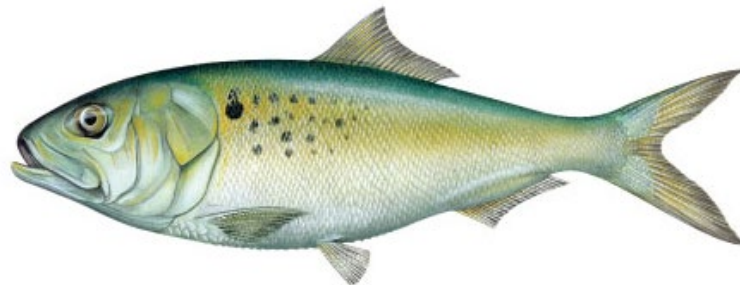




# **Fecundity Reference Points and 2021-2022 Specifications**



Atlantic Menhaden Board  
October 20, 2020

# Outline



- Background
- Revisions to Fecundity (FEC) Reference Points
- Board Task and Range of Total Allowable Catch (TAC) Levels
- Questions

# Background



- August 2020
  - Board approved Ecological Reference Points (ERPs)
  - The ERPs adjust the Fecundity (FEC) reference points outlined in Amendment 3
  - The Board tasked the Technical Committee (TC) with developing a range of TAC alternatives for 2021-2022
- September 2020
  - ERP WG reviewed memo revised FEC reference points
  - TC met twice to develop memo on TAC alternatives

# FEC Reference Points



Reference Points	ERP Fecundity (Billions of Eggs)	Single Species Fecundity (Billions of Eggs)	2017 Fecundity Estimate (Billions of Eggs)
ERP $FEC_{TARGET}$ , Equilibrium Fecundity at $F_{TARGET}$	2,003,986	1,945,613	2,601,550
ERP $FEC_{THRESHOLD}$ , Equilibrium Fecundity at $F_{THRESHOLD}$	1,492,854	1,463,344	

# TAC Specification



- Set an annual or multi-year TAC through Board action
  - Based on best available science (e.g., projection analysis)
- Ecological reference points (ERP) established
- Beaufort Assessment Model (BAM) used for short-term projections

# Review: TAC Specification



- BAM projection methods changes
  - Using ERP in model
  - Updated recruitment projections
- Monte Carlo bootstrap (MCB) runs of 2020 benchmark of the BAM used as the basis for projections
- Recruitment projected using non-linear time series analysis
- Incorporates uncertainty in recruitment, 2017 abundance, natural mortality, selectivity



# Board Tasking

- Provide TACs that have 25%-60% probability of exceeding the ERP target, in 5% increments, using 2021-2022 combined and as separate years.
- Calculate the percent risk of exceeding the ERP target and threshold if the current TAC was changed by -10% to +10% in 5% increments



# Recent History: TAC and Landings

Year	TAC	Landings
2017	200,000 mt	173,000 mt
2018	216,000 mt	191,500 mt
2019	216,000 mt	208,800 mt
2020	216,000 mt	Not available

In 2017,  $F$  was 0.16, below both the ERP target (0.19) and ERP threshold (0.57)



# TACs associated with 25-60%



Probability of Exceeding the ERP Target	TAC for 2021-2022	TAC for 2021	TAC for 2022
25%	148,700	148,700	150,800
30%	153,200	153,200	157,200
35%	158,000	158,000	162,900
40%	163,100	163,100	169,400
45%	169,400	169,400	177,300
50%	176,800	176,800	187,400
55%	186,600	186,600	200,600
60%	197,200	197,200	216,200



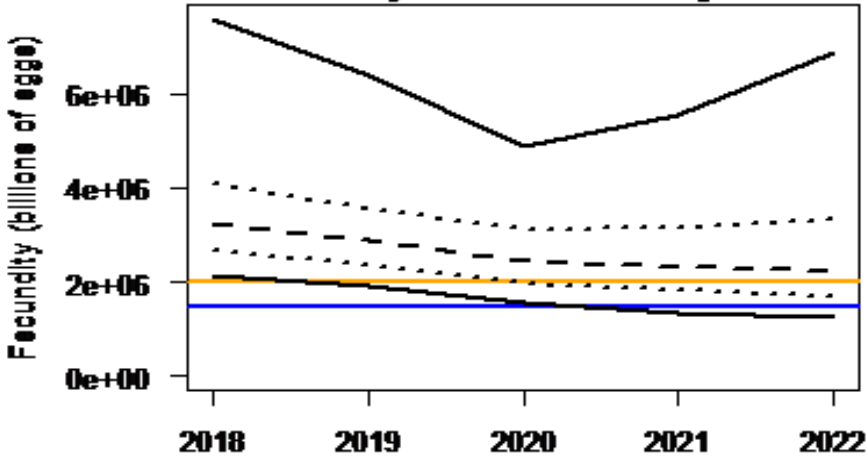
# Percent risk of exceeding ERP Target and Threshold

