Mid-Atlantic Fishery Management Council
800 North State Street, Suite 201, Dover, DE 19901
Phone: 302-674-2331 | FAX: 302-674-5399 | www.mafmc.org
Michael P. Luisi, Chairman | P. Weston Townsend, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: May 26, 2022

To: Chris Moore, Executive Director

From: Jason Didden, Staff

Subject: River Herring and Shad (RH/S) Spatial Analyses

To investigate whether spatial management may be useful for RH/S catch avoidance, staff coordinated with the NEFSC to produce revenue maps of several areas of interest that appear to have regular RH/S interactions based on raw observer data (off Cape Ann, MA, off Cape Cod, MA, off Rhode Island, and off northern coastal NJ).

NEFSC staff produced revenue maps both for the full year and the months when most RH/S observations occurred (January, February, November, December), with the above areas of higher RH/S catch outlined (several other off-shore closed areas are also noted).

Based on those revenue maps, there are no areas that could be closed to trawling to provide an obvious and consistent low-cost option for reducing RH/S catch. It may be possible to build upon these analyses, but such an effort would require substantial investigation and resources to sufficiently consider the potential impacts. The Council could weigh the relevant workload tradeoffs when developing future annual implementation plans.

The following materials are included for Council consideration on this subject:

1) Initial White Paper

2) Annual Revenue Analyses Maps
Supporting Tables Link on Meeting Page

3) Seasonal Revenue Analyses Maps (Jan, Feb, Nov, Dec)
Supporting Tables Link on Meeting Page

4) MSB and RH/S Advisory Panel Input (pages 6-7) - See Mackerel Rebuilding Tab

5) 2021 RH/S Update information is available on the October 2021 Meeting Page: https://www.mafmc.org/briefing/october-2021 under "Atlantic Mackerel Rebuilding"

Mid-Atlantic Fishery Management Council
800 North State Street, Suite 201, Dover, DE 19901
Phone: 302-674-2331 | FAX: 302-674-5399 | www.mafmc.org
Michael P. Luisi, Chairman | P. Weston Townsend, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: January 28, 2021

To: Council

From: J. Didden

Subject: River Herring and Shad (RH/S) Spatial Considerations

Staff examined NMFS **observer** data from three time periods for this analysis: 2008-2011, 2012-2015, and 2016-2019. These time groupings were the "analyst's choice," to balance increasing the number of observations in a group versus the potential to see change (or consistency) over time. For this initial analysis, staff used all available observer data (no trip definition to limit data), and simply binned combined RH/S catch by ten-minute squares (TMS). There was no extrapolating (by area or gear type), so the results are impacted/biased by the observer deployment protocols (the Standardized Bycatch Reporting Methodology (SBRM)) and fishing effort. This admittedly simple approach seemed like a reasonable first step, and makes use of the most observer data possible – all trips with any recorded RH/S catch were included. Table 1 summarizes the trips that had some catch of RH/S by gear type. Like the spatial analysis, the summary trip counts are influenced by observer coverage levels.

Table 1. Included trips by gear type, which is also the number of trips that had any recorded RH/S catch.

Gear	2008-2011	2012-2015	2016-2019
Bottom Trawl	1,072	1,295	2,005
Gill Net	203	353	310
Mid-Water Trawl	199	107	46
Other	27	27	18

The TMSs (about 100 square miles each) were sorted from most to least RH/S catch, and then grouped and labeled "1", "2," "3," or "4." The TMSs with the most RH/S catch that totaled at least 25% of the RH/S catch for a time period were labeled "1s." In a time period, it may have been a single TMS, or several TMSs to make up that first 25% of observed RH/S catch (raw data). For each following group/label (2,3,4), the other TMSs that account for the next 25% of catch are grouped and labeled similarly. Since the TMSs are first sorted from high to low catch, it takes relatively few initial TMSs (which have the highest catch) to get the first 25% of total catch (group 1), more TMSs to get the next 25% of total catch (group 2), and so on. So there are few of the darkest blue TMSs and more lighter blue TMSs.

There do seem to be some areas that have repeated higher RH/S catches common among two or three time periods. Staff noted (subjective visual inspection and drawing by staff) four areas with

green dashed outlined boxes in the figures below that appear to have repeated higher RH/S catches. As was considered with previous actions, the real effects of closing any area mostly depend on how the relevant fisheries respond to closures, and the proportions of both the targeted species and RH/S in the areas where any re-directed effort ends up. If a fishery is pushed into an area with lower abundance of RH/S but where the targeted species is scarce, the net effect could increase total RH/S catch if the fishery expends additional effort to compensate. Nevertheless, the four highlighted areas accounted for 65% of observed RH/S catch in 2008-2011, 61% in 2012-2015, and 57% in 2016-2019. In addition, most (74%-89%) of the RH/S in those four areas occurred during the months of January, February, November, and December. For reference, the approved (effective February 10, 2021) NEFMC inshore midwater trawl restricted areas are also included in Figure 4.

If the Council would like to explore this issue further, staff recommends that the Council request revenue maps from the NEFSC (like were done for the coral amendment) for small mesh bottom trawl and mid-water trawl gear corresponding to these time periods (January, February, November, and December of 2008-2011, 2012-2015, and 2016-2019). Then with those maps, staff could gather input from the advisory panel during planned 2021 meetings on whether possible restrictions in these times/areas could facilitate the fishery avoiding RH/S while still catching the relevant quotas (or whether restrictions could just re-shuffle effort in an inefficient manner). Based on the revenue maps and AP input, the Council could then consider whether to evaluate potential time-area closures in a 2022 action, with additional analysis conducted by an FMAT.

