Striped Bass FMP Amendment 2

Tar-Pamlico and Neuse Rivers 2025 Data Review

DEPARTMENT OF ENVIRONMENTAL QUALITY

Marine Fisheries

Marine Fisheries Commission

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Presentation Outline

- Amendment 2 Management
- Data Analysis for Tar-Pamlico and Neuse Rivers
  - DMF Juvenile Striped Bass Seine Survey
  - DMF Gill Net Survey
  - WRC Electrofishing Survey
  - DMF and WRC Parentage-based tagging (PBT)
  - Age data
- Results
- Conclusions
- Next Steps

Amendment 2 Management

Amendment 2 Management

- Maintained commercial and recreational no possession measure for striped bass (including hybrids) in coastal, joint, and inland fishing waters of the Tar-Pamlico and Neuse rivers

- Maintained the gill net closure above the ferry lines in the Tar-Pamlico and Neuse rivers

- Maintained tie-down and distance from shore requirements for large mesh anchored gill nets year-round in the Tar-Pamlico and Neuse rivers

Amendment 2 Adaptive Management

- Adaptive management framework specifies that for the Tar-Pamlico and Neuse rivers in 2025, data through 2024 will be reviewed to determine if populations are self-sustaining and if sustainable harvest can be determined

- "…*Maintain the gill net prohibition through 2024 to allow for assessment of its performance*"

- Review will assess the gill net closure provision through 2024

- The next comprehensive FMP review is scheduled in 2027

Amendment 2 Goal

- The goal of Amendment 2 to the Estuarine Striped Bass FMP is to manage estuarine striped bass fisheries to achieve self-sustaining populations that provide sustainable harvest based on science-based decision-making processes

- If biological and/or environmental factors prevent a self-sustaining population then alternative management strategies will be implemented that provide protection for and access to the resource

Juvenile Recruitment Data

Striped Bass Stocking

Tar-Pamlico River

Year-Class	Phase-I (1-2 inch)	Phase-II (5-8 inch)
2010	0	114,012
2011	0	107,767
2012	0	45,667
2013	257,404	123,416
2014	138,889	92,727
2015	0	52,922
2016	234,718	121,190
2017	0	101,987
2018	0	120,668
2019	0	97,920
2020	0	90,614
2021	0	23,082
2022	175,633	55,465
2023	116,989	66,165
2024	0	0

Neuse River

Year-Class	Phase-I (1-2 inch)	Phase-II (5-8 inch)
2010	0	107,142
2011	0	102,089
2012	50,180	91,985
2013	181,327	113,784
2014	79,864	78,866
2015	0	109,107
2016	80,910	134,559
2017	0	14,203
2018	96,900	86,556
2019	0	85,694
2020	0	96,933
2021	31,208	80,122
2022	91,569	33,560
2023	62,885	71,527
2024	0	0

Juvenile Abundance

Juvenile Abundance Index from DMF Anadromous Seine Survey (Program 100), 2017-2024

	Tar-Pamlico River			Neuse River		
	Seine			Seine		
Year	Striped bass (n)	Samples (n)	Relative Abundance	Striped bass (n)	Samples (n)	Relative Abundance
2017	0	54	0.00	0	54	0.00
2018	0	30	0.00	0	30	0.00
2019	0	36	0.00	0	36	0.00
2020	0	48	0.00	0	48	0.00
2021*	2	48	0.04	0	48	0.00
2022†	21	48	0.44	4	48	0.08
2023†	14	71	0.20	4	70	0.06
2024	0	64	0.00	0	63	0.00
Total	37	399	0.09	8	397	0.02

* PBT analysis: 'wild' origin

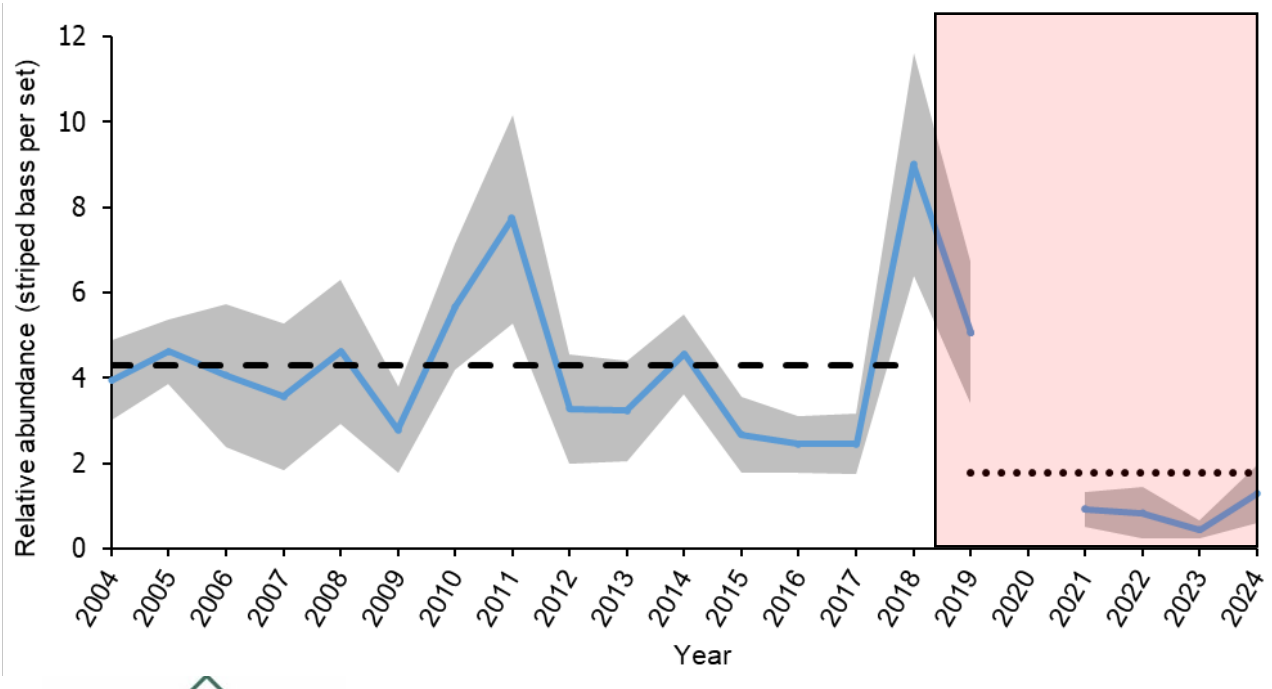
† PBT analysis: hatchery origin

Adult Abundance Data

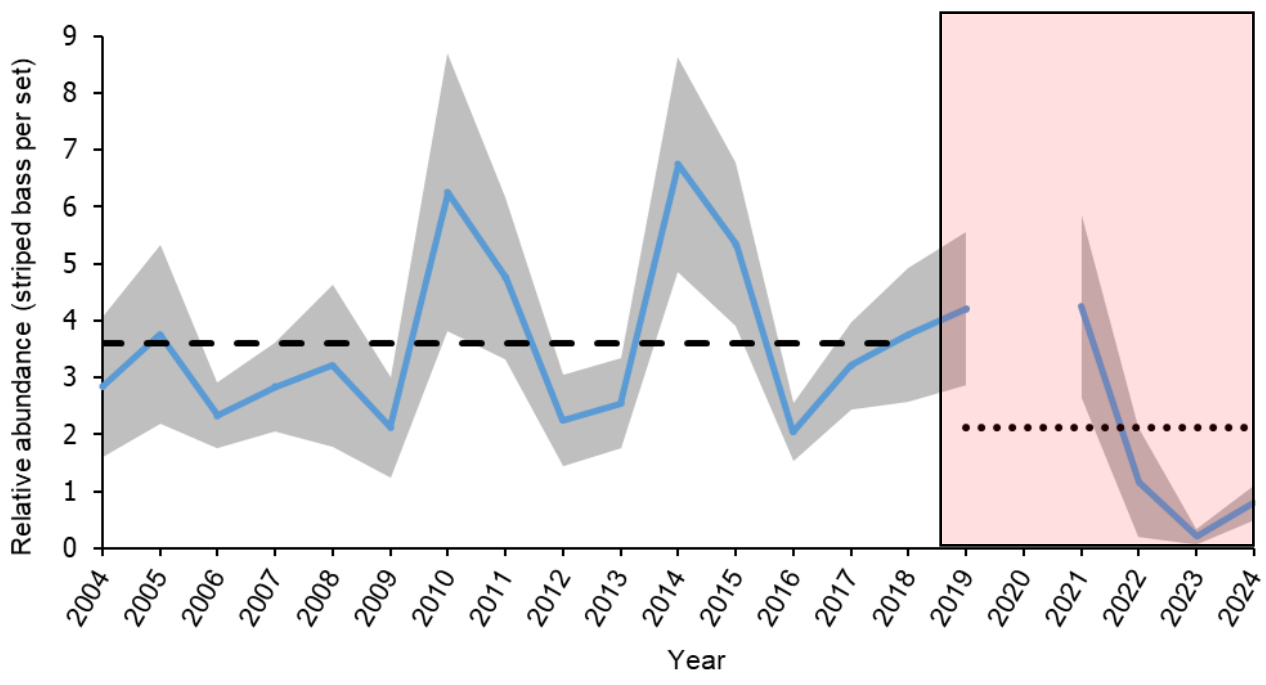
Adult Abundance

Relative Abundance Index from the DMF Independent Gill Net Survey (Program 915), 2004-2024

Tar-Pamlico River



Neuse River



Dashed line is mean abundance pre-closures,
Dotted line is mean abundance post-closures

No sampling occurred in 2020 and limited sampling (July–December) occurred in 2021 due to COVID restrictions

Adult Abundance

Mann-Kendall Trend Test of Program 915 Abundance Data

System	Closures	Trend
Tar-Pamlico River	Before (2004 - 2018)	Not Significant
	After (2019 - 2024)	Not Significant

System	Closures	Trend
Neuse River	Before (2004 - 2018)	Not Significant
	After (2019 - 2024)	Not Significant

