

Maryland Oyster Update Stock Assessment 2023

Oyster Advisory Commission Meeting: 6/6/2023



Methods

- Update of the 2018 Maryland Oyster Stock assessment
- Same methods as in the 2018 assessment were used
- Updated the stage-structured and reference point model from 2018 assessment
- Updated data from the the last update assessment presented in 2021

Updated data included:

- Seafood Dealer Buy Ticket harvest data: 2021-22 & 2022-23
- Annual Oyster Fall Dredge Survey: 2021 & 2022
- Spat-on-shell, wild seed and shell planting data: 2021 & 2022

Types of Results

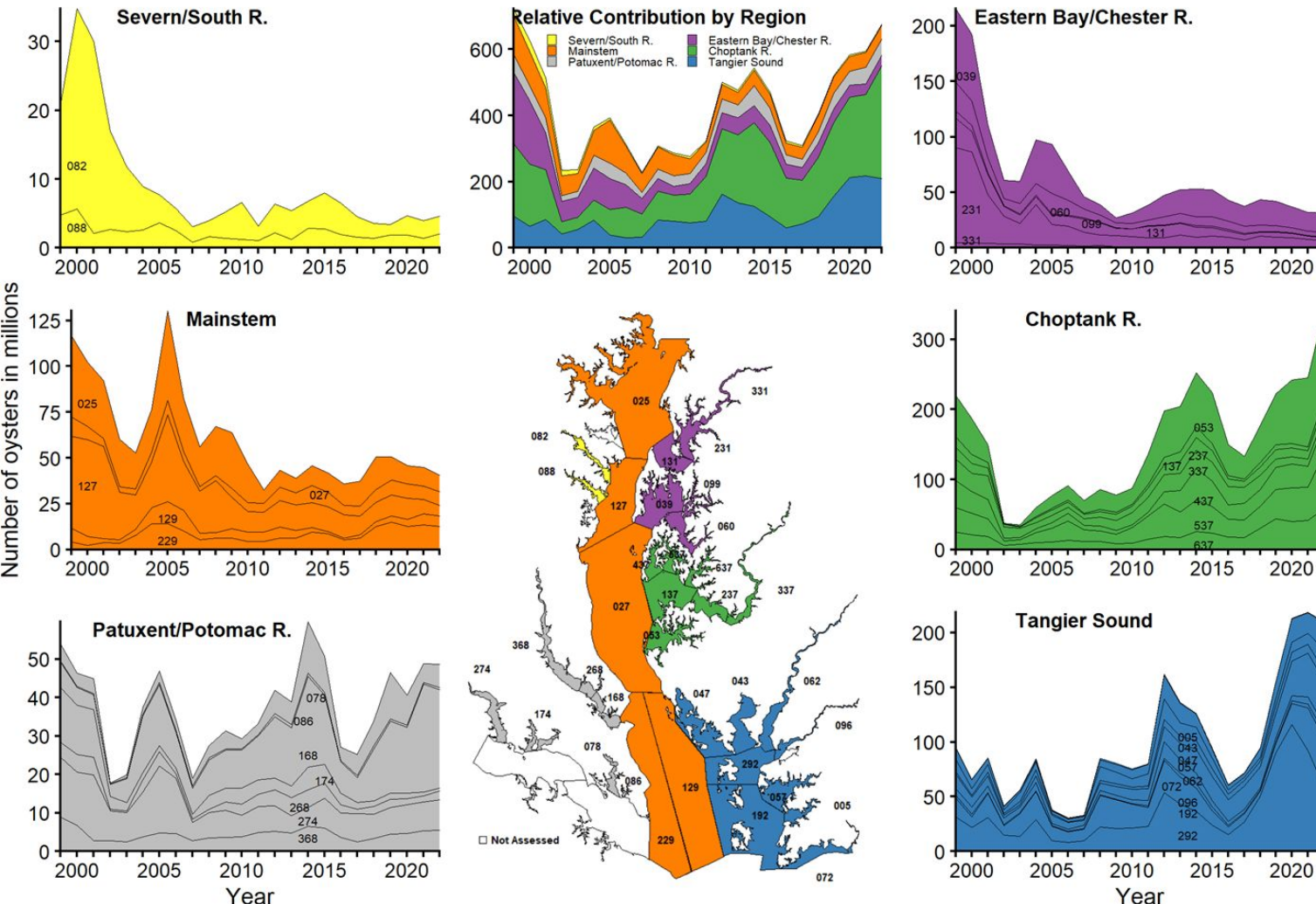
Types of results estimated in model:

- Number of spat (<1 year old), small (>1 year old, < 3 inches), and market-sized oysters (>3 inches)
- Natural mortality rates (Fraction that die to causes other than harvest)
- Harvest fraction
- Habitat relative to 1980
- One year forecast estimate of small and market abundance

Market Abundance Prior to 2022-23 Harvest



Estimated number of oysters (in millions) by region that are above the minimum size limit (3 inches), 1999-2022

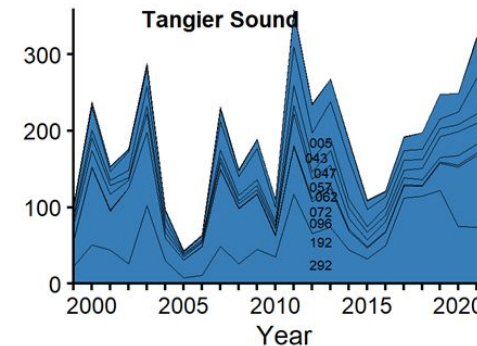
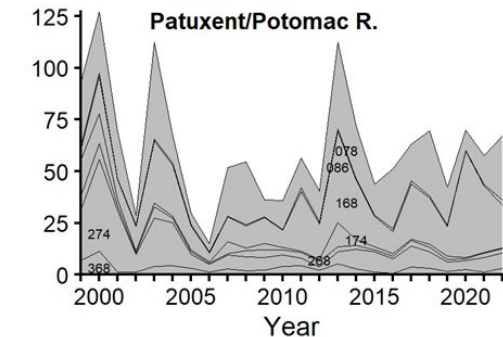
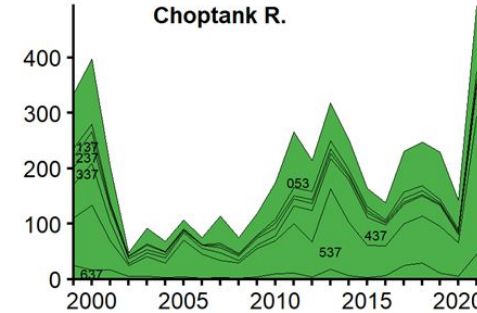
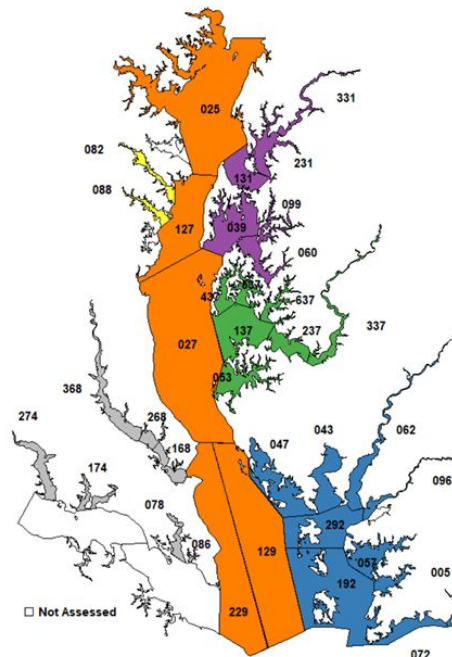
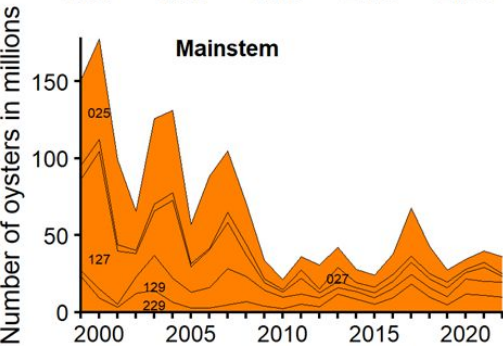
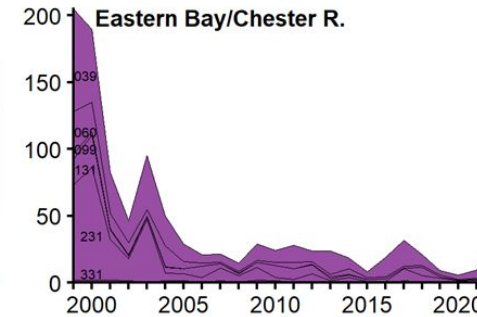
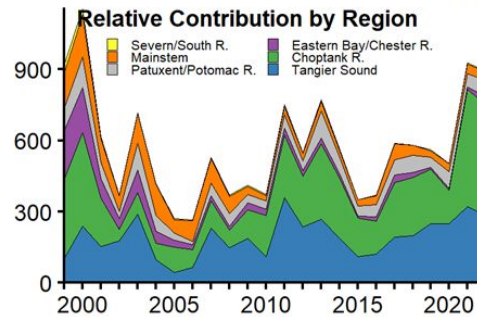
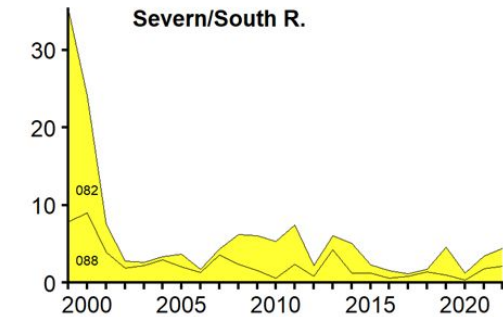