TAC	Probability of Exceeding ERP Target		Probability of Exceeding ERP Threshold	
	2021	2022	2021	2022
194,400 mt (-10%)	58.5%	52.5%	0%	0%
205,200 mt (-5%)	63.5%	56.5%	0%	0%
216,000 mt (current TAC)	66%	60%	0%	0%
226,800 mt (+5%)	68.5%	62.5%	0%	0.5%
237,600 mt (+10%)	70.5%	65%	0.5%	0.5%

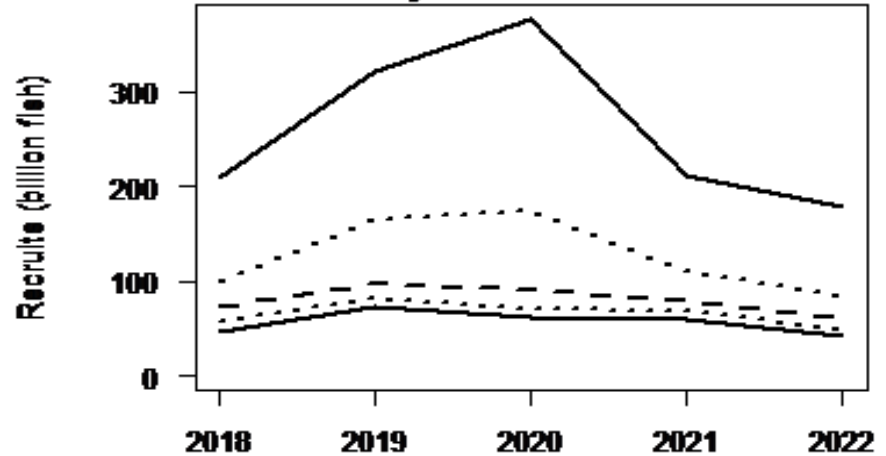
# TAC at 216,000 MT



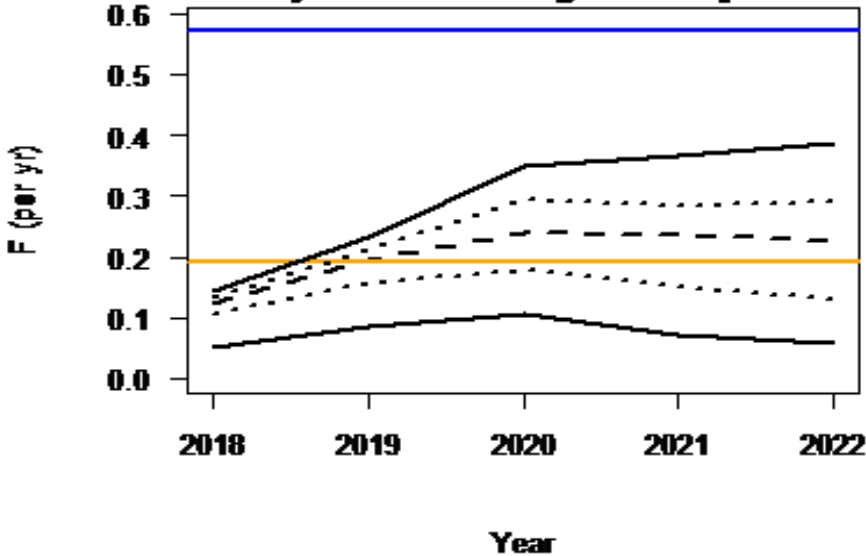
**Projection: Fecundity**



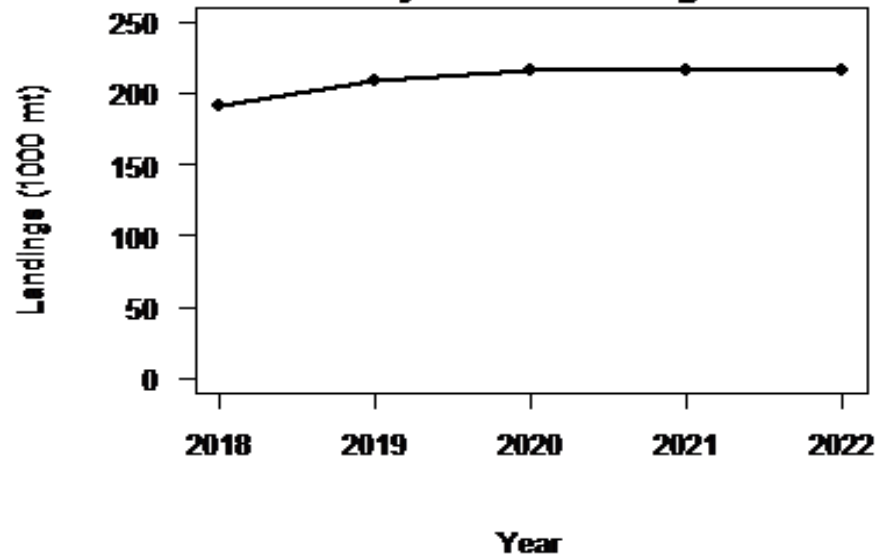
**Projection: Recruits**



**Projection: Fishing mortality rate**



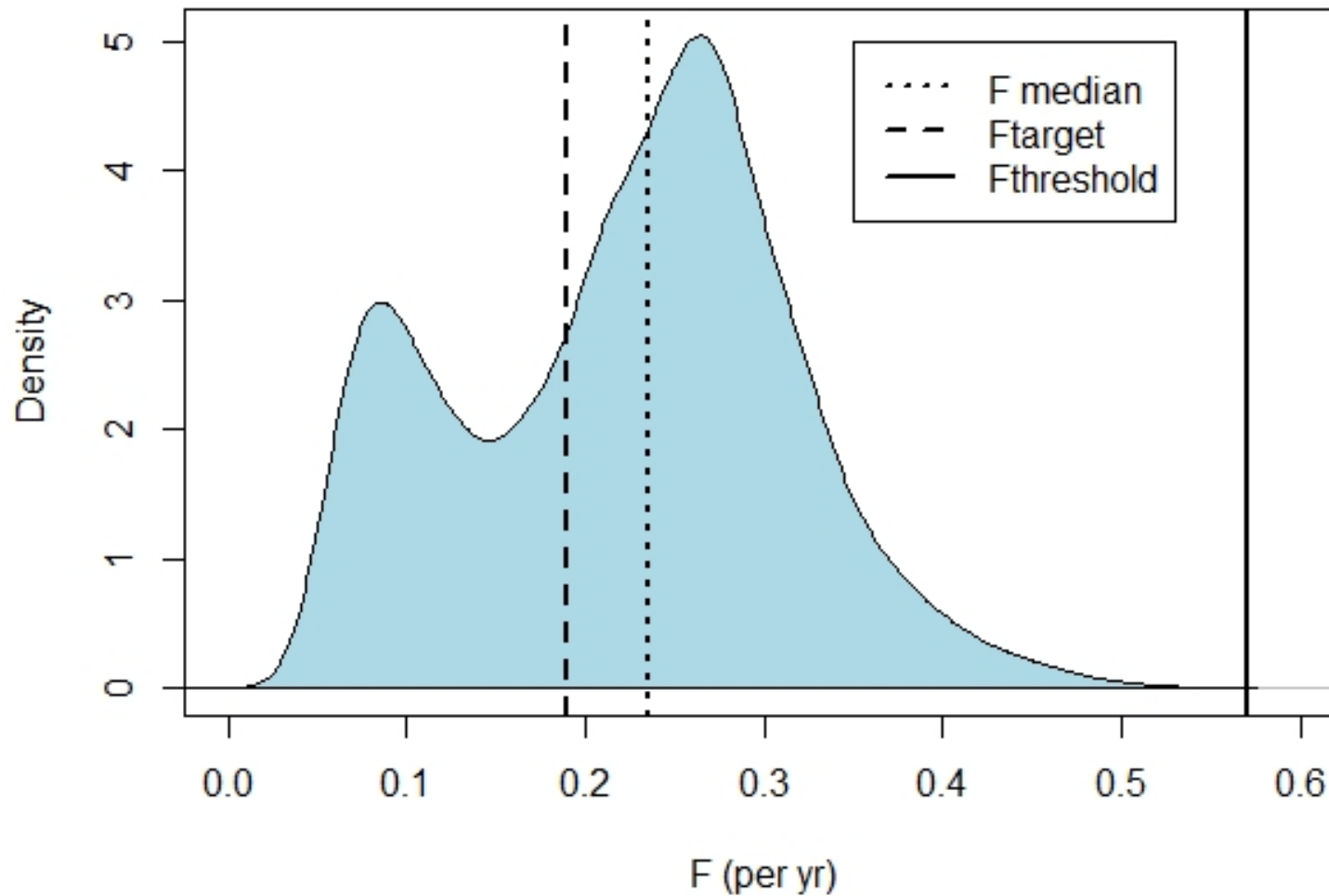