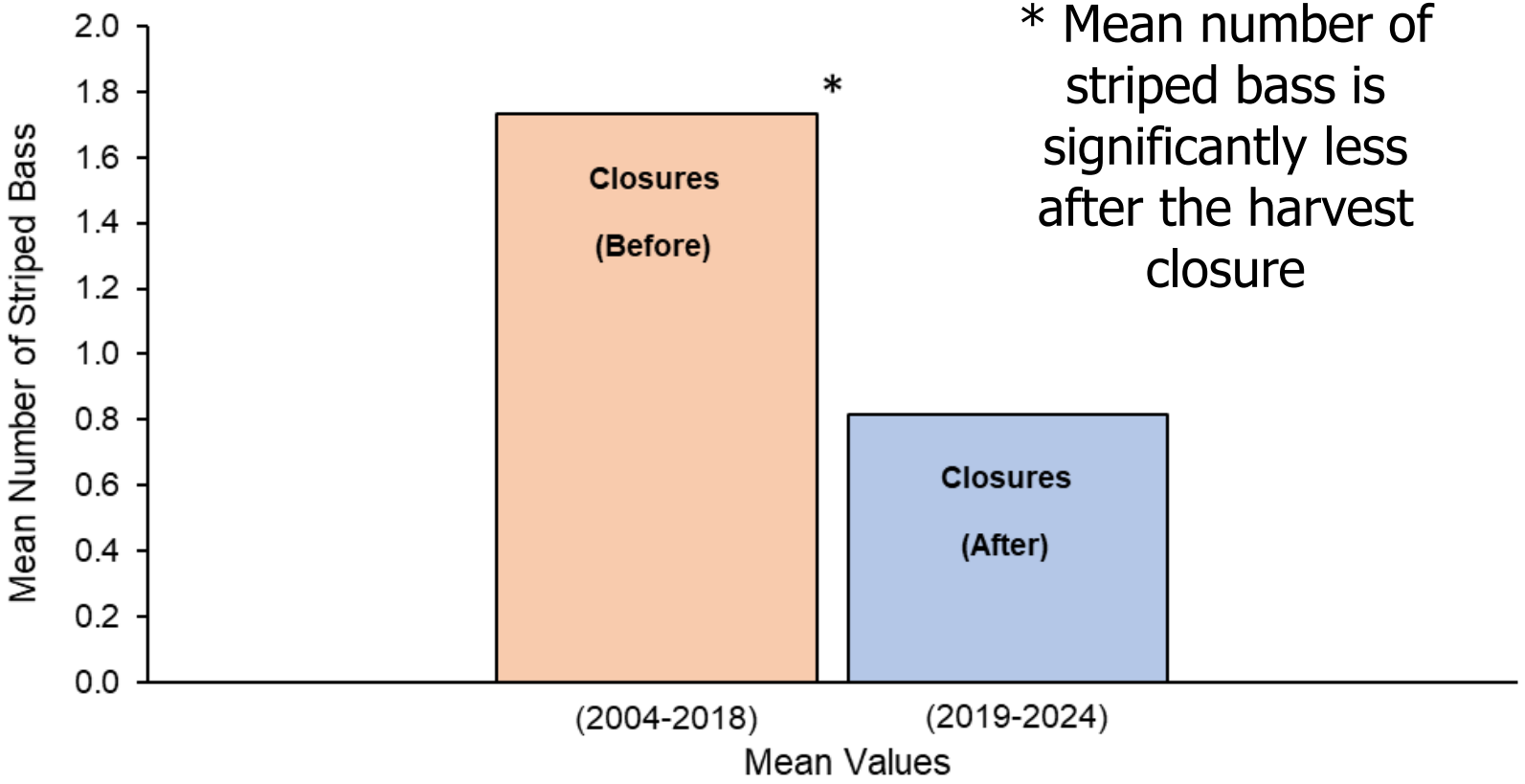
Adult Abundance

Randomization Test of Tar-Pamlico Program 915 Abundance Data

* Mean number of striped bass is significantly less after the harvest closure

Adult Abundance

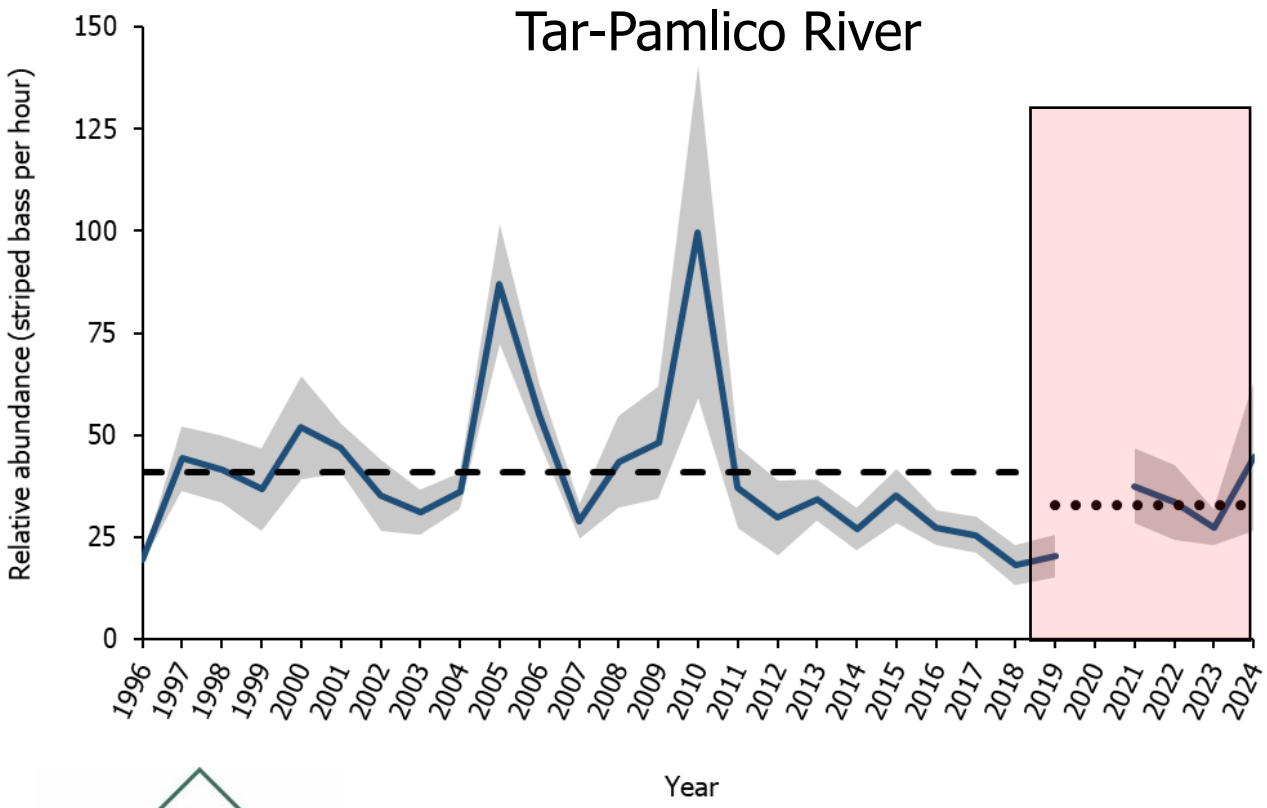
Randomization Test of Neuse Program 915 Abundance Data

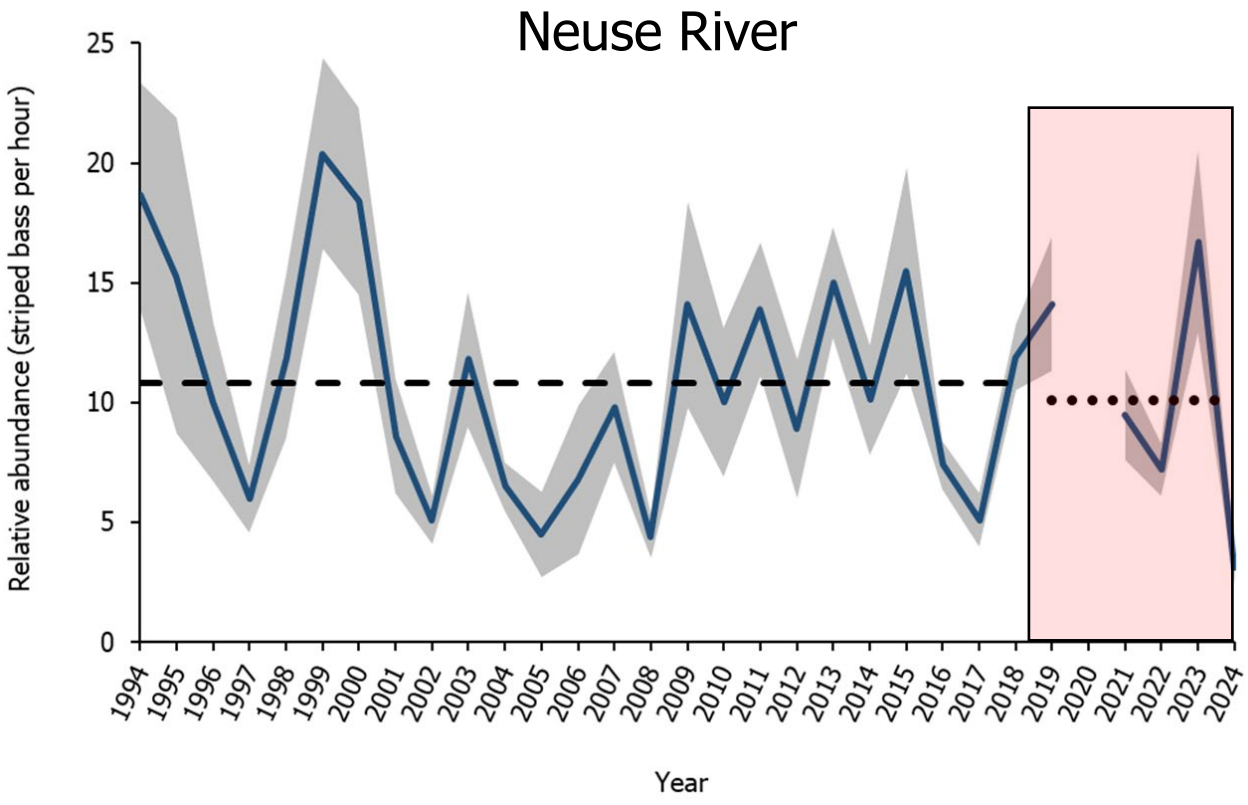


* Mean number of striped bass is significantly less after the harvest closure

Adult Abundance

Relative Abundance Index from WRC Spawning Ground Electrofishing Survey, 1994/1996-2024





Dashed line is mean abundance pre-closures,
Dotted line is mean abundance post-closures

No sampling occurred in 2020 due to COVID restrictions

Adult Abundance

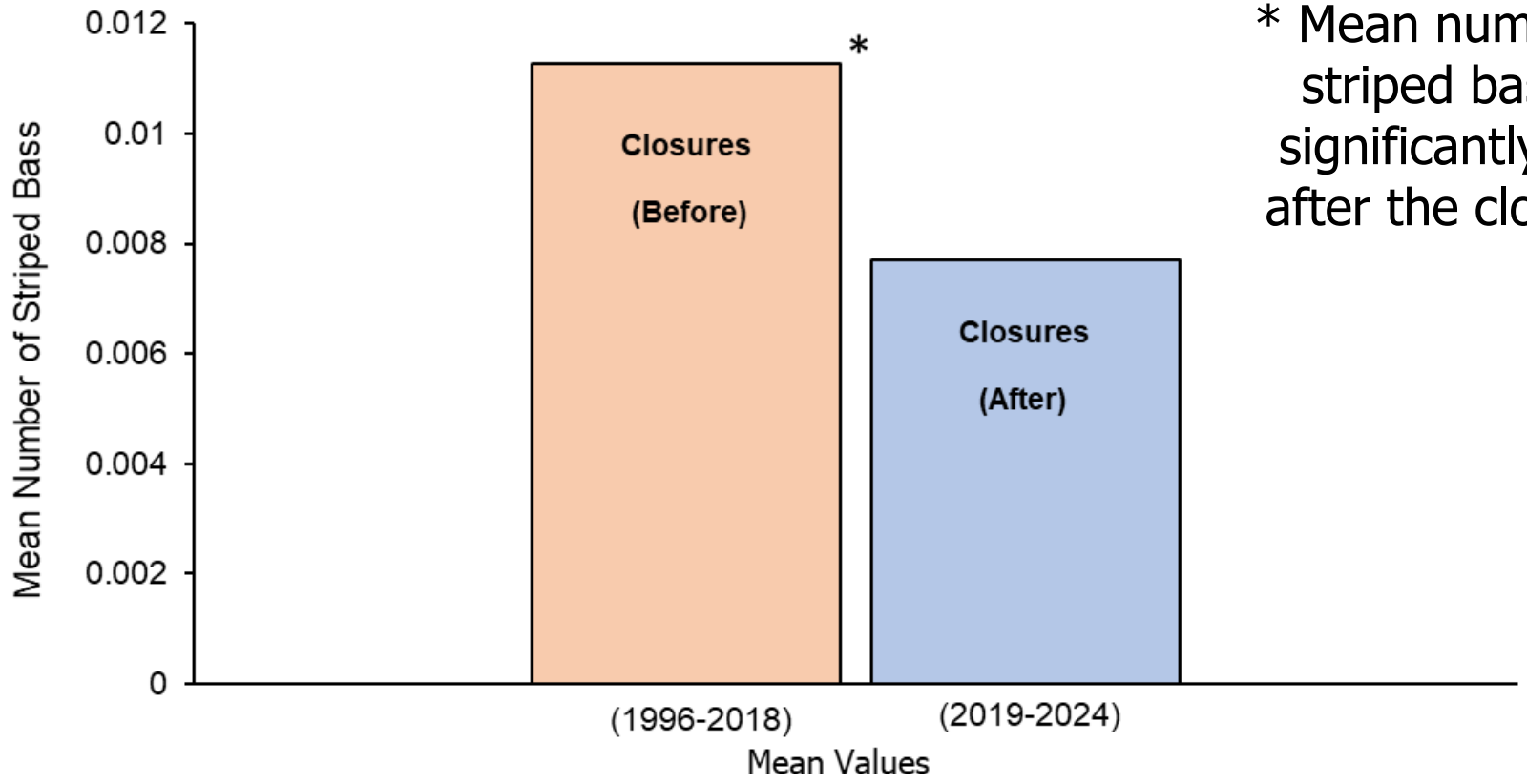
Mann-Kendall Trend Test of WRC Spawning Ground Survey Data

System	Closures	Trend
Tar-Pamlico River	Before (1996 - 2018)	Decreasing
	After (2019 - 2024)	Not Significant

System	Closures	Trend
Neuse River	Before (1994 - 2018)	Not Significant
	After (2019 - 2024)	Not Significant