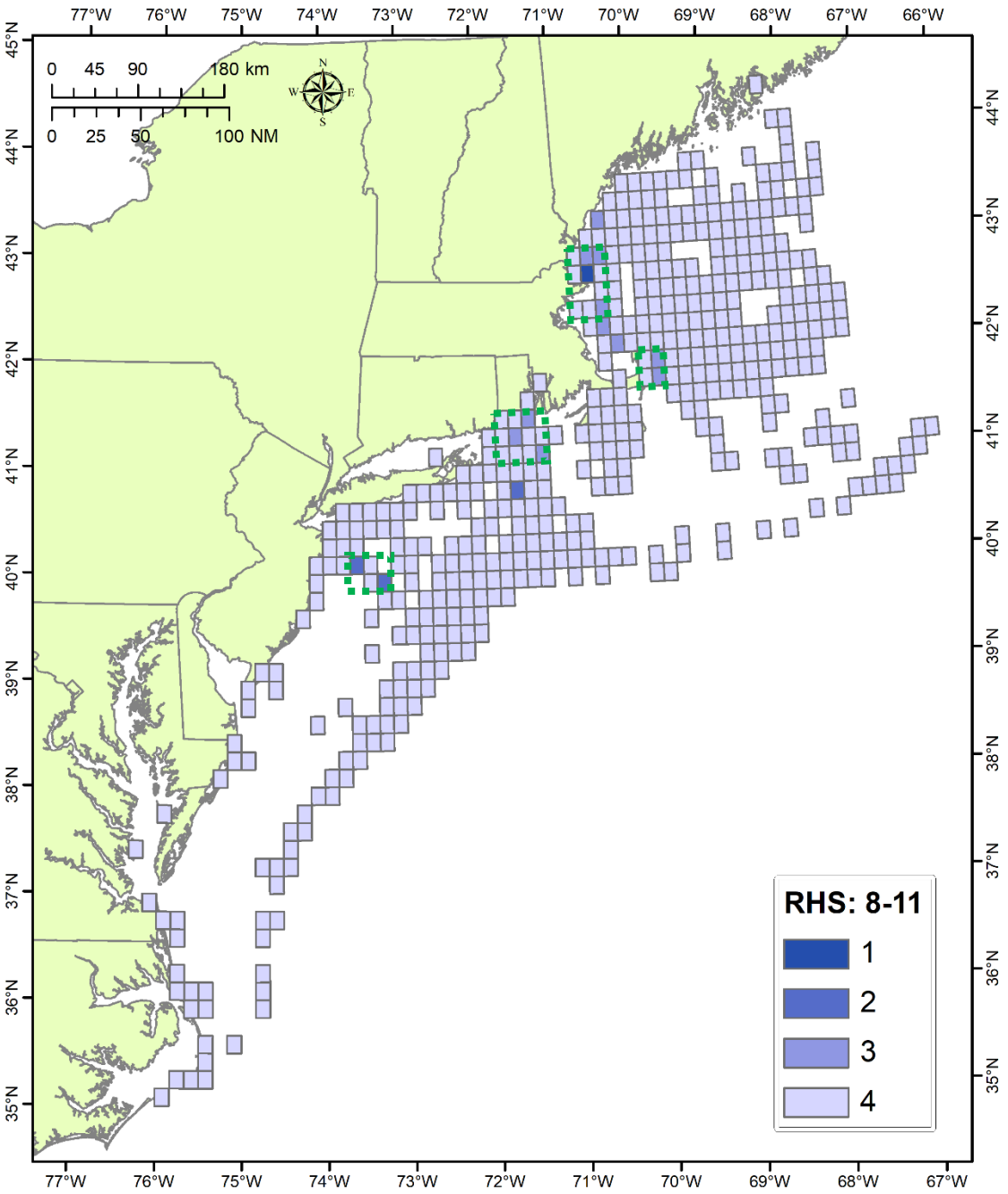


Figure 1. RH/S catch density (raw data) in 2008-2011 observer data, all gears. 1 = those ten minute squares that had highest RH/S catch and accounted for 25% of total observed RH/S catch, and so on for other quartiles of total RH/S catch and less dense groups of ten minute squares. Staff noted (subjective visual inspection and drawing by staff) four areas with green dashed outlined boxes that appeared to have repeated higher RH/S catches.