- 2nd highest abundance of markets
- Increase in 2022 primarily due to Choptank River region
- Highest in Choptank and Tangier Sound regions
- Lowest in upper bay regions

Small Abundance Prior to 2022-23 Harvest



Estimated number of oysters (in millions) by region that are older than one year but below the minimum size limit (3 inches), 1999-2022

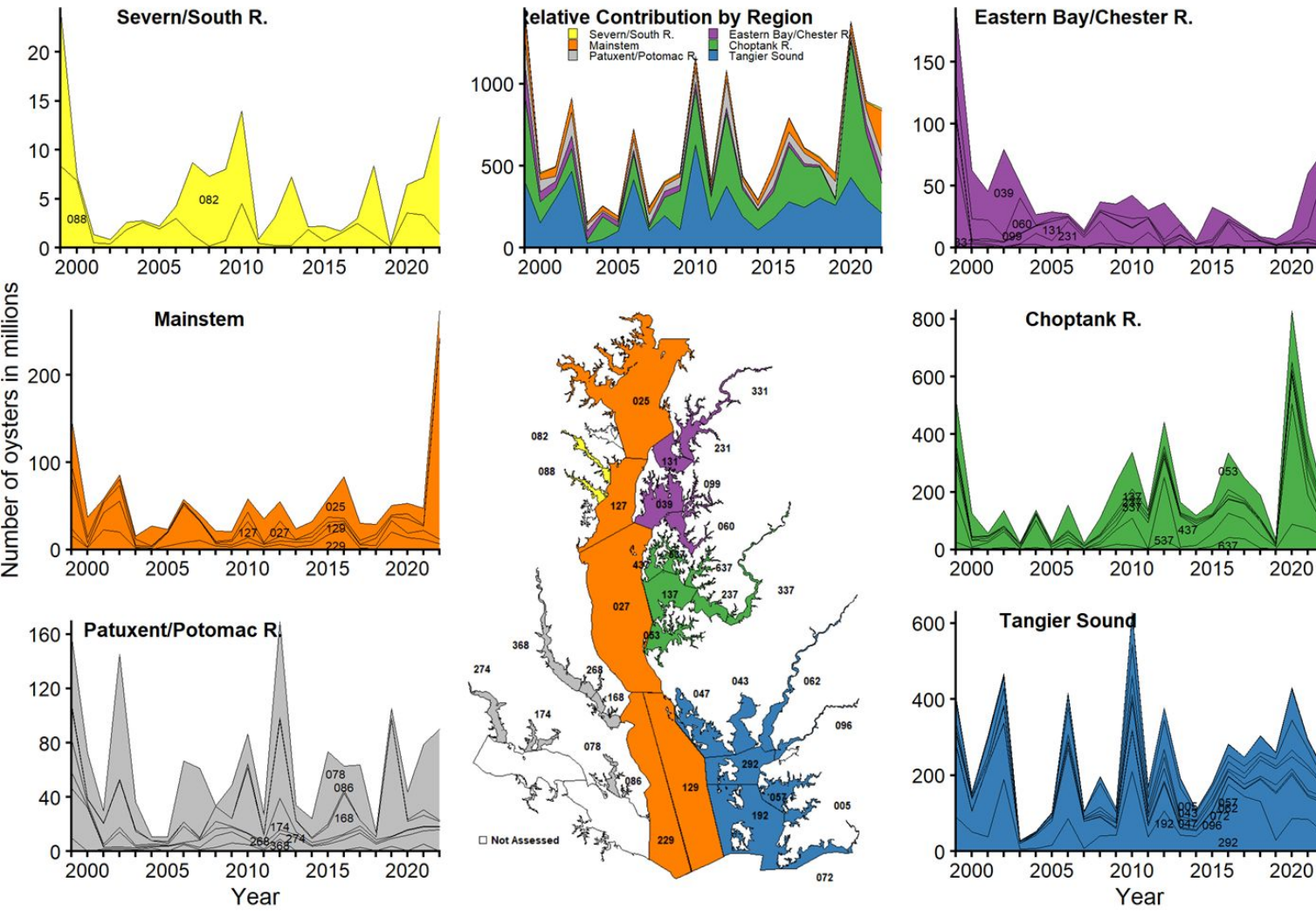


- Slight decrease in small abundance
- Slight decrease in Choptank and Tangier Sound regions, but still very high
- Slight increase in upper bay region, but still very low