Adult Abundance

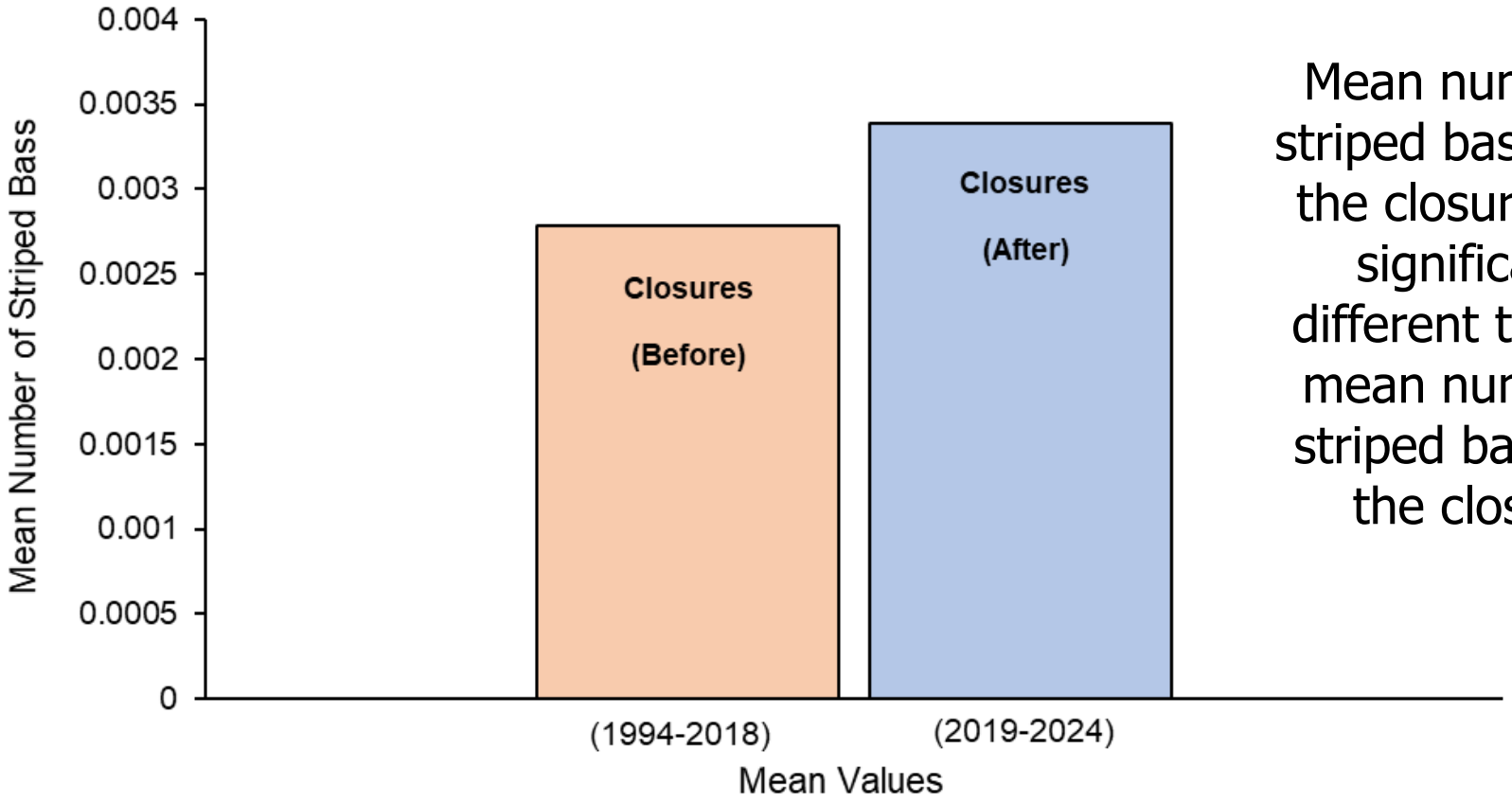
Randomization Test of Tar-Pamlico WRC Spawning Ground Survey Data



* Mean number of striped bass is significantly less after the closures

Adult Abundance

Randomization Test of Neuse WRC Spawning Ground Survey Data



Mean number of striped bass before the closures NOT significantly different than the mean number of striped bass after the closures

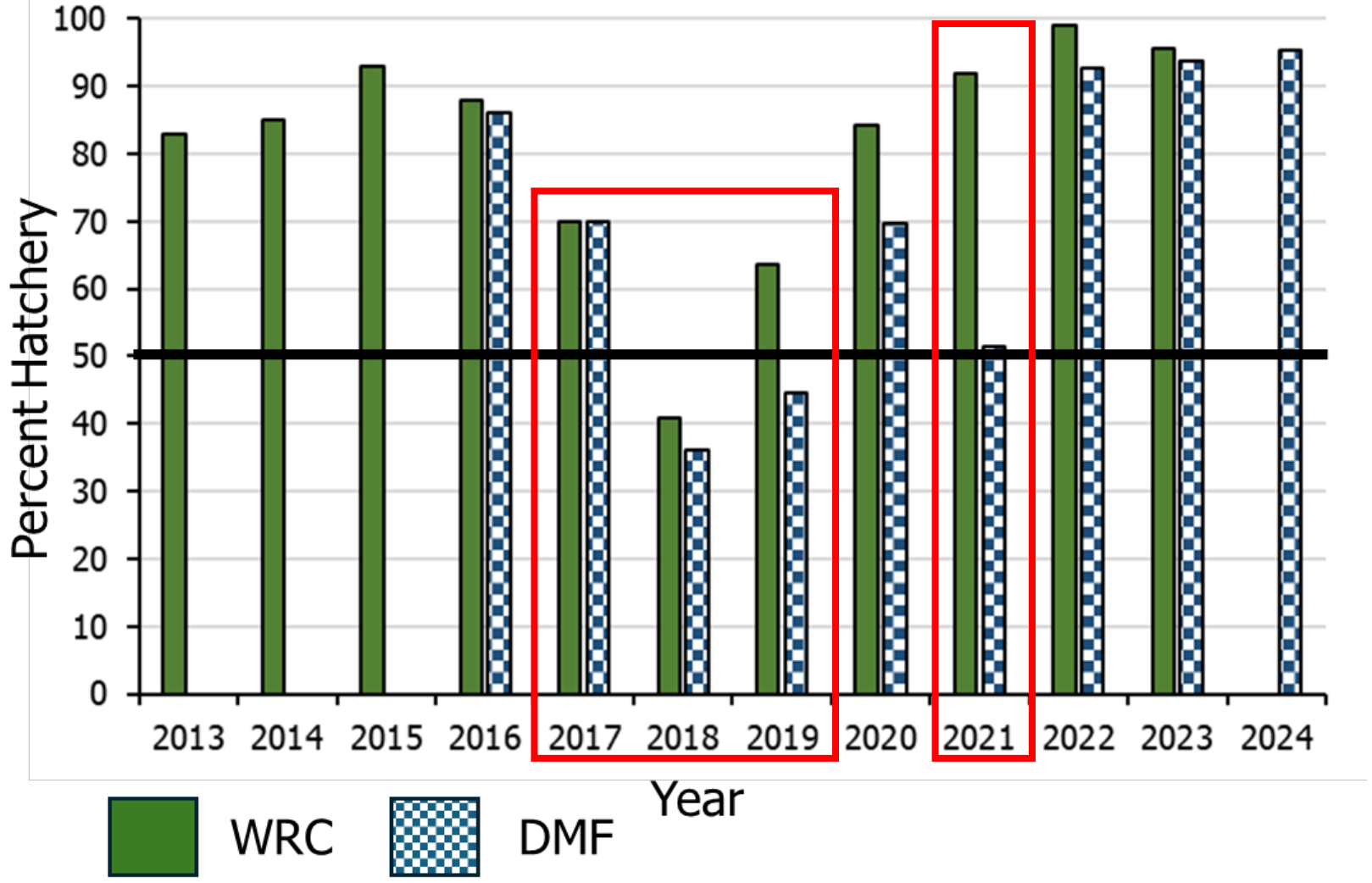
Parentage Based Tagging (PBT) Data

- Fin clip used to identify hatchery or non-hatchery 'wild'
- Genetic marker
- WRC - spawning grounds (since 2010)
- DMF - lower rivers (since 2016)

Striped bass genetics

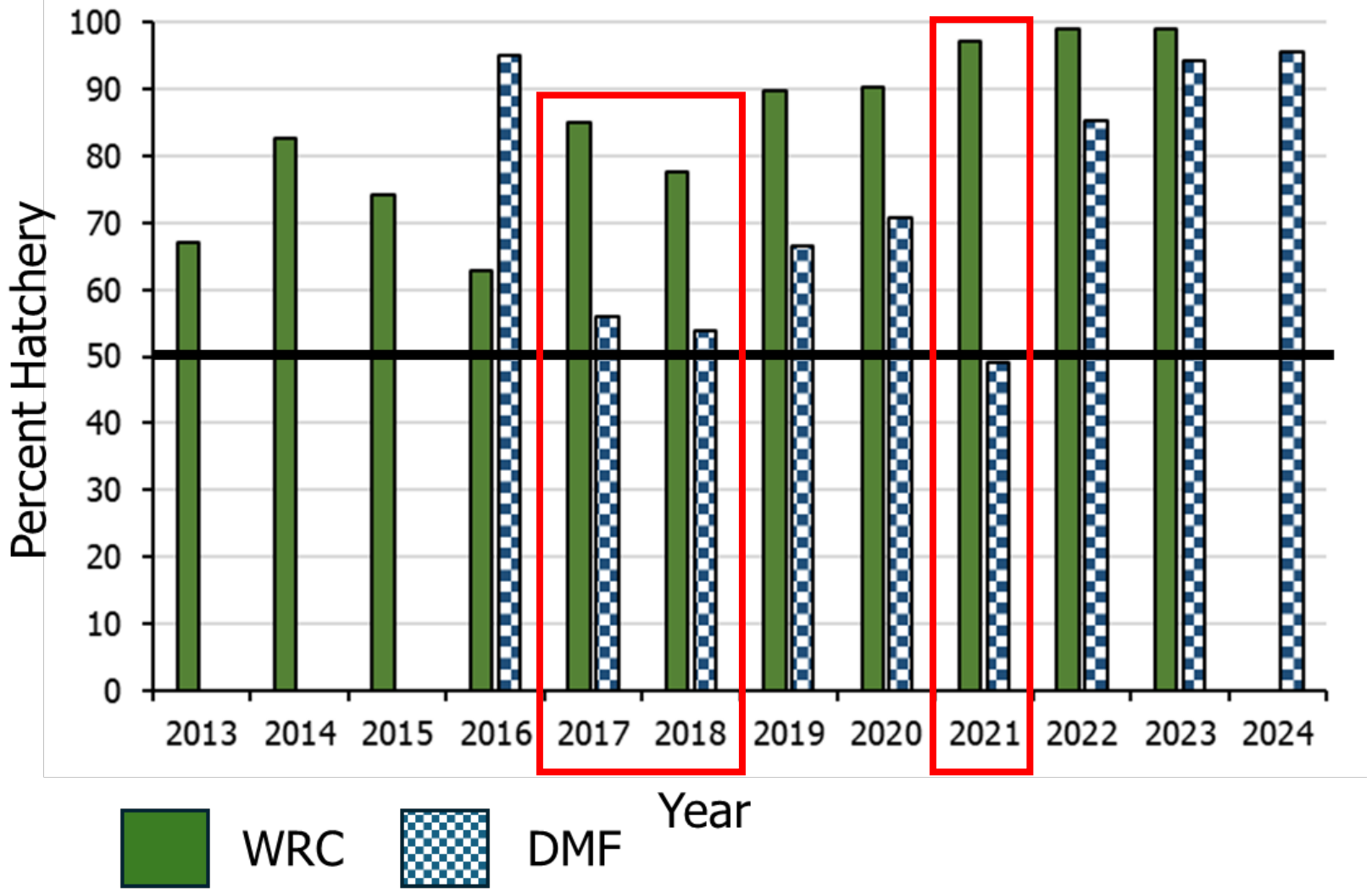
DMF & WRC Parentage-Based Tagging (PBT)