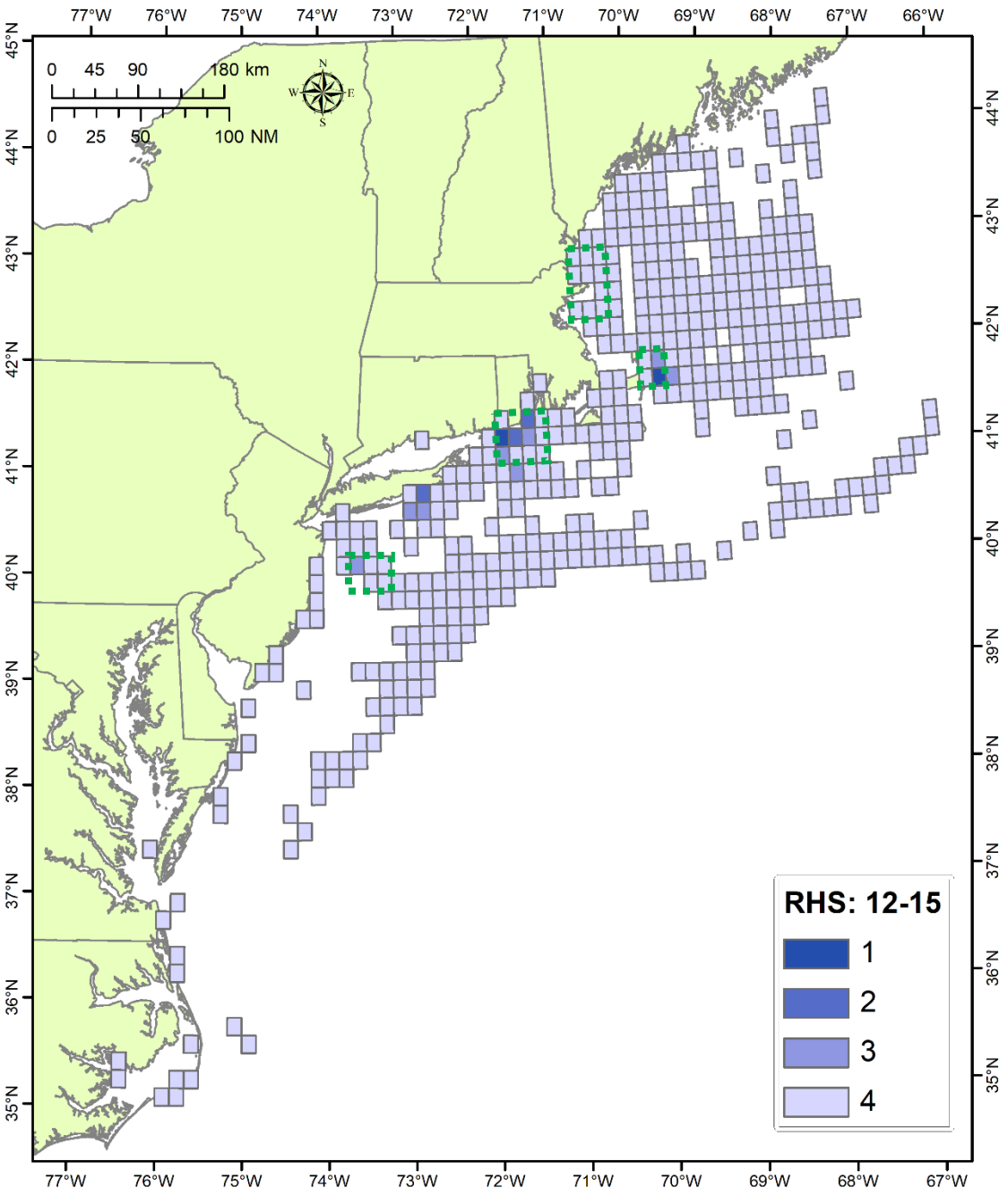


Figure 2. RH/S catch density (raw data) in 2012-2015 observer data, all gears. 1 = those ten minute squares that had highest RH/S catch and accounted for 25% of total observed RH/S catch, and so on for other quartiles of total RH/S catch and less dense groups of ten minute squares. Staff noted (subjective visual inspection and drawing by staff) four areas with green dashed outlined boxes that appeared to have repeated higher RH/S catches.