Spat Abundance Prior to 2022-23 Harvest



Estimated number of oysters (in millions) by region that are less than one year old, 1999-2022



- Spat abundance slightly less than previous year, but still 7th highest
- Decrease in Choptank and Tangier Sound regions, but still high
- Increase in Mainstem and upper bay regions (spat-on-shell plantings)



Biological Reference Points

Market Abundance (lower threshold only)

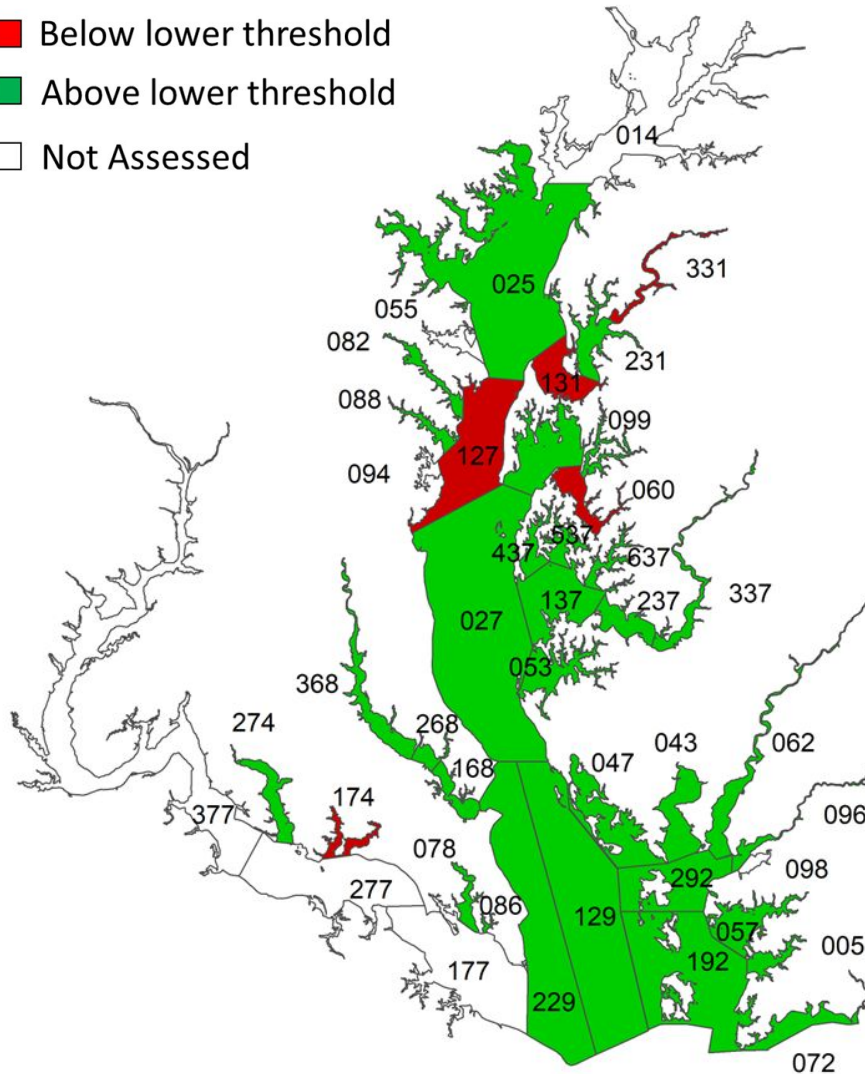
- Goal – not allow abundance to decrease below the lowest levels observed
- Set to the minimum abundance estimated during 1999-2017

Harvest Rate (target and upper limit)

- Target rate is estimated as the fraction of market-sized oysters that maximizes long-term harvest while resulting in a stable or increasing oyster population
- Upper limit represents the absolute maximum harvest rate that can be sustainable, which will result in eventual disappearance the population if it is regularly exceeded
- Estimated using a model that includes oyster's reliance on shell for habitat and their production of shell
- Goal: Not allow the harvest rate to exceed the upper limit