Percent of hatchery fish in DMF and WRC Tar-Pamlico River sampling, 2013-2024

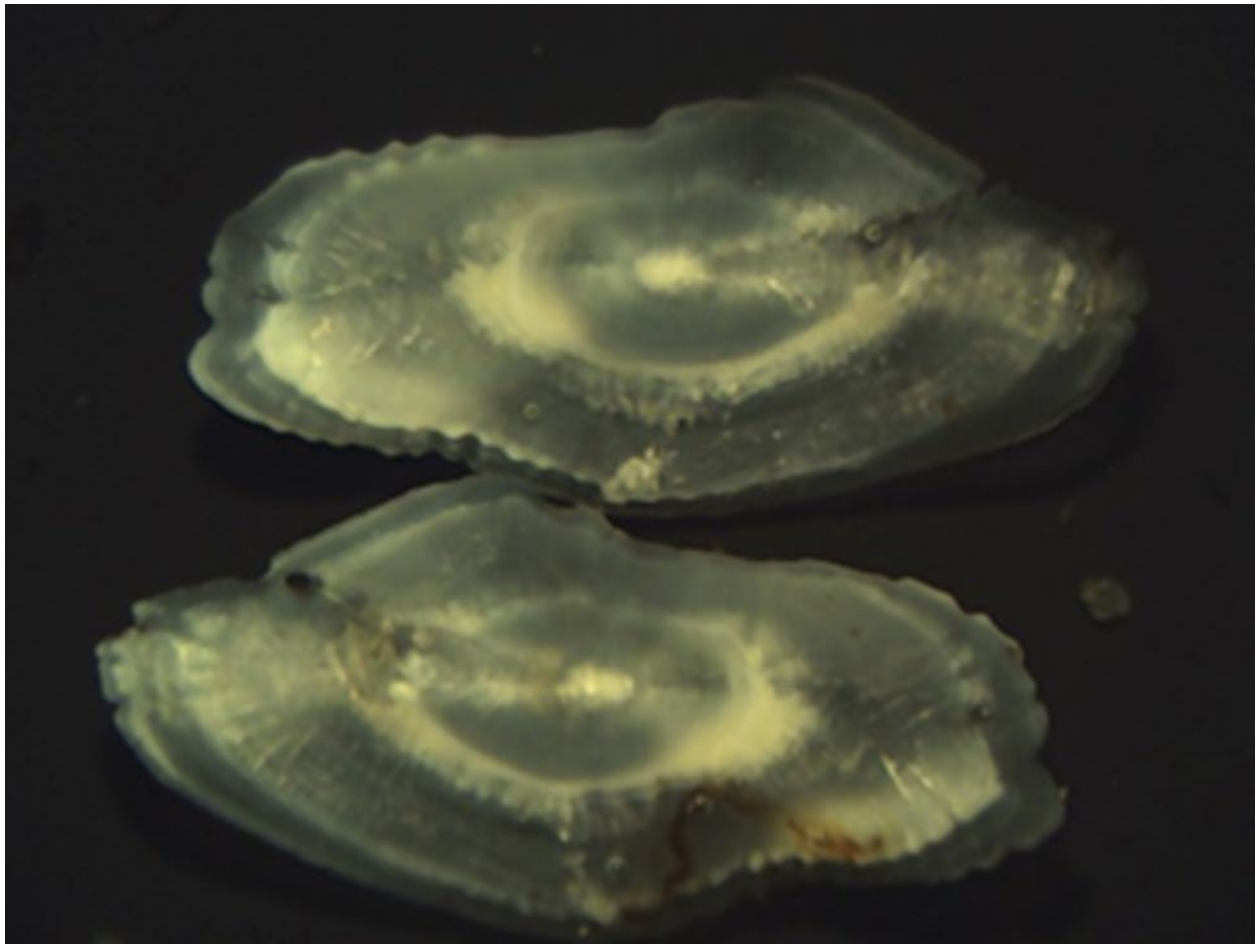


DMF & WRC Parentage-Based Tagging (PBT)

Percent of hatchery fish in DMF and WRC Neuse River sampling, 2013-2024

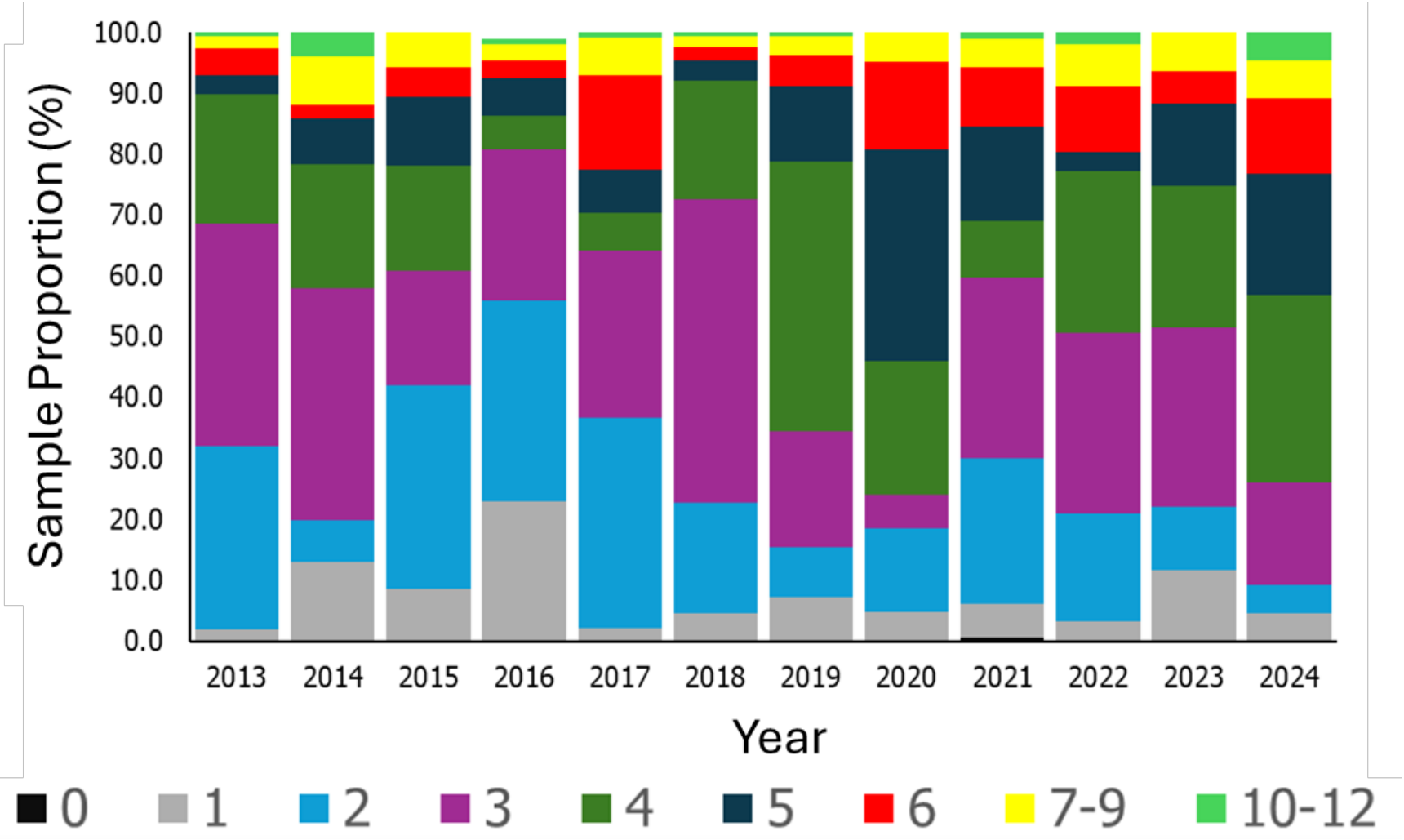


Age Data



DMF Age Data

Proportion at Age (otolith ages: 2013-2024)



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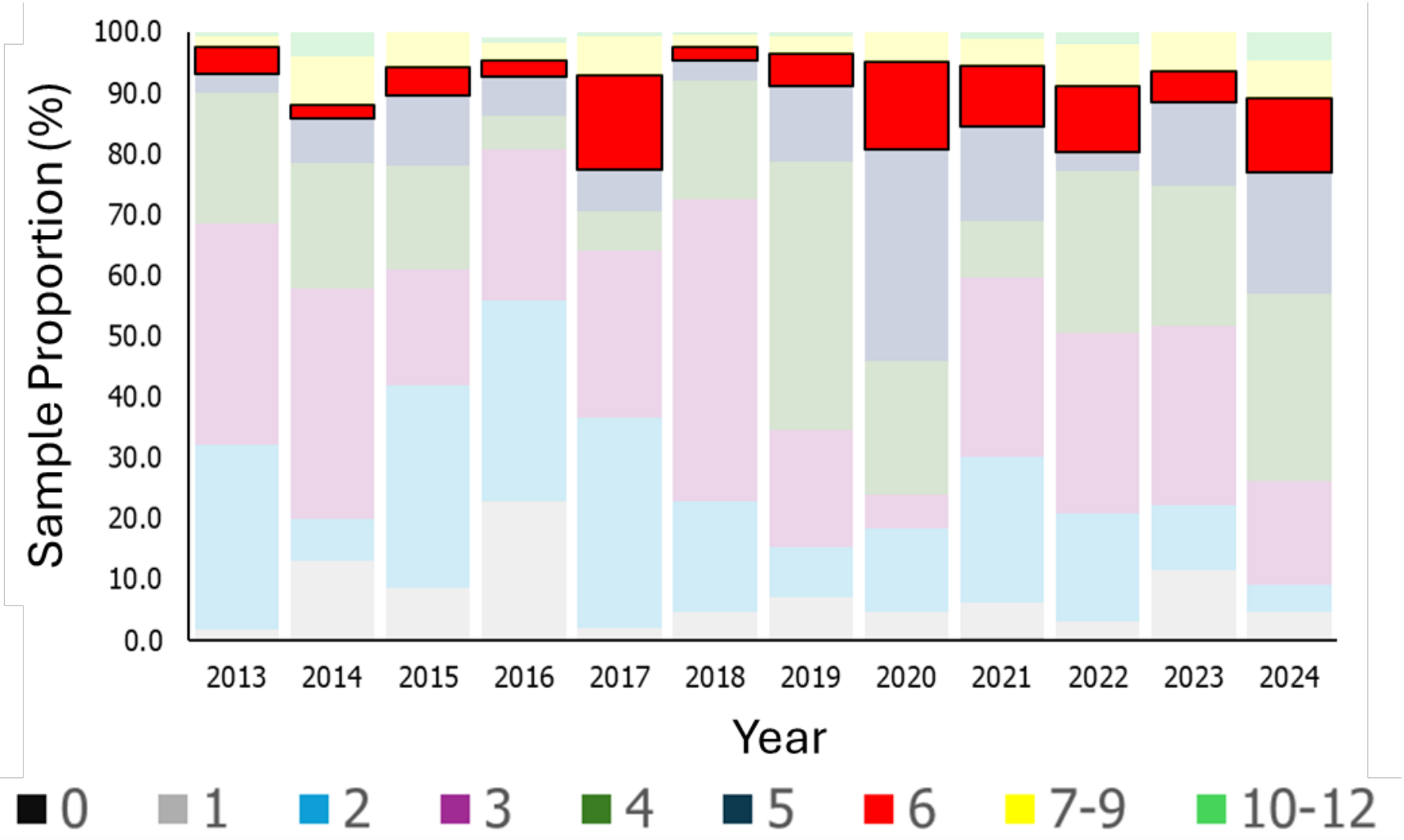

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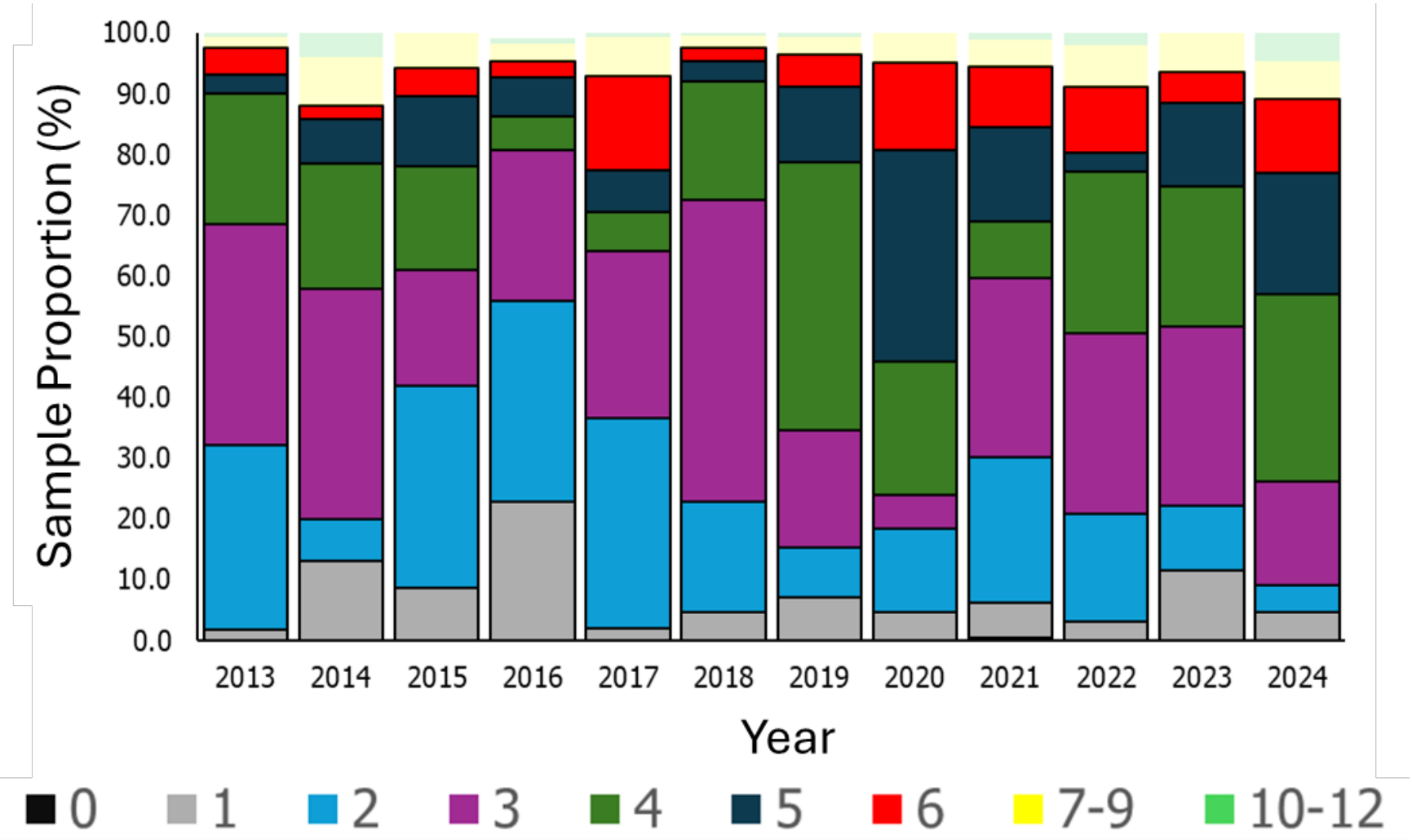