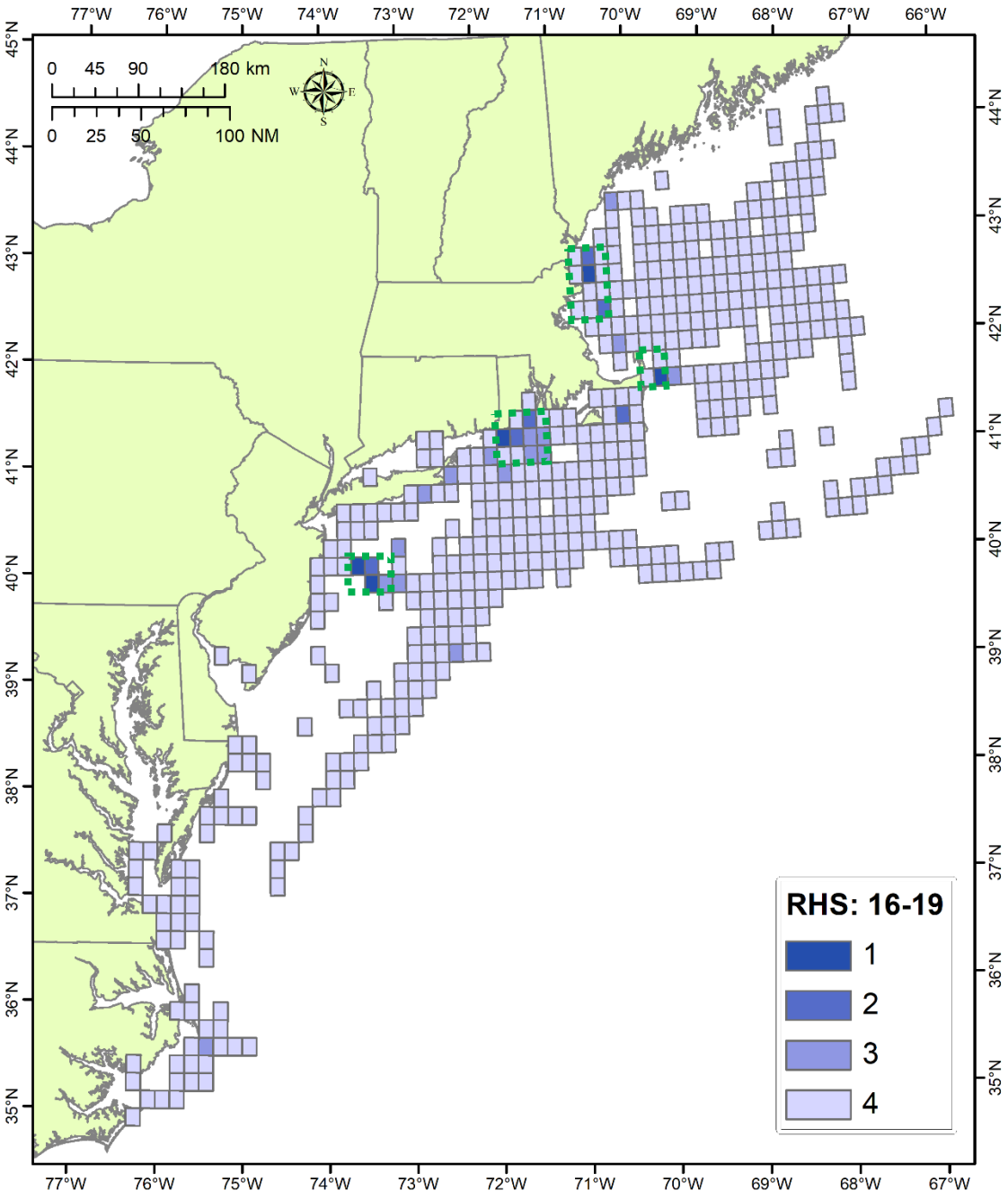


Figure 3. RH/S catch density (raw data) in 2016-2019 observer data, all gears. 1 = those ten minute squares that had highest RH/S catch and accounted for 25% of total observed RH/S catch, and so on for other quartiles of total RH/S catch and less dense groups of ten minute squares. Staff noted (subjective visual inspection and drawing by staff) four areas with green dashed outlined boxes that appeared to have repeated higher RH/S catches.

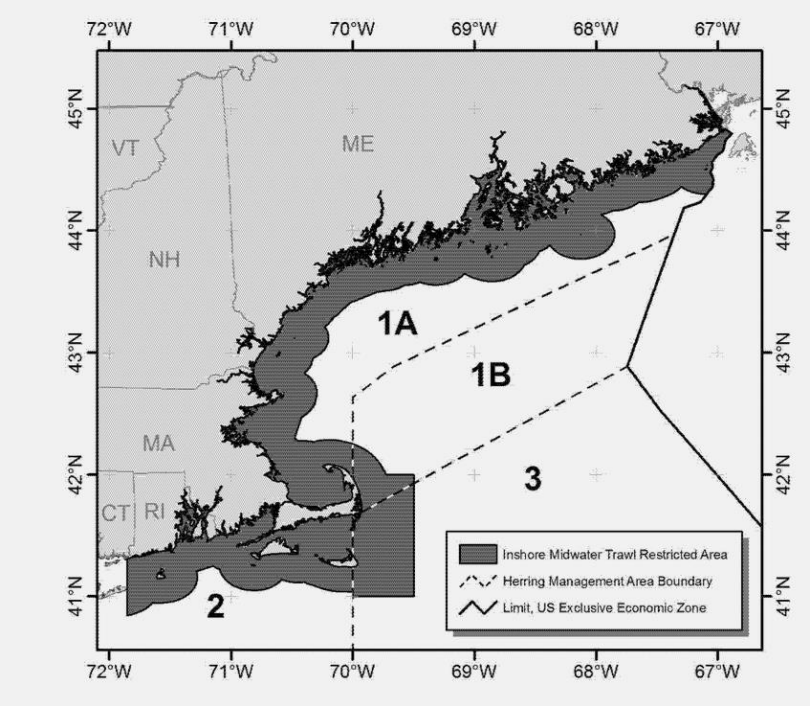


Figure 4. NEFMC Inshore Midwater Trawl Restricted Area (Effective February 10, 2021)