Market Abundance

- Below lower threshold
- Above lower threshold
- Not Assessed



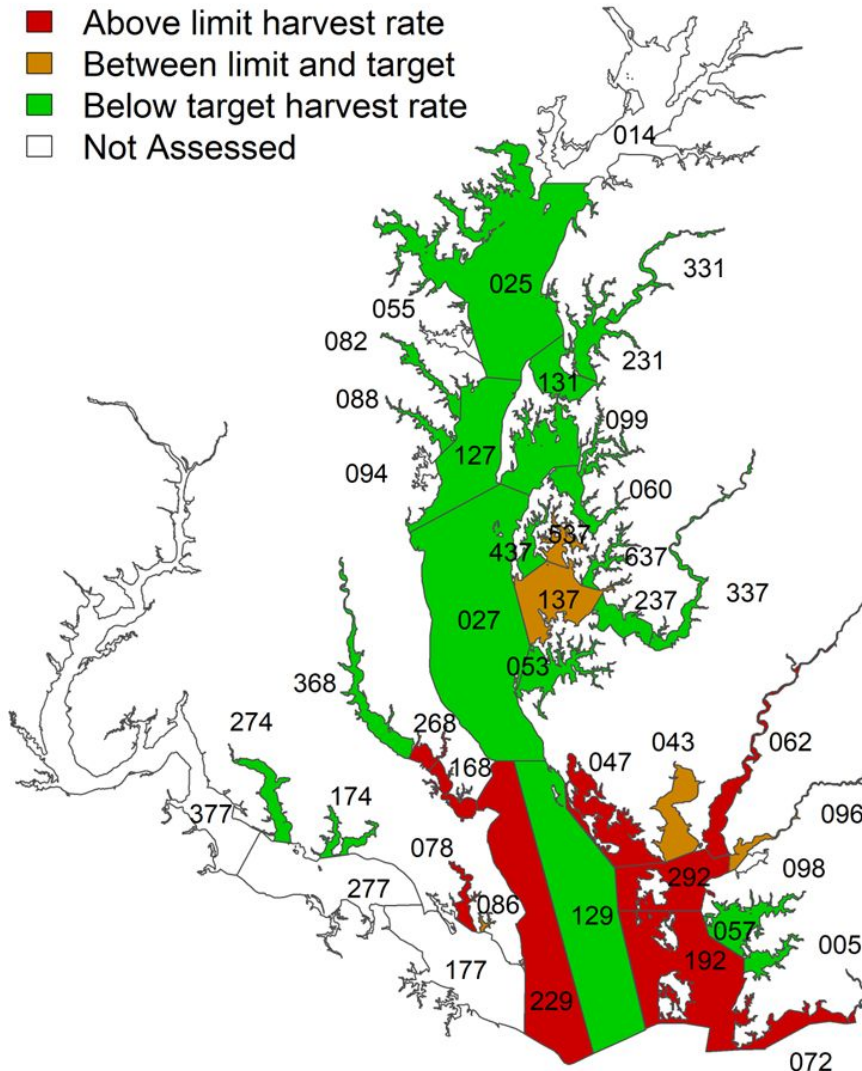
- Upper and Lower Chester River (131 & 331)
- Upper Mainstem Below Bay Bridge (127)
- Miles River (060)
- St Clements and Breton Bay (174)

Red shading indicates abundance below the lower threshold.

Green shading indicates abundance above the lower threshold.

Harvest Rate

- Above limit harvest rate
- Between limit and target
- Below target harvest rate
- Not Assessed



Harvest rate (corrected for spat plantings) in the 2022-2023 season relative to target and upper limit harvest rates

In most recent season:

- 22 NOAA Codes at or below target
- 5 NOAA Codes between target and upper limit
- 9 NOAA Codes above upper limit

Harvest Rates

Region	NOAA Code	Upper Limit	Target	2020-21	2021-22	2022-23
Eastern Bay & Chester River Region	131	0	0	-0.843	-0.826	-0.905
	231	0	0	-1.131	-1.173	-1.408
	331	0	0	-0.001	-0.001	-0.001
	039	0.024	0.012	-0.311	-0.282	-0.335
	060	0	0	-0.179	-0.181	-0.156
	099	0	0	0	0	0
Choptank River Region	137	0.301	0.151	0.345	0.274	0.194
	237	0	0	-0.407	-0.321	-0.271
	337	0	0	-0.99	-0.704	-0.535
	437	0.011	0.005	-1.294	-0.977	-0.305
	537	0.21	0.105	0.163	0.181	0.142
	637	0.008	0.004	-2.474	-2.667	-0.804
	053	0.048	0.024	-1.15	-1.311	-0.846