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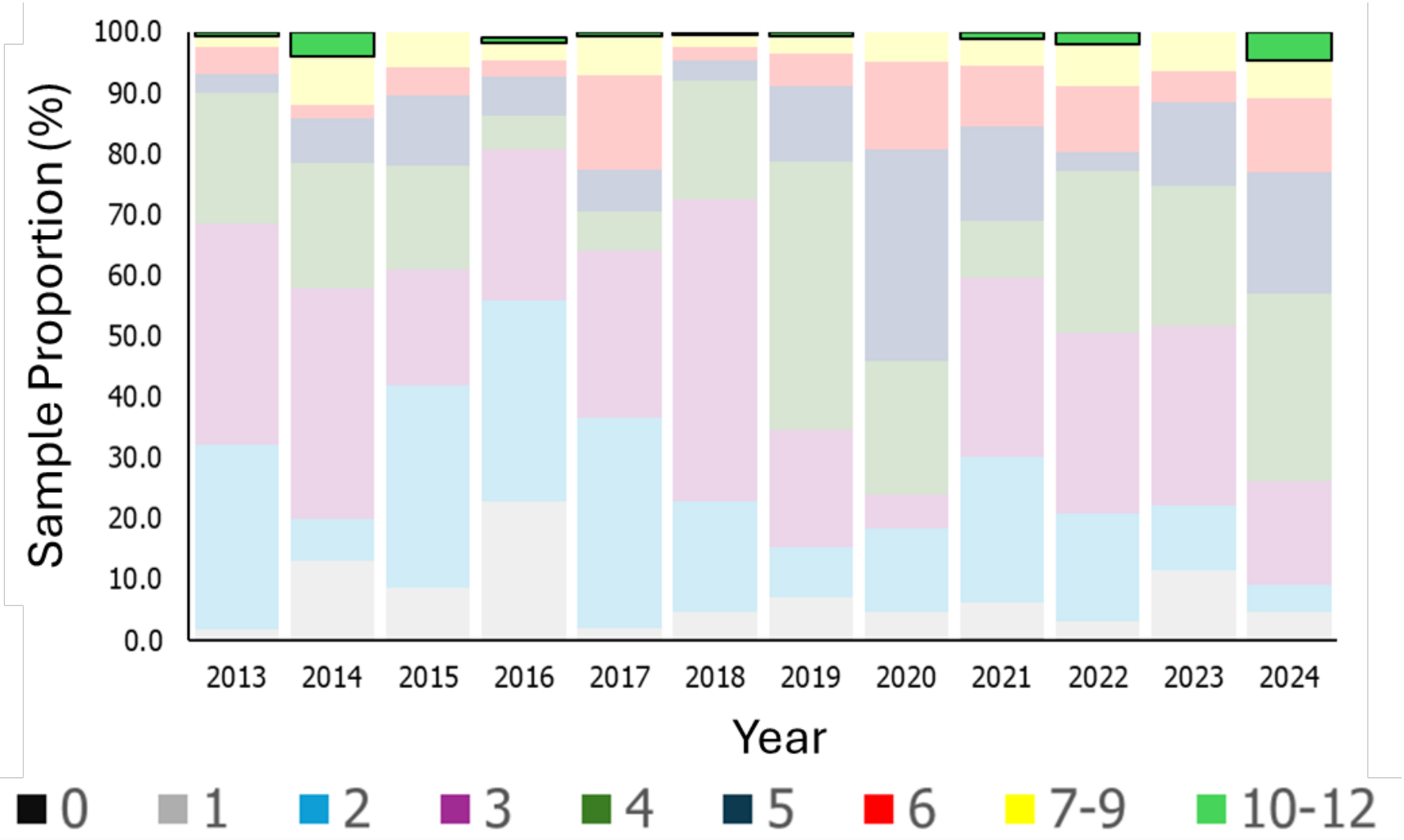

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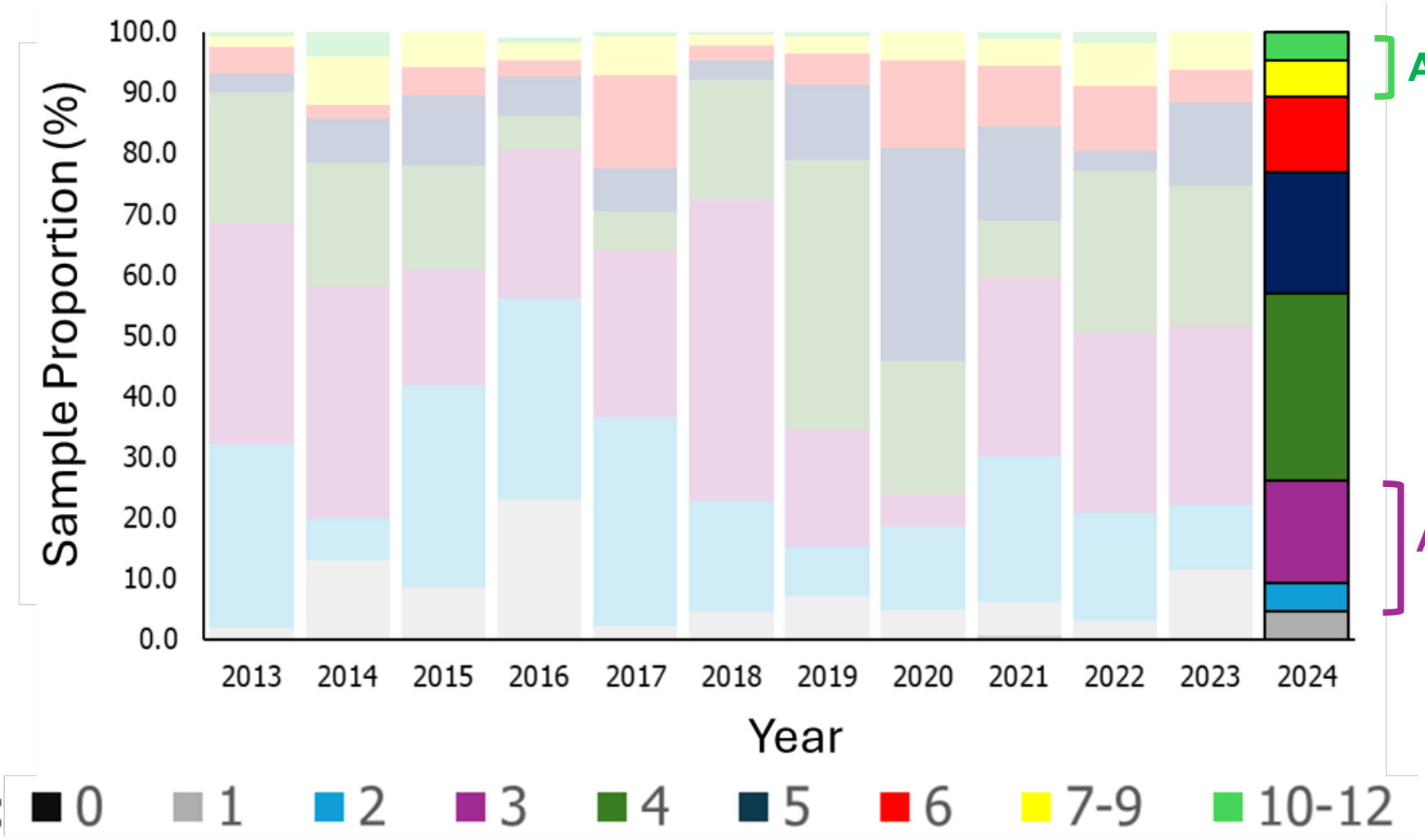


Fishery-Dependent Data

DMF Creel Survey

Recreational Effort and Catch, 2004-2024

River	Year	Trips (n)	Harvest		Discards (n)	Total Catch (n)
			Number	Pounds		
Tar-Pamlico, Pungo, Neuse	2004	12,782	6,141	22,958	13,557	19,698
	2005	16,414	3,832	14,965	16,854	20,671
	2006	10,611	2,481	7,352	14,895	17,376
	2007	10,971	3,597	10,794	23,527	27,124
	2008	6,621	843	2,990	17,966	18,809
	2009	5,642	895	3,061	6,965	7,860
	2010	6,559	1,757	5,537	7,990	9,747
	2011	12,606	2,728	9,474	24,188	26,916
	2012	18,338	3,922	15,240	43,313	47,236
	2013	20,136	5,467	19,537	32,461	37,928
	2014	15,244	3,301	13,368	28,658	31,959
	2015	17,950	3,934	14,269	31,154	35,088
	2016	23,283	6,697	25,260	74,833	81,529
	2017	26,100	7,334	26,973	131,115	138,450
	2018	16,369	3,371	10,884	48,982	52,353
	2019	8,796	959	3,562	33,598	34,557
	2020	2,839	0	0	19,420	19,420
	2021	4,641	0	0	22,895	22,895
	2022	3,953	0	0	27,462	27,462
	2023	3,020	0	0	12,957	12,957
	2024	1,604	0	0	9,723	9,722
	Total	244,480	57,258	206,224	642,514	699,758

Pre-Closures
- ~22,000 trips per year
- ~5,800 harvested
- ~85,000 discards

Post-Closures
- ~4,000 trips per year
- ~21,000 discards

DMF Observer Program

Gill Net* Observations (2012-2024)

	Large Mesh				Small Mesh				Total Numbers				
Year	Trips	Harvested	Dead Discard	Alive Discard	Trips	Harvested	Dead Discard	Alive Discard	Trips	Harvested	Dead Discard	Alive Discard	Striped Bass Captured
2012	70	19	1	8	17	0	1	12	87	19	2	20	41
2013	104	58	14	12	11	0	0	0	115	58	14	12	84
2014	252	167	41	83	39	2	0	9	291	169	41	92	302
2015	149	202	16	42	39	4	4	9	188	206	20	51	277
2016	153	119	25	14	23	0	4	12	176	119	29	26	174
2017	163	110	12	134	35	0	0	36	198	110	12	170	292
2018	122	37	15	45	23	1	2	10	145	38	17	55	110
2019	60	0	8	12	45	0	2	5	105	0	10	17	27
2020	0	0	0	0	7	0	0	1	7	0	0	0	1
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
2022	3	0	0	0	0	0	0	0	3	0	0	0	0
2023	8	0	0	3	4	0	0	3	12	0	0	3	3
2024	4	0	0	1	4	0	0	1	8	0	0	1	1
Totals	1,088	712	132	354	247	7	13	98	1,335	719	145	447	1,312

* Excludes runaround and drift gill nets

Ferry Line Gill Net Closure

Adult Abundance (Above Ferry Line)