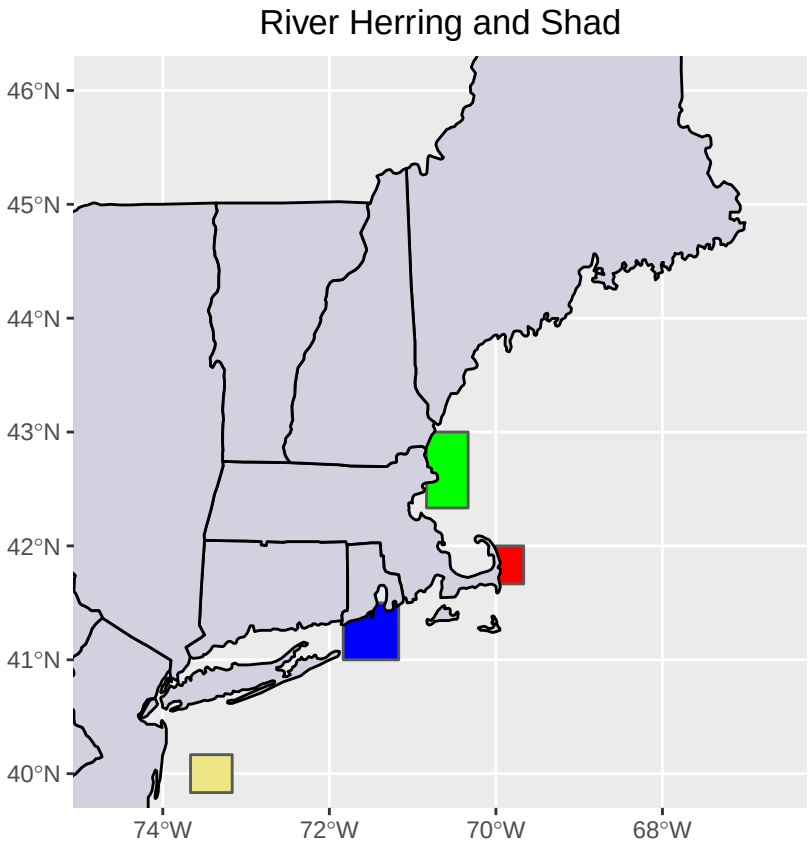
Appendix 2 - Spatial Economic Analyses of Selected
Areas that had higher levels of observed RH/S Catch

Maps for River Herring

Min-Yang Lee

June 09, 2021

Maps of Selected Fishery Landings and Revenue



Data sources:

Commerical Fisheries landings data, Vessel Trip Reports, and Surfclam/OceanQuahog Logbooks

Caveats and notes:

- When mapped, values are reported in nominal dollars per square kilometer.
- When mapped, values reported are nominal dollars per square kilometer.
- Pounds are reported in landed pounds.

- Data summarized here is based on vessels that are required to provide federal VTRs.

Selected Maps

Midwater Trawl River herring

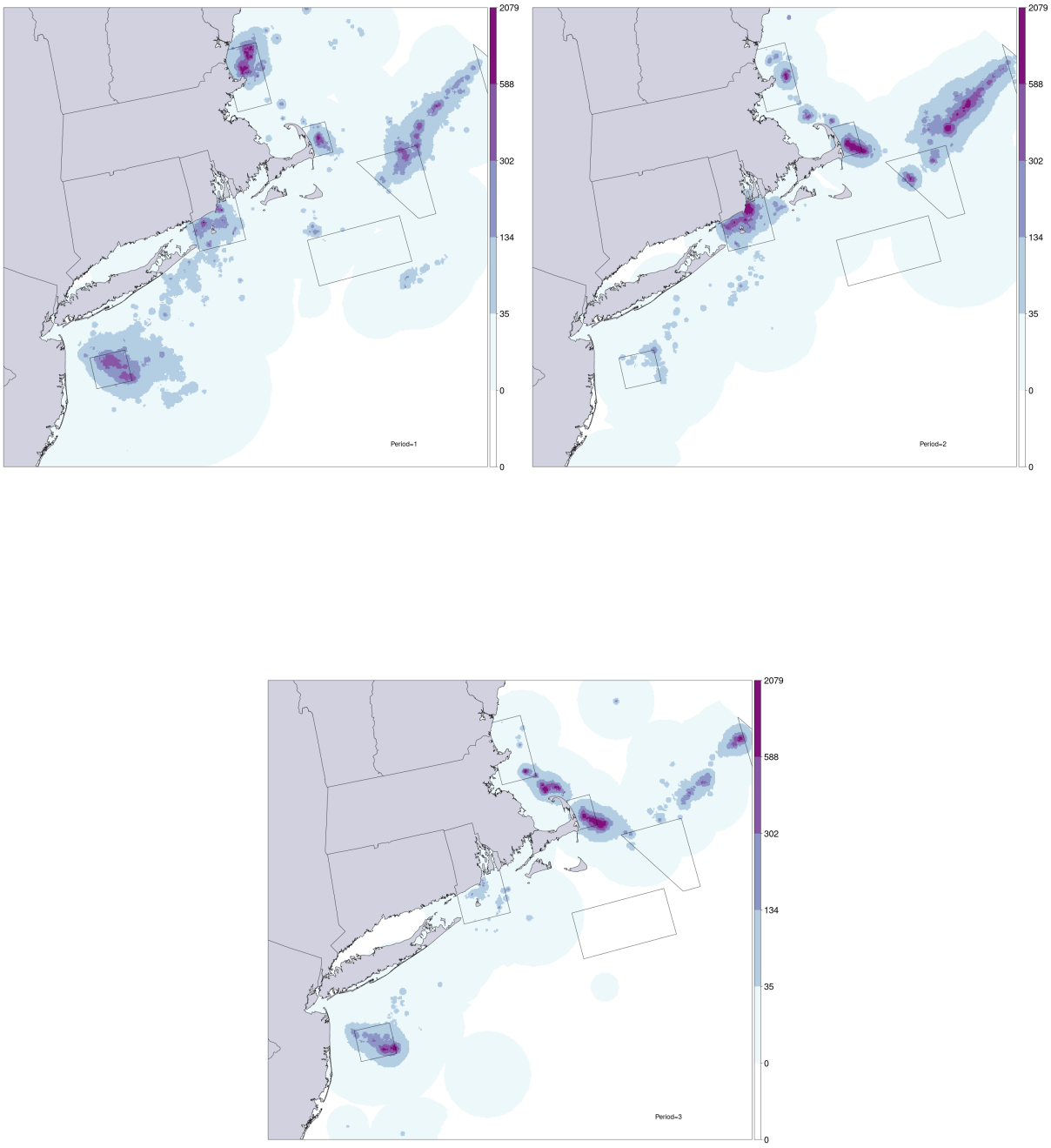


Figure 1: Total Revenue by Midwater Trawl. Top Left: 2008-2011. Top Right: 2012-2015. Bottom: 2016-2019.