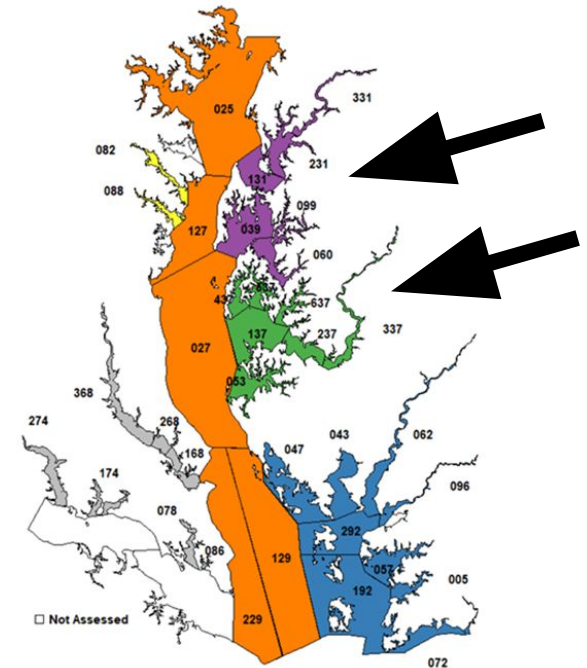


Table Shading

Red shading indicates fishing over the upper limit.

Orange shading indicates fishing over the target rate and under the limit rate.

Green shading indicates fishing at or below the target rate.

Harvest Rates

Region	NOAA Code	Upper Limit	Target	2020-21	2021-22	2022-23
Severn River & South River	082	0	0	-5.527	-5.529	-5.832
	088	0	0	-0.905	-0.556	-0.792
Patuxent River & Potomac River Tributaries	168	0.181	0.09	0.121	0.289	0.597
	268	0.116	0.058	0.079	0.034	0.149
	368	0	0	-0.584	-0.453	-0.208
	086	0.23	0.115	0.279	0.145	0.15
	078	0.32	0.16	0.359	0.355	0.341
	174	0	0	-1.94	-1.616	-1.225
	274	0	0	-1.536	-0.977	-1.096

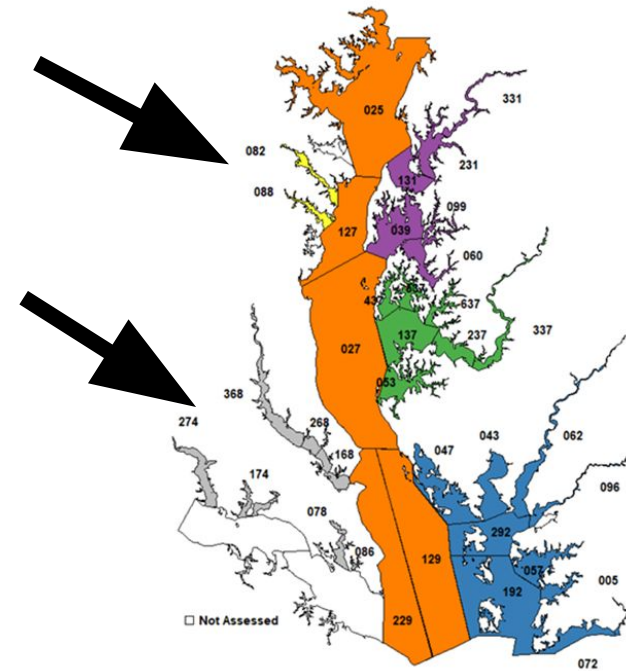


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Green shading indicates fishing at or below the target rate.

Excluded from the assessment due to lack of data:
094 Rhode & West Rivers
055 Magothy River

Harvest Rates

Region	NOAA Code	Upper Limit	Target	2020-21	2021-22	2022-23
Mainstem	025	0	0	-0.509	-0.118	-0.252
	127	0	0	-1.338	-1.375	-0.776
	027	0.124	0.062	-0.114	-0.072	-0.171
	229	0.119	0.06	0.089	0.191	0.414
	129	0.284	0.142	0.074	0.204	0.137