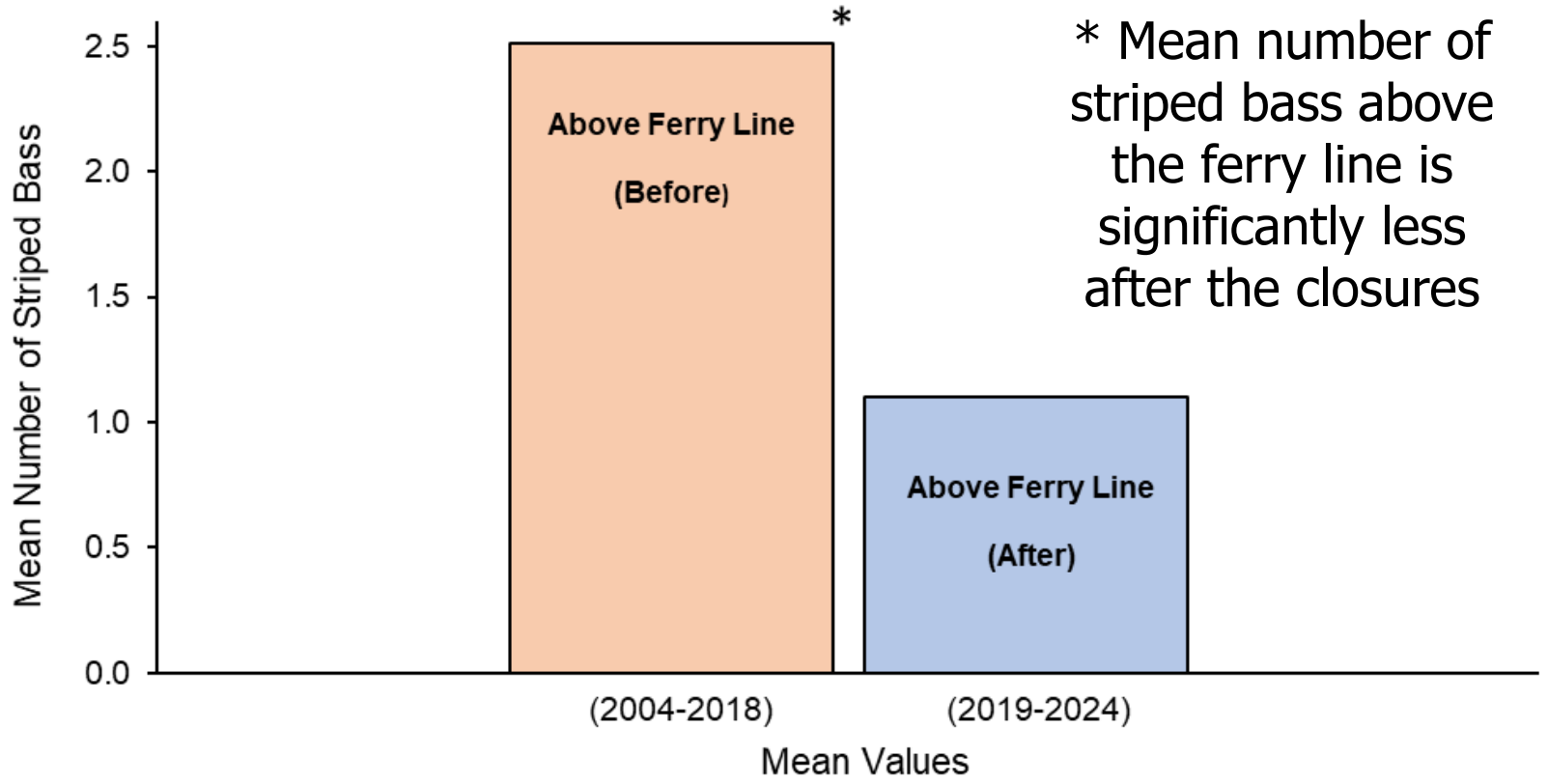
Mann-Kendall Trend Test of Program 915 Abundance Data

System	Closures	Trend
Tar-Pamlico River	Before (2004 - 2018)	Not Significant
	After (2019 - 2024)	Not Significant

System	Closures	Trend
Neuse River	Before (2004 - 2018)	Not Significant
	After (2019 - 2024)	Not Significant

Adult Abundance (Above Ferry Line)

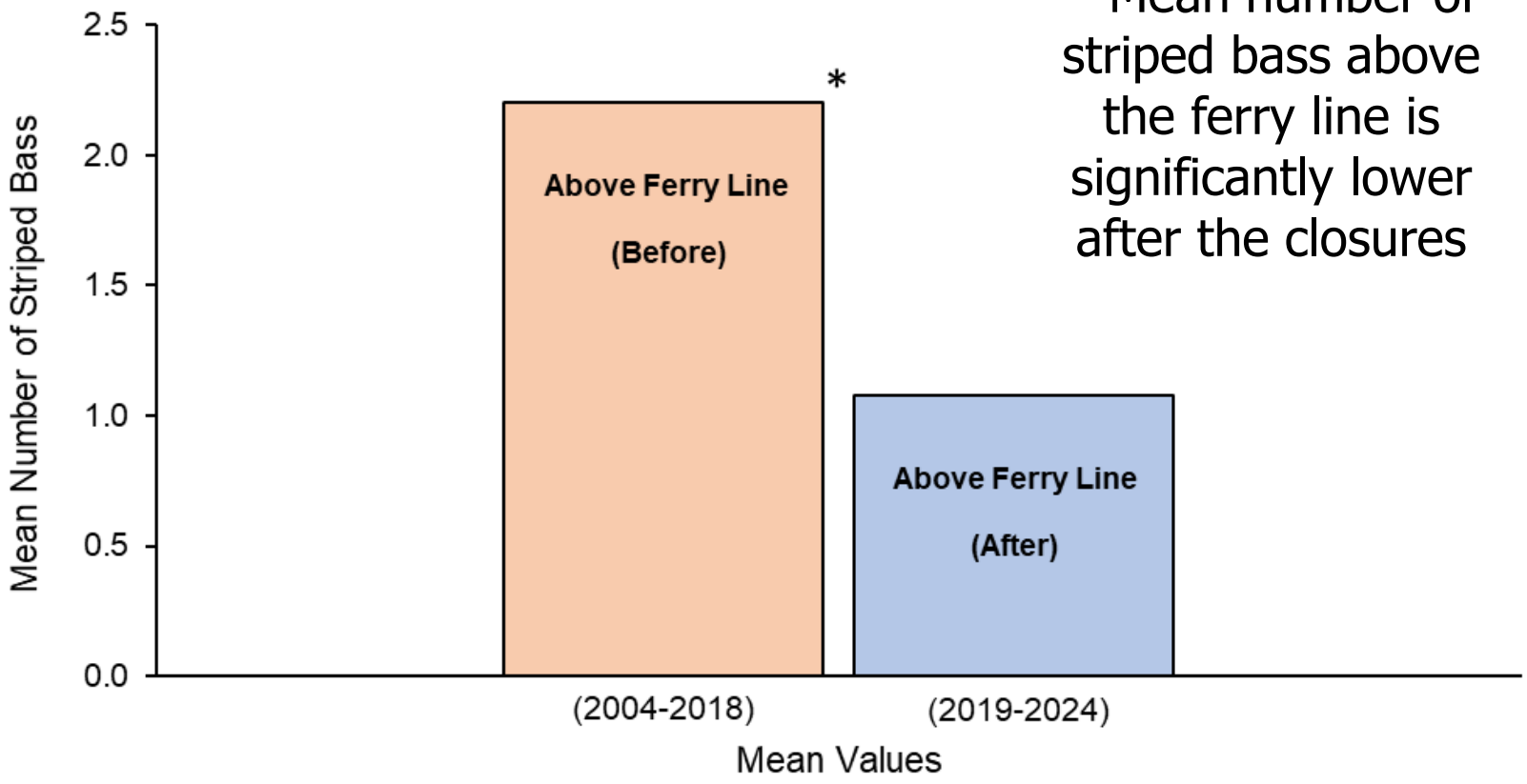
Randomization Test of Tar-Pamlico Program 915 Abundance Data



* Mean number of striped bass above the ferry line is significantly less after the closures

Adult Abundance (Above Ferry Line)

Randomization Test of Neuse Program 915 Abundance Data



* Mean number of striped bass above the ferry line is significantly lower after the closures

What Does This All Mean?

Analysis Results

- Only two ‘wild’ juvenile striped bass have been caught in the Tar-Pamlico and Neuse rivers during 2017 - 2024

Analysis Results

- Only two 'wild' juvenile striped bass have been caught in the Tar-Pamlico and Neuse rivers since 2017 - 2024

- Percentage of hatchery striped bass on the spawning grounds of the Tar-Pamlico and Neuse rivers has increased to nearly 100%

Analysis Results

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- Percentage of hatchery striped bass on the spawning grounds of the Tar-Pamlico and Neuse rivers has increased to nearly 100%

- Percentage of hatchery origin striped bass in the lower Tar-Pamlico and Neuse rivers has been variable ranging from <50% to >90%

Analysis Results

- Only two 'wild' juvenile striped bass have been caught in the Tar-Pamlico and Neuse rivers since 2017 - 2024
- Percentage of hatchery striped bass on the spawning grounds of the Tar-Pamlico and Neuse rivers has increased to nearly 100%
- Percentage of hatchery origin striped bass in the lower Tar-Pamlico and Neuse rivers has been variable ranging from <50% to >90%
- Abundance in the lower river has declined and is lower after the closures than before

Analysis Results

- Only two 'wild' juvenile striped bass have been caught in the Tar-Pamlico and Neuse rivers since 2017 - 2024
- Percentage of hatchery striped bass on the spawning grounds of the Tar-Pamlico and Neuse rivers has increased to nearly 100%
- Percentage of hatchery origin striped bass in the lower Tar-Pamlico and Neuse rivers has been variable ranging from <50% to >90%
- Abundance of all age classes in the lower river has declined and is lower after the closures than before
- Abundance on the spawning grounds did not increase after the closures

Why Management Was Ineffective

Matrix Model Predictions

- Used to evaluate stocking and management strategies

- Abundance of age-3+ striped bass was projected to begin increasing in year two (2021)

- Abundance of older age-6+ striped bass should start to increase abundance of older fish after 6 years (2024)

- Model predictions have not been met

Why Management Was Ineffective

- Difficult to pinpoint exact reasons

- Poor environmental conditions
  - Other southeastern striped bass stocks have declined similarly
  - Given suitable environmental conditions very few individuals can naturally produce large numbers of fish

- Total mortality of stocked fish is high
  - Neuse River study:
    - 66% mortality - phase II striped bass
    - 54% mortality - adult striped bass

- Recreational discards remain a source of fishing mortality

Why Management Was Ineffective

- Stocking goal is 100,000 phase II size fish per river each year
- 100,000 fish stocking goal has not always been met

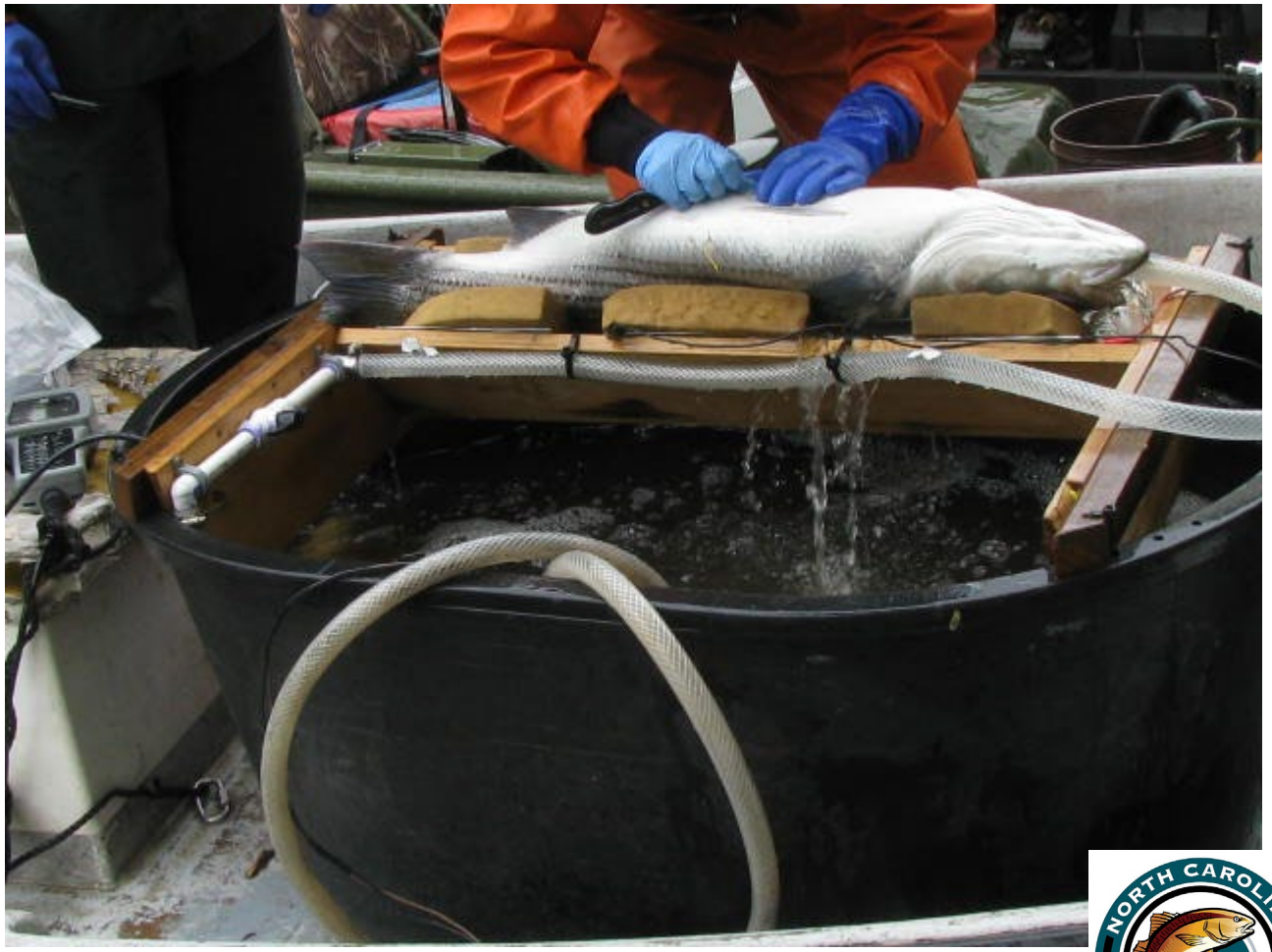
Tar-Pamlico River			Neuse River		
Year-Class	Phase-I	Phase-II	Year-Class	Phase-I	Phase-II
2010	0	114,012	2010	0	107,142
2011	0	107,767	2011	0	102,089
2012	0	45,667	2012	50,180	91,985
2013	257,404	123,416	2013	181,327	113,784
2014	138,889	92,727	2014	79,864	78,866
2015	0	52,922	2015	0	109,107
2016	234,718	121,190	2016	80,910	134,559
2017	0	101,987	2017	0	14,203
2018	0	120,668	2018	96,900	86,556
2019	0	97,920	2019	0	85,694
2020	0	90,614	2020	0	96,933
2021	0	23,082	2021	31,208	80,122
2022	175,633	55,465	2022	91,569	33,560
2023	116,989	66,165	2023	62,885	71,527
2024	0	0	2024	0	0