Small Mesh Bottom Trawl River herring

References

DePiper GS (2014) Statistically assessing the precision of self-reported VTR fishing locations.
Benjamin S, Lee MY, DePiper G. 2018. Visualizing fishing data as rasters. NEFSC Ref Doc 18-12; 24 p.

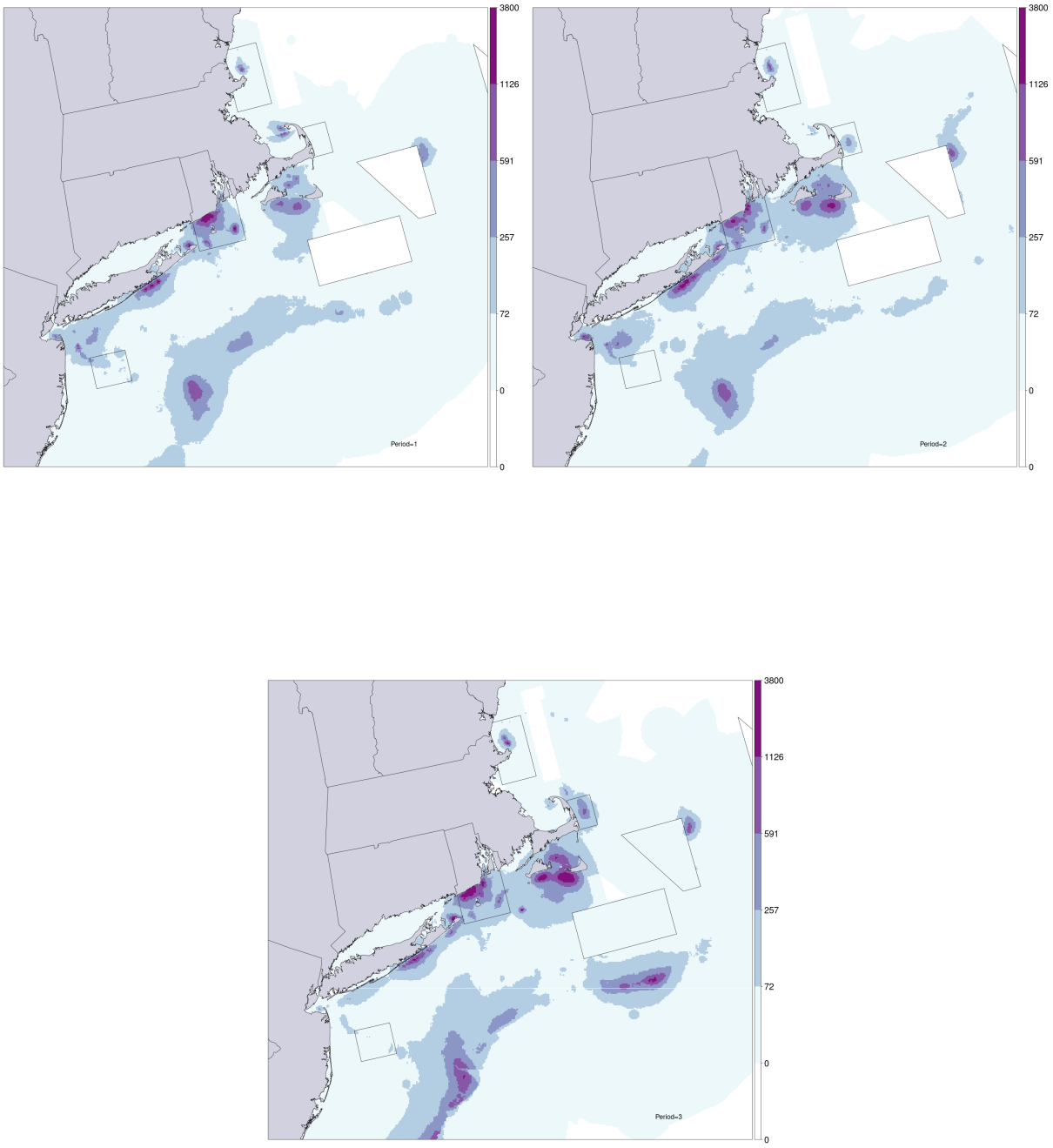


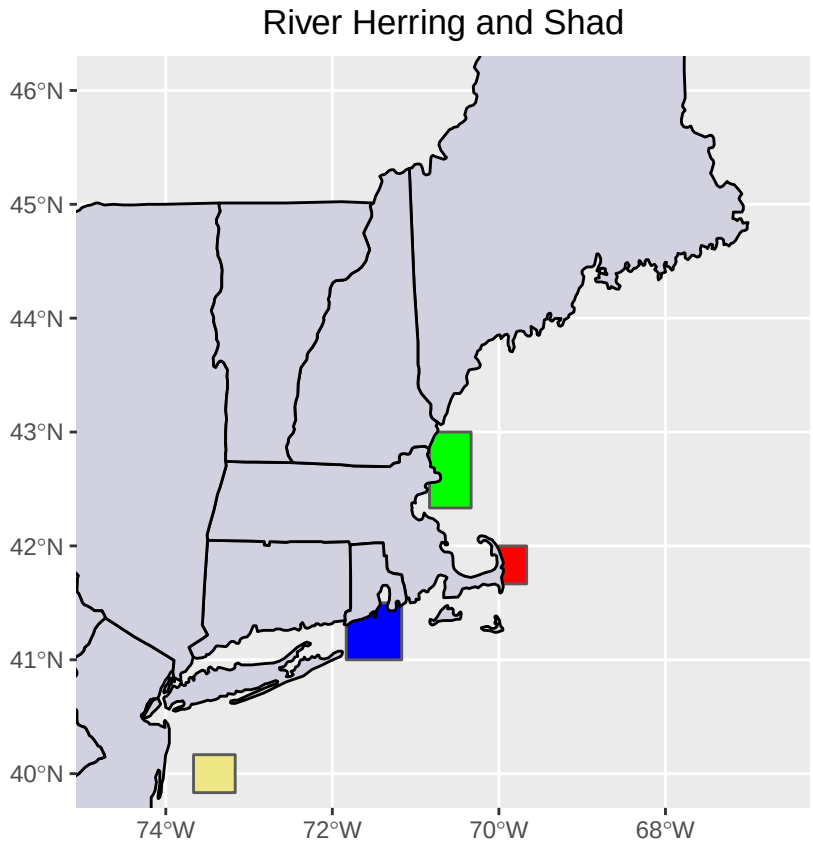
Figure 2: Total Revenue by Small Mesh Bottom Trawl.Top Left: 2008-2011. Top Right: 2012-2015. Bottom: 2016-2019.

Maps for River Herring: Jan, Feb, Nov, Dec

Min-Yang Lee

March 23, 2022

Maps of Selected Fishery Landings and Revenue



Data sources:

Commerical Fisheries landings data, Vessel Trip Reports, and Surfclam/OceanQuahog Logbooks

Caveats and notes:

- When mapped, values are reported in real (2019) dollars per square kilometer.
- Pounds are reported in landed pounds.
- Data summarized here is based on vessels that are required to provide federal VTRs.