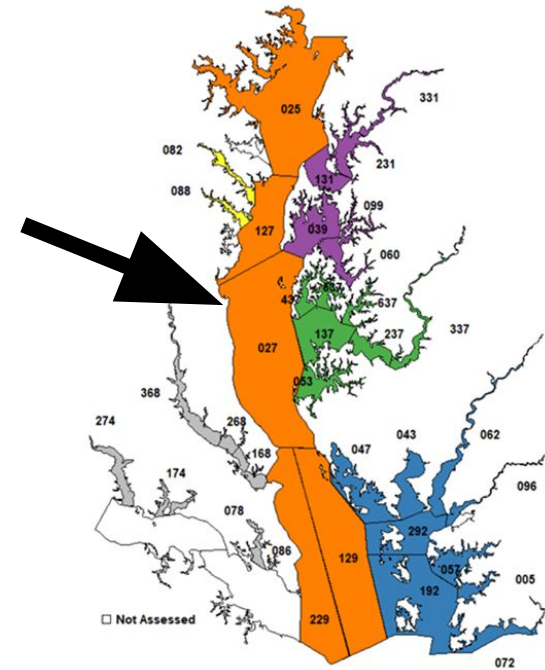


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Harvest Rates

Region	NOAA Code	Upper Limit	Target	2020-21	2021-22	2022-23
Tangier Sound Region	047	0.331	0.165	0.197	0.574	0.534
	043	0.53	0.265	0.357	0.563	0.31
	062	0.014	0.007	-0.001	0.119	0.019
	096	0.102	0.051	-0.12	0.019	0.057
	292	0.198	0.099	0.298	0.54	0.505
	057	0.14	0.07	0.001	0.029	0.001
	192	0.382	0.191	0.354	0.485	0.969
	005	0.13	0.065	0.023	0	0.01
	072	0.27	0.135	0.173	0.164	0.318

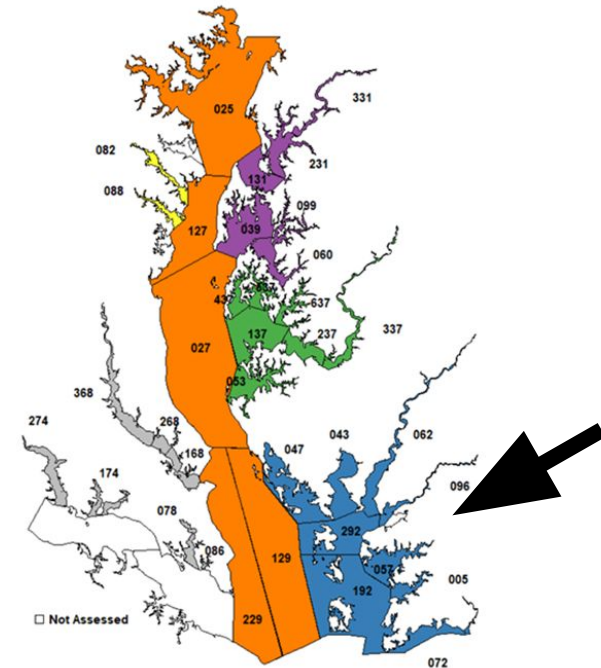


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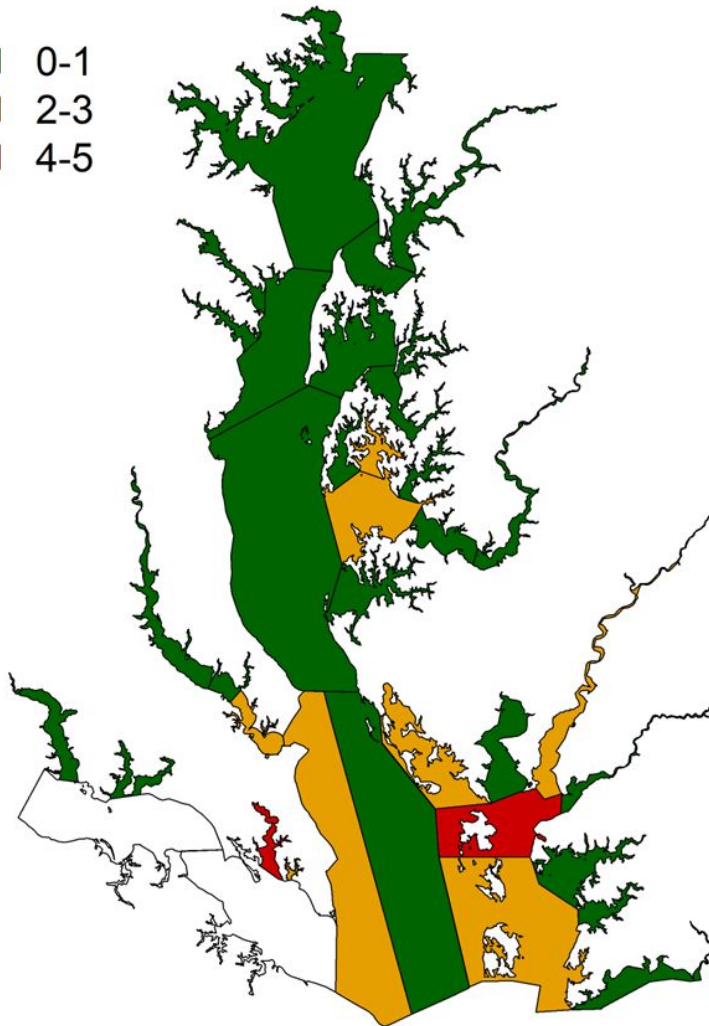
Orange shading indicates fishing over the target rate and under the limit rate.