Number of Phase I and Phase II striped bass stocked in the Tar-Pamlico and Neuse rivers, 2010-2024

Why Management Was Ineffective

- Striped bass move regularly between Albemarle Sound and Tar-Pamlico and Neuse Rivers

- During periods of high abundance in Albemarle Sound up to 31% of stock could use areas outside of Albemarle Sound

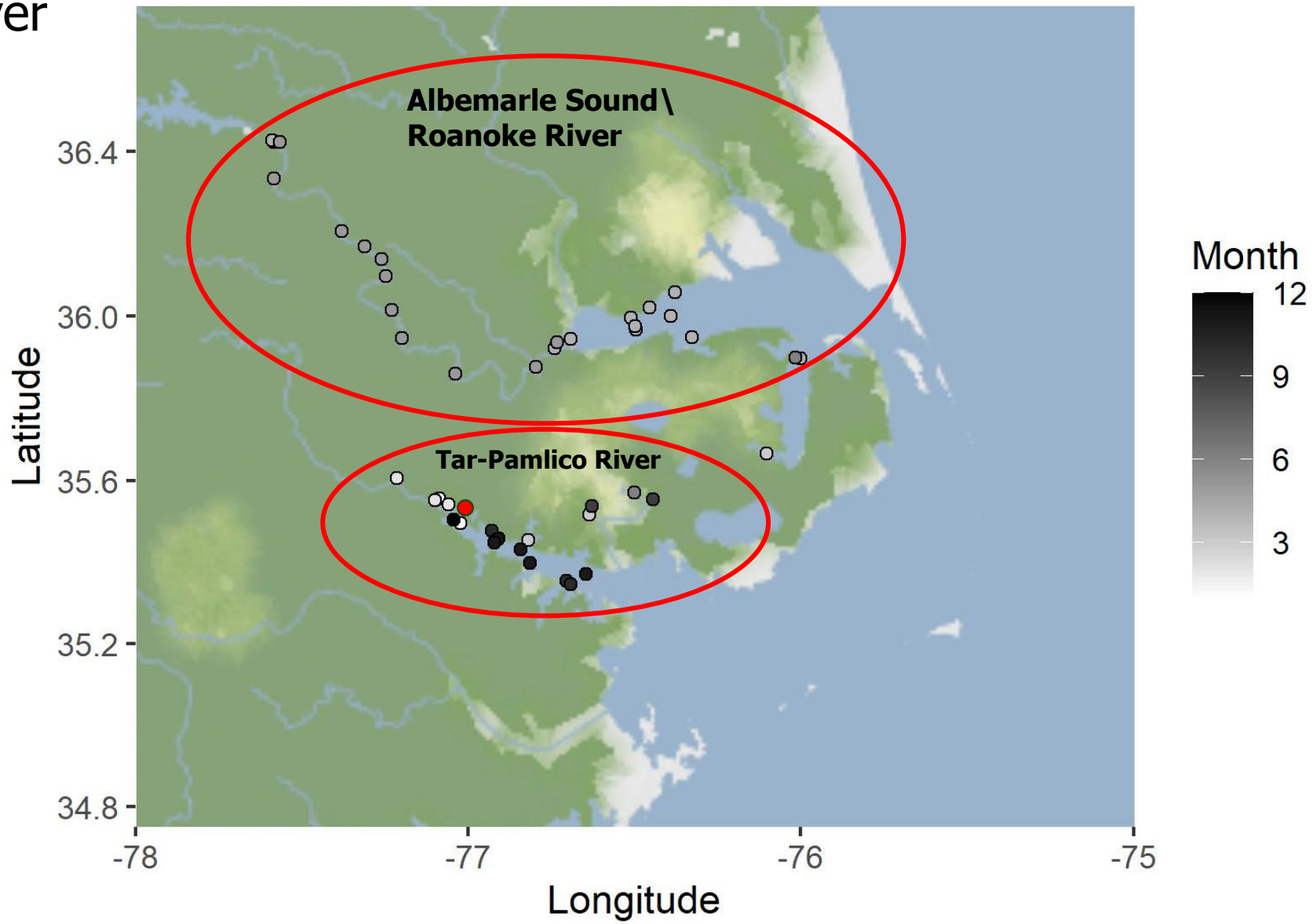


Why Management Was Ineffective

- DMF initiated acoustic telemetry study to track movement of 'wild' Tar-Pamlico and Neuse rivers striped bass
- Objective to infer natal origin
- Tagged 30 'wild' striped bass in Tar-Pamlico and Neuse rivers
- 70% of 'wild' tagged fish were detected in Albemarle Sound or on the Roanoke River spawning grounds in the spring (n=21)
- 5 'wild' fish made repeated trips between Tar-Pamlico and Neuse rivers and the Roanoke River spawning ground in subsequent years
- 2 'wild' fish was detected on Tar-Pamlico spawning grounds
- 1 'wild' fish was detected on Neuse River spawning grounds