Selected Maps

Midwater Trawl River herring

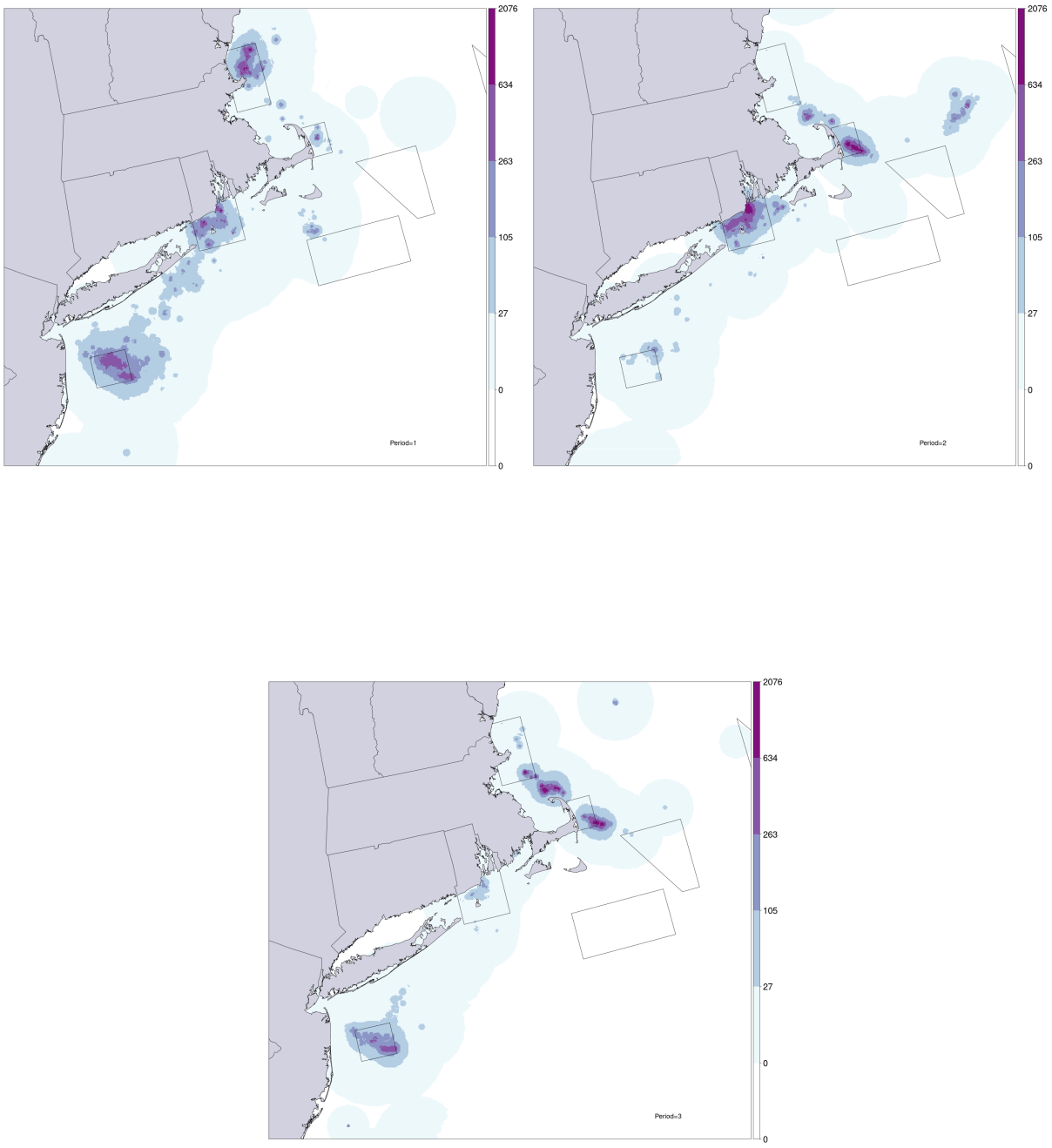


Figure 1: Total Revenue by Midwater Trawl. January, February, November, and December only. Top Left: 2008-2011. Top Right: 2012-2015. Bottom: 2016-2019.

Small Mesh Bottom Trawl River herring

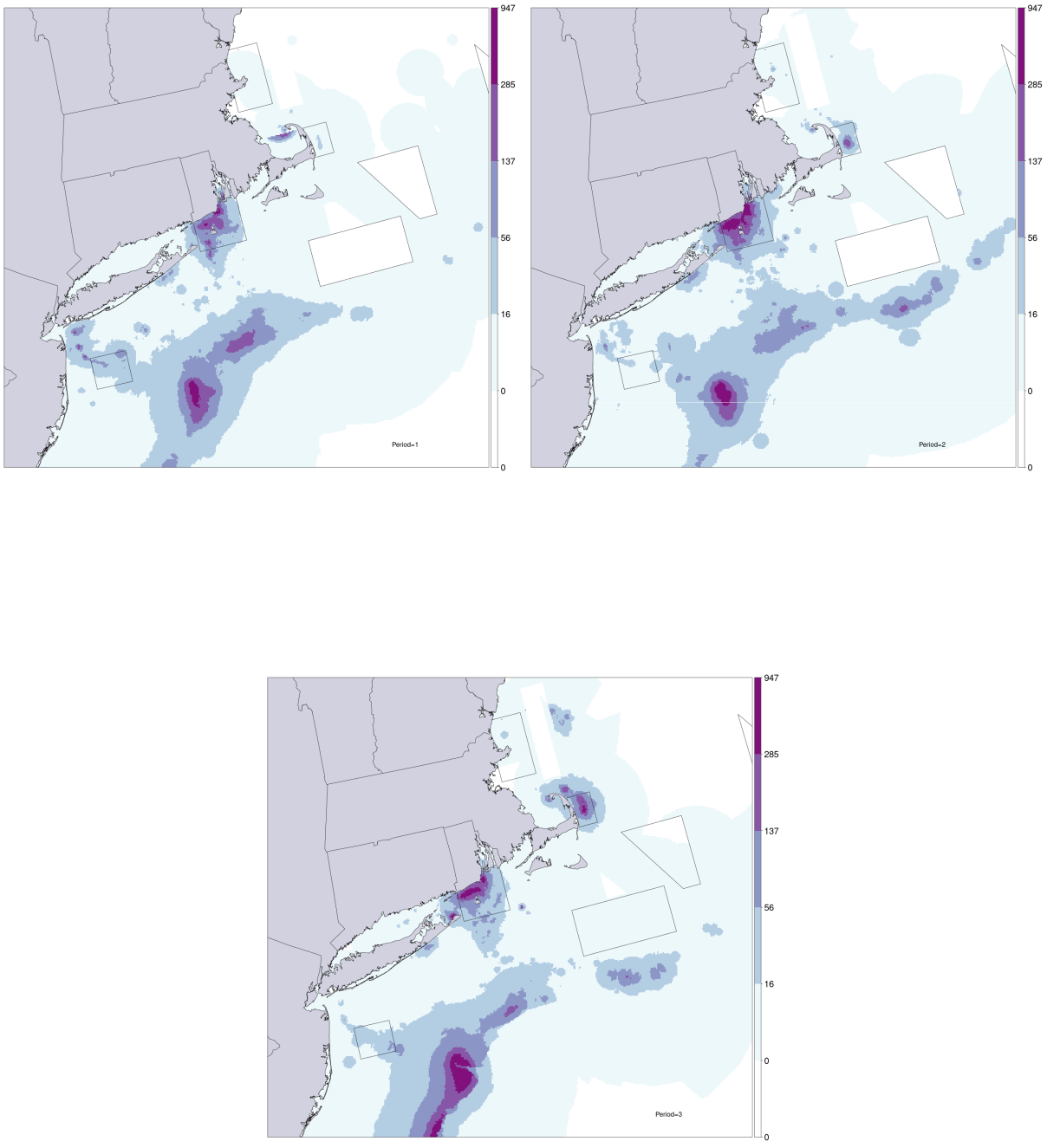


Figure 2: Total Revenue by Small Mesh Bottom Trawl. January, February, November, and December only. Top Left: 2008-2011. Top Right: 2012-2015. Bottom: 2016-2019.

References

DePiper GS (2014) Statistically assessing the precision of self-reported VTR fishing locations.
Benjamin S, Lee MY, DePiper G. 2018. Visualizing fishing data as rasters. NEFSC Ref Doc 18-12; 24 p.