Interpolator Grid: Testing thinning of 50 m and 100 m segments

BORG meeting
May 18, 2026

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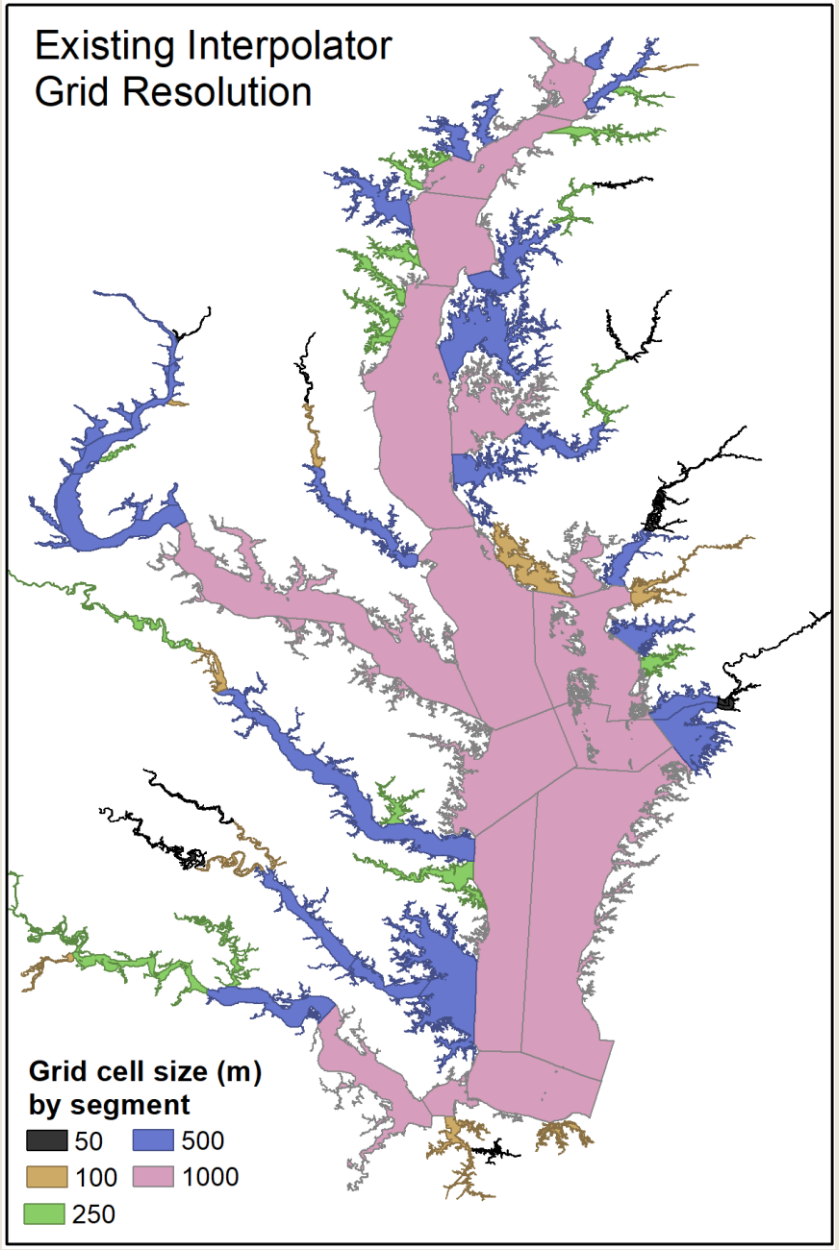
For today

- Thank you for comments last month and via email.
- Today we will quickly review, and then zoom in on a few questions:
  - *Comparison to data depths in segments with some grid-depth impacts.*
  - *Reasons for recommendations.*
- Decision to move forward with proposed set of thinning.