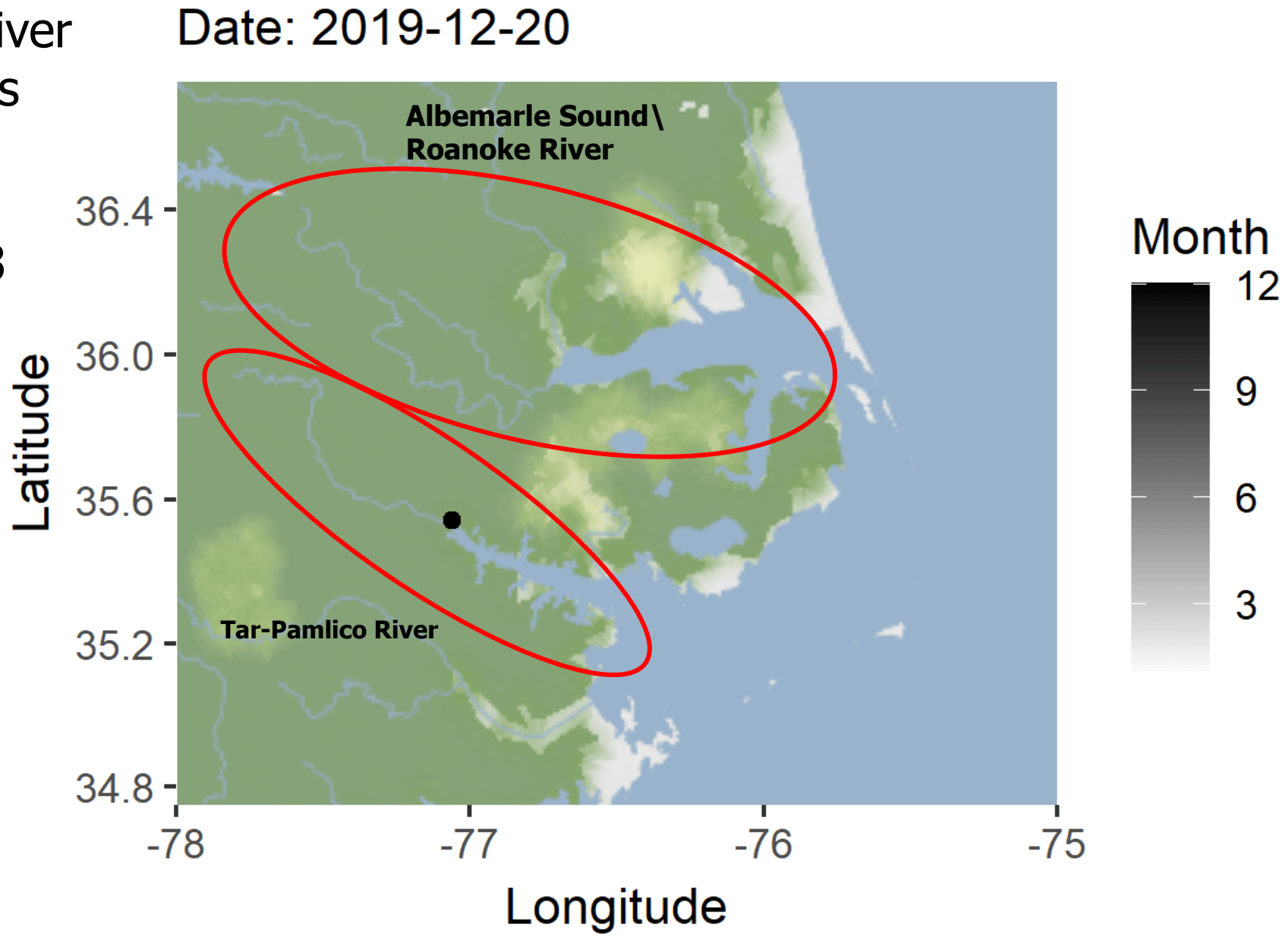
Why Management Was Ineffective

Tar-Pamlico River Striped Bass Movement (#38) 2020–2023



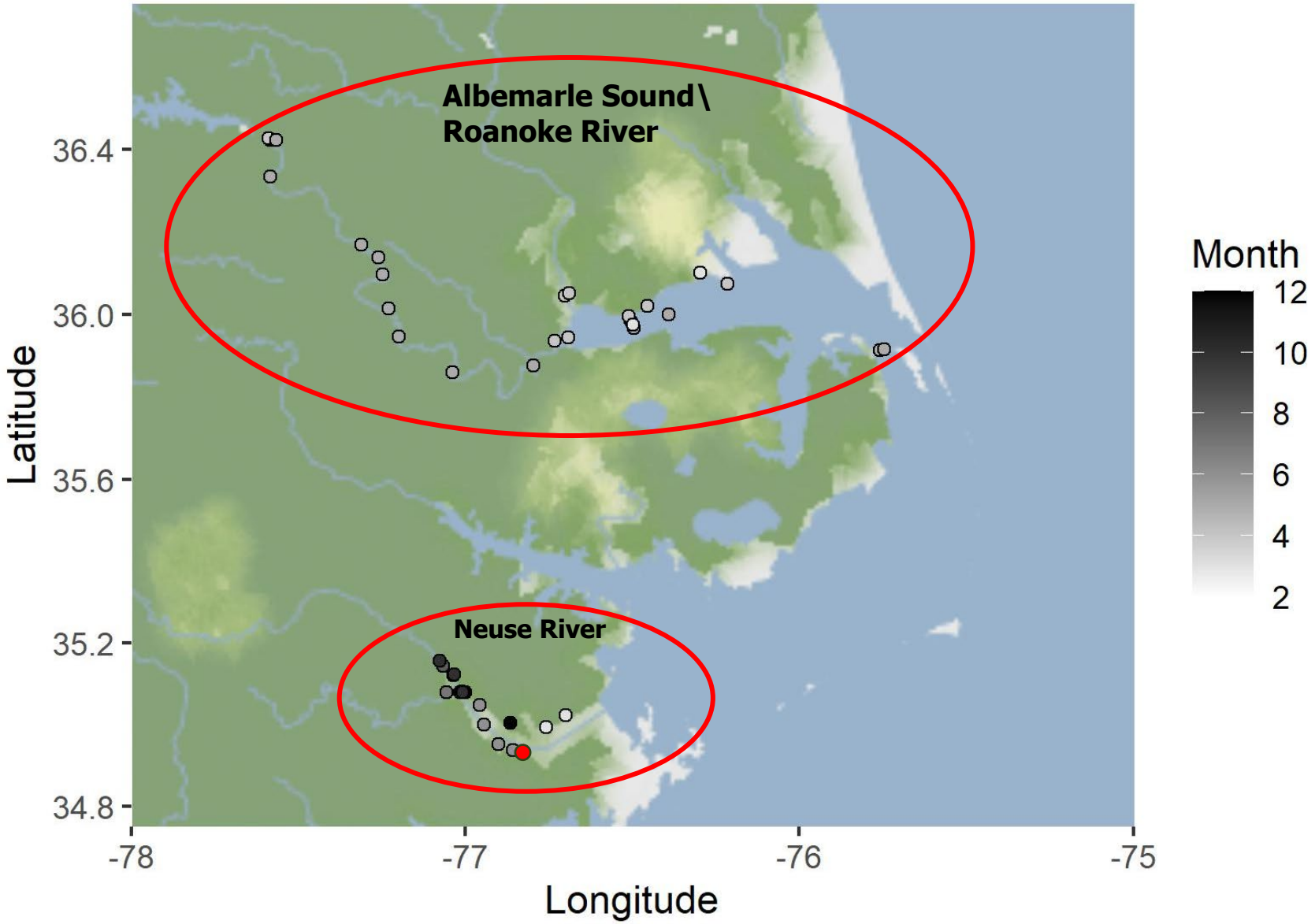
Why Management Was Ineffective

Tar-Pamlico River Striped Bass Movement (#38) 2020–2023



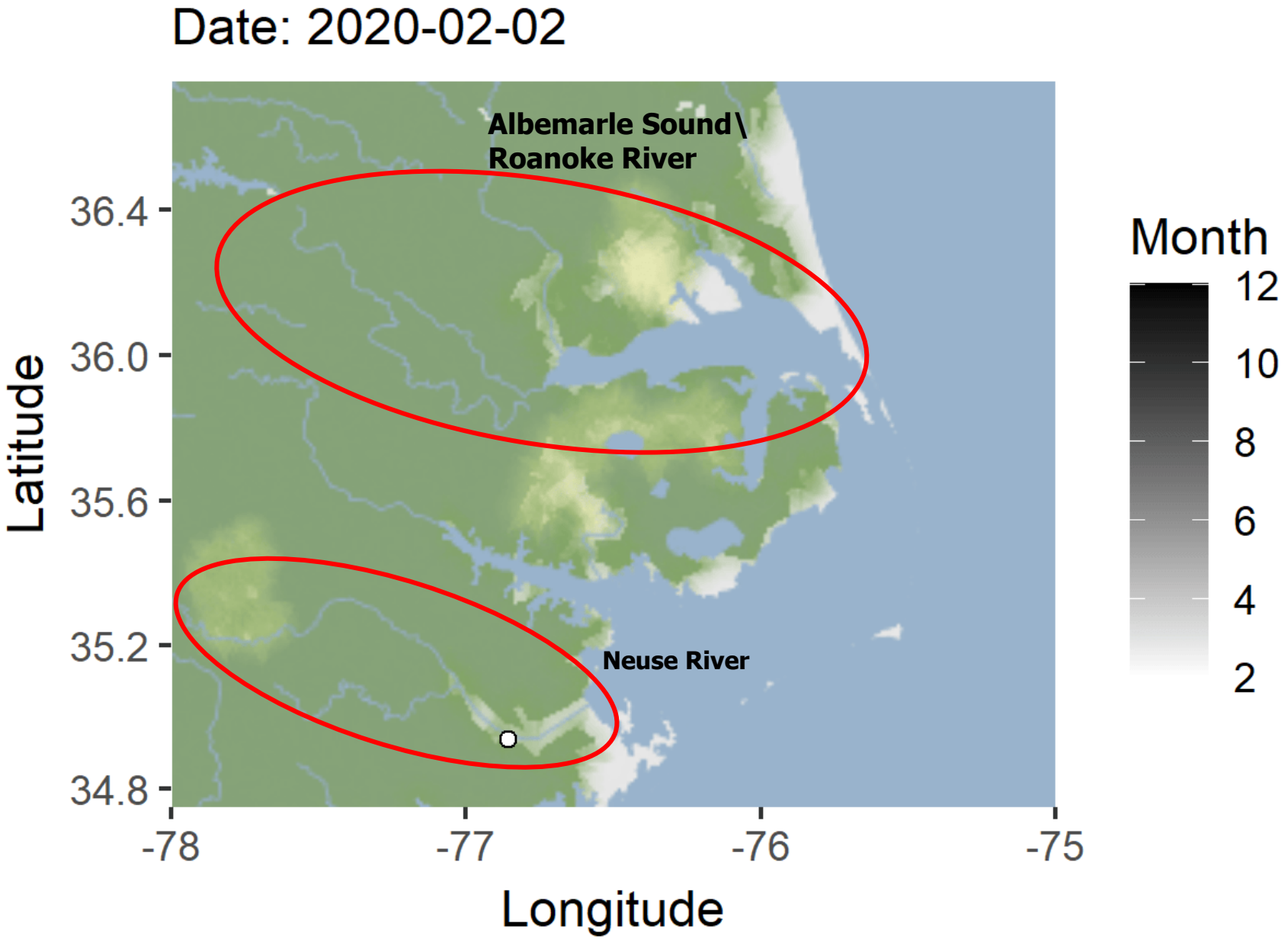
Why Management Was Ineffective

Neuse River Striped Bass Movement (#70) 2020–2022

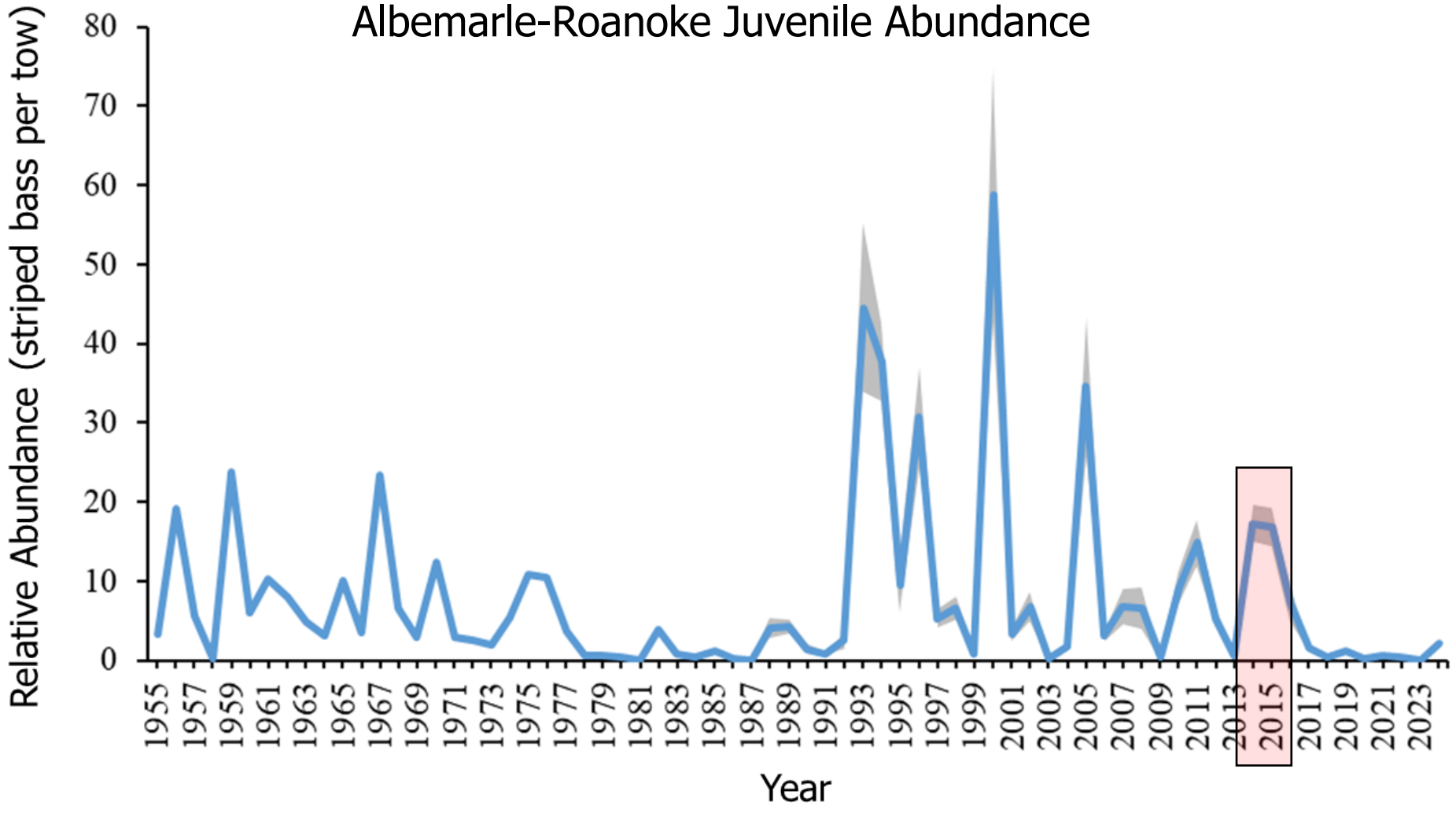


Why Management Was Ineffective

Neuse River Striped Bass Movement (#70) 2020–2022



Why Management Was Ineffective



Analysis Conclusions

Analysis Conclusions

- Harvest closure and gill net closure have been ineffective at increasing adult abundance, expanding the age structure, and promoting recruitment
- The Tar-Pamlico and Neuse rivers striped bass stocks are currently not sustainable
- Factors other than fishing mortality and inadequate spawning stock abundance are preventing sustainability of the Tar-Pamlico and Neuse rivers striped bass stocks
- Most of the 'wild' fish in the Tar-Pamlico and Neuse rivers are likely part of the Albemarle-Roanoke stock
- Environmental factors and declines in the Albemarle-Roanoke stock have contributed to reduced striped bass abundance in the Tar-Pamlico and Neuse rivers
- Additional management aimed at trying to achieve sustainability of these stock is unlikely to be effective unless significant environmental improvements occur

Adaptive Management

Next Steps

- Consistent with the Amendment 2 goal and adaptive management framework, explore harvest management measures that provide protection for and access to the resource

- Harvest of stocked fish should be low enough that mature striped bass abundance in the rivers is maintained so in the event of favorable environmental conditions, natural reproduction could occur

- Harvest management strategy will focus harvest on stocked fish in the Tar-Pamlico and Neuse rivers and limit harvest of A-R striped bass to the greatest extent possible

Preliminary Potential Management

- An open recreational harvest season in the Tar-Pamlico and Neuse rivers from April 1–30
- A one fish per person per day recreational creel limit
- An 18–22” recreational harvest slot, or >27”
- Harvest will not be allowed throughout the entire Tar-Pamlico and Neuse rivers but will be directed to areas where harvest of A-R stock striped bass will be limited

Next Steps

- Continue reviewing tagging and PBT data to determine downstream extent of harvest

- Explore commercial harvest measures
  - Amendment 2 adaptive management allows for hook and line as a commercial gear

- Present harvest management plan at the November 2025 MFC business meeting

- WRC temporary rulemaking needs to begin no later than October 2025 for a season to occur in April 2026 (15A NCAC 10C .0314 (i))

Gill Net Closure - Next Steps

- March 13, 2019 – Emergency MFC meeting
  - Motion directing DMF Director to issue gill net proclamation
  - Director bound by law to issue proclamation

- March 15, 2019 – Proclamation prohibiting use of all gill nets upstream of ferry lines

- Amendment 2 adopted November 2022
  - Motion to adopt Amendment 2 included language to: "*maintain the gill net prohibition through 2024 to allow for assessment of its performance*"

Gill Net Closure - Next Steps

- Without additional MFC action, gill net prohibition above the ferry lines in the Tar-Pamlico and Neuse rivers sunsets

- Ferry line closure (Proclamation M-6-2019) would no longer be in place

- Additional proclamations will be issued to re-institute restrictions shown to minimize striped bass bycatch.
  - Large Mesh: 3-ft tie-downs, distance from shore, attendance requirements will apply when large mesh is allowed
  - Small Mesh: attendance and distance from shore requirements will apply

Timeline

Supplement A to Amendment 1 adopted	March 2019
Ferry Line Gill Net Closure implemented	March 15, 2019
Amendment 2 adopted	November 2022
Division begins data review	January 1, 2025
Division provides background to MFC	May 21 - 23, 2025
You are here **Division presents data analysis to MFC – NO STRIPED BASS ACTION**	**August 2025**
Wildlife Resources Commission – Initiate Temporary Rule Making	October 2025
Division present plan for harvest management to MFC	November 2025

Questions?

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