Green shading indicates fishing at or below the target rate.

Excluded from the assessment due to lack of data:
098 Monie Bay

Summary Harvest Rates

- 0-1
- 2-3
- 4-5



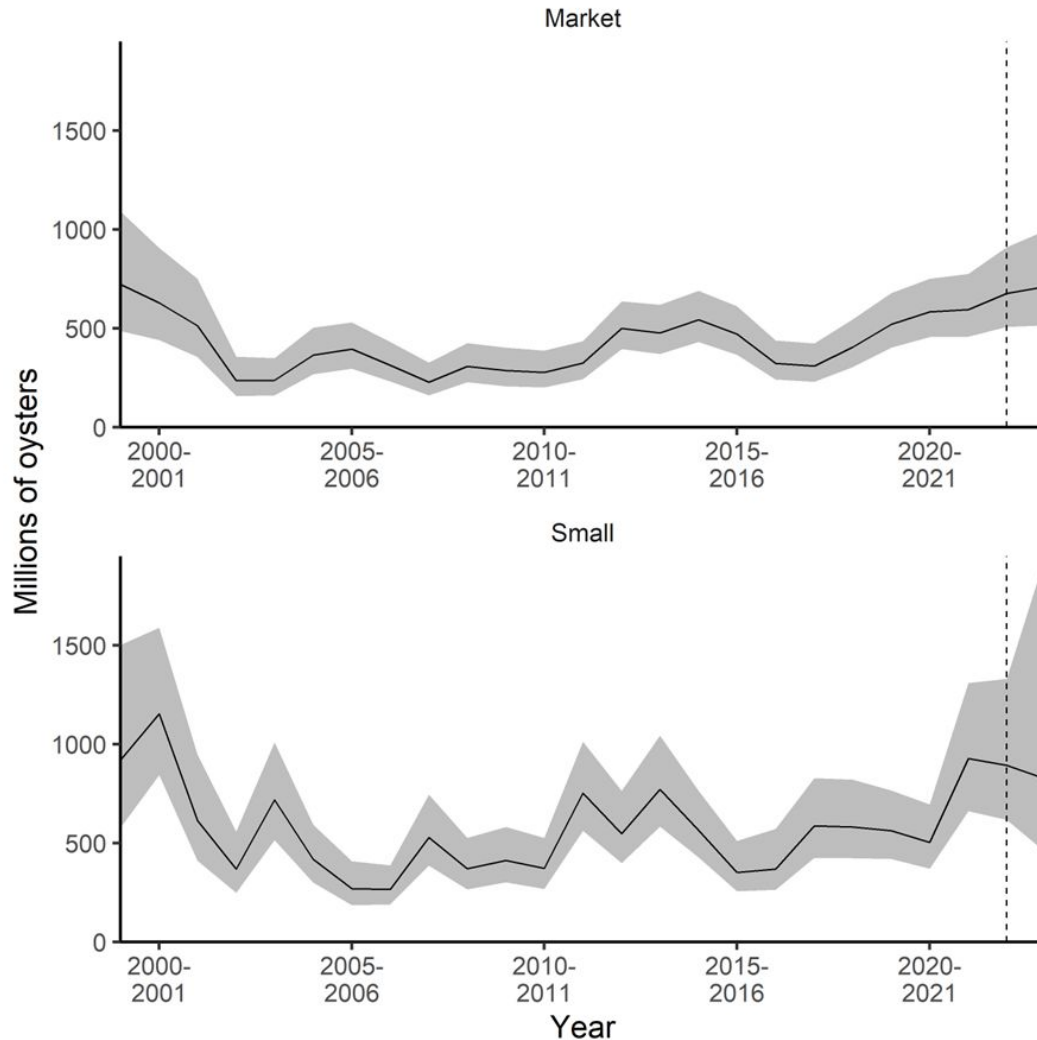
Summary of Harvest Rate Reference Point over past 5 years

Number of years above fishing mortality upper limit reference point

- Upper Tangier Sound (292)
- St Marys (078)

Forecast for 2023-24

Forecast for following year is after dashed vertical line



Baywide forecast for beginning of 2023-2024 season

- Estimated slight increase in markets (mostly from Choptank region)
- Estimated decrease in smalls

Summary

Summary Findings from Update Model Assessment Results and Biological Reference Points

- 27/36 NOAA Codes are estimated to be below the upper limit fishing rate in the most recent year (75%)
- 31/36 NOAA Codes were above the minimum abundance threshold in the most recent year (86%)
- 6 NOAA Codes at highest adult (smalls + markets) abundance in assessment time period