**Projection: Landings**



# Density plot Figure (F in 2021)



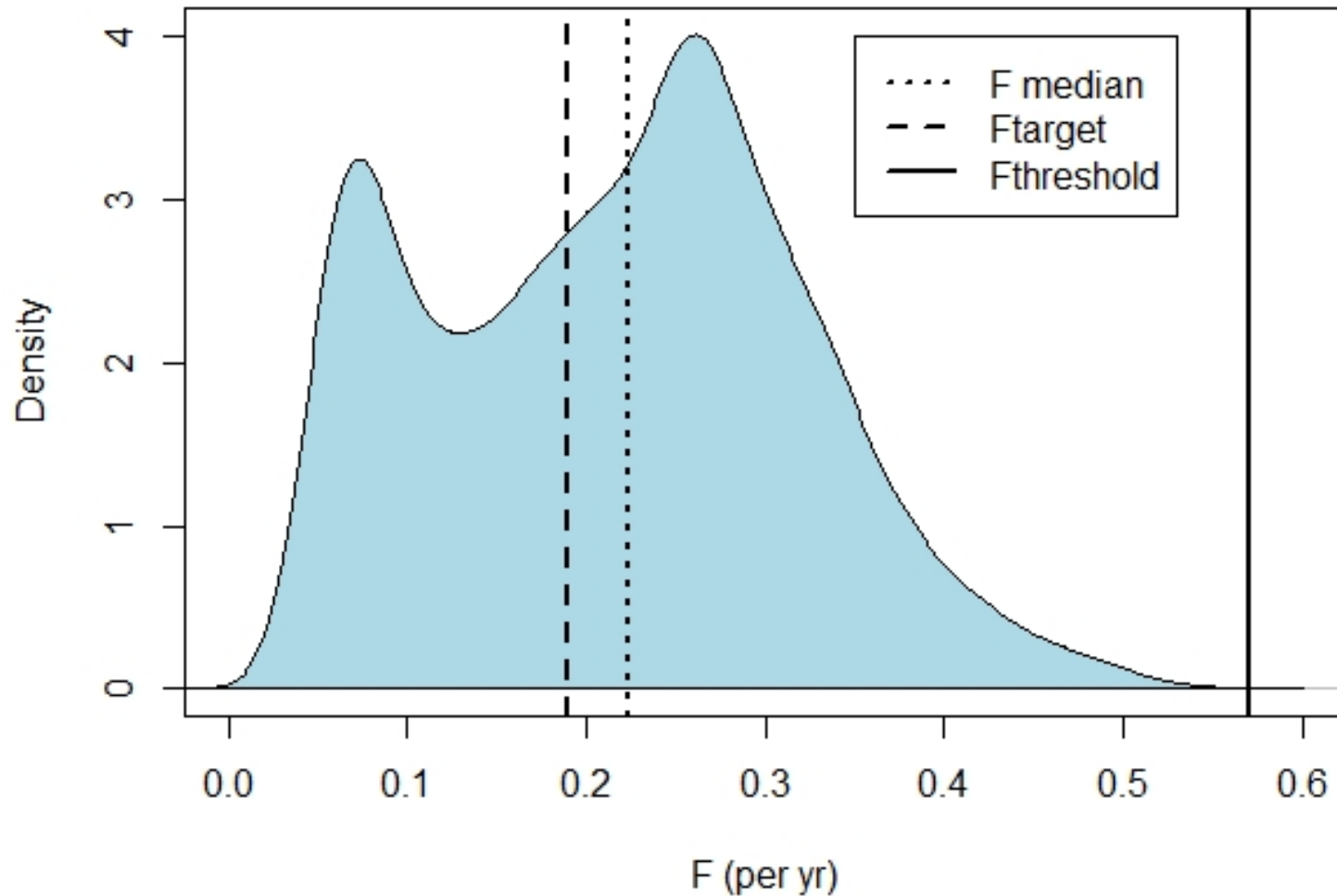
Density plot of 2021 F at TAC of 216,000



# Density plot Figure (F in 2022)



Density plot of 2022 F at TAC of 216,000





**QUESTIONS?**