics makes this species optimal for a pilot reproductive monitoring project. Black Drum samples for this study were collected both from commercial fish processors and with bottom longline gear deployed at known aggregation sites. Our objectives are to estimate spawning season duration, fraction, and frequency; estimate batch fecundity and couple batch fecundity with spawning frequency to estimate annual fecundity; regress annual fecundity across length, age, and weight; and assess the exponent values of the annual fecundity and weight non-linear regression power equations. Sampling began in December 2019 and concluded in April 2020. The analysis of collected samples is ongoing.

Introduction

Black Drum (*Pogonias cromis*) is an economically important saltwater species to the Louisiana commercial and recreational fisheries. They are the 2nd highest landed commercial saltwater finfish species in Louisiana with ~3 million pounds of Black Drum landed annually on average (Ogunyinka et al. 2011). Black Drum are landed in the recreational fishery at similar rates, behind only Spotted Seatrout and Red Drum (NMFS 2017).

Reproductive metrics are important in understanding the effects of stock structure on the subsequent recruitment of fish to a fishery (Rothschild and Fogarty 1989, Rickman et al. 2000, Porch et al. 2007). The legitimacy of using fecundity to estimate recruitment in the place of a biomass proxy can be tested with a ‘fecundity within body weight’ non-linear power function (Rothschild and Fogarty 1989). When fecundity is not directly proportional to weight (linear relationship), fecundity may more accurately, or with proper uncertainty, estimate recruitment. These methods can be applied to Black Drum in order to determine the legitimacy of monitoring reproductive metrics.

Black Drum fecundity estimates have been documented previously from data collected in the late 1980s. Current data and standardized methods of analyses are necessary to be applied to contributions to stock assessment (Nieland and Wilson 1993). Additionally, because these fish are commercially harvested, fishery dependent samples can be obtained from fish processors. The economic importance of these fisheries to Louisiana and the need for updated reproductive metrics makes this species optimal for a pilot reproductive monitoring project.

Objectives

1. Estimate spawning season duration, fraction, and frequency.
2. Estimate batch fecundity and couple batch fecundity with spawning frequency to estimate annual fecundity.
3. Regress annual fecundity across length, age, and weight.
4. Assess the exponent values of the annual fecundity and weight non-linear regression power equations. If the exponent is larger than 1 then fecundity and body weight are not directly proportional.

Sampling Methodology

Fish Processors

Research and Assessment Section staff sampled Black Drum at fish processors in collaboration with Coastal Study Area staff. The majority of these fish house samples came from fish in the ‘puppy drum’ category (16”-27”) since that represents the highest market demand. Routine CSA sampling quotas are quarterly, whereas our desired collections are monthly. We made independent visits to fish processors in order to meet our monthly targets.

Directed Bottom Longline Sampling

We conducted bottom longline (BLL) sampling for adult Black Drum two days per month from Nov 1, 2019 through May 31, 2020, and targeted known spawning areas near the Grand Isle Fisheries Research Lab. Methods approximated existing SEAMAP BLL protocols. We conducted directed BLL sampling in order to ensure that the larger adult Black Drum, less common at the fish processors, are present in our overall sample. These large fish are critical for the assessment of reproductive metrics.

Data Collection

Biologists measured total length (mm) and total weight (kg) of Black Drum before they removed otoliths and ovaries of every female encountered. Both total fresh and total fixed (after >2 weeks in 10%NBF) weights were recorded for all ovaries (g) to allow us to develop a correction factor for fixed gonad weights. Ovaries were fixed in 10% formalin on the same day of sampling. Male gonads (testes) were not sampled.

Histology

All ovaries are histologically processed using standardized histological methods and stained with hematoxylin and eosin-y to evaluate spawning duration, fraction and frequency (Luna 1960). For females identified with hydrated oocytes, three subsamples (~75mg) are being removed from random regions of the ovary to estimate batch fecundity. Spawning frequency and batch fecundity estimates are being used to determine annual fecundity. Annual fecundity and total body weight are being regressed across length and a comparison of non-linear power functions yielding the utility of monitoring egg production.

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References