Background

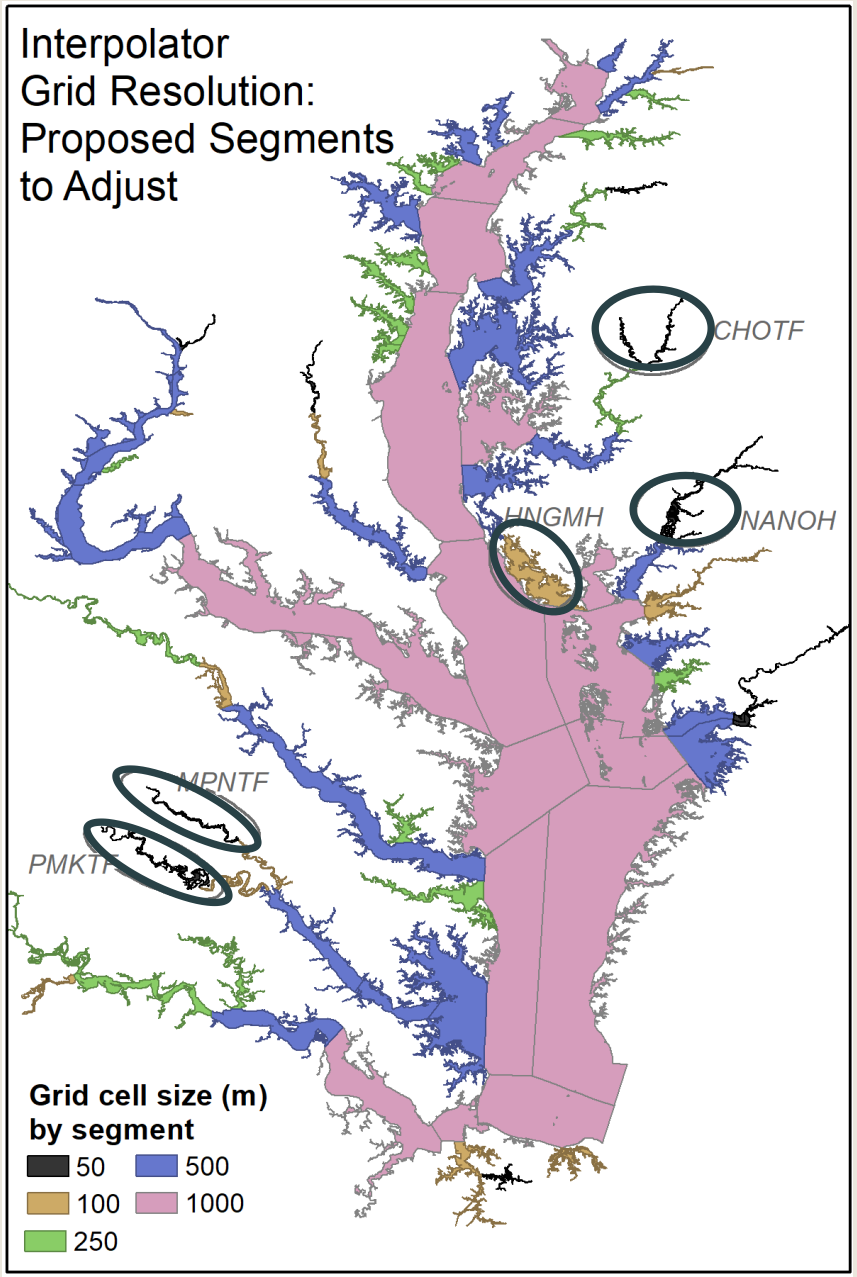
- For criteria assessment purposes, DO data is interpolated to a grid that fills the volume of each segment.
- A spatial grid exists that has been used for the 3-D interpolator:
  - *Vertical resolution = 1m layers*
  - *Horizontal resolution = cells ranging from 50m x 50m to 1km x 1km*
- For consistency, we intended to use that same grid for the 4-D spatial output.

Cell size	Number of segments	Area (km^2)
50 m	15	91
100 m	15	265
250 m	19	497
500 m	26	2,467
1 km	17	8,341



Background

- At our meeting in Nov. 2025, we discussed whether five segments could be thinned to make runs more feasible on personal computer (memory requirements get large with more grid points).
- We looked at maps and DO distributions with and without thinning from the interpolation results.
- BORG team agreed results were acceptable to thin these segments, and also requested analysis for remaining 50 m resolution segments.
- Subsequent analysis led us to also test all originally 100 m grid cells (also count = 15) to see if any of them could be thinned to 200 m.



Segment lists

Originally 50 m segments

segment	state	description	count at 50m	count at 100m	discussed previously
ANATF_DC	DC	Anacostia River, DC	4,971	1,247	
NANTF_DE	DE	Upper Nanticoke, DE	1,307	340	
ANATF_MD	MD	Anacostia River, MD	69	15	
CHOTF	MD	Upper Choptank River	5,767	1,473	yes
CHSTF	MD	Upper Chester River	1,345	331	
NANOH	MD	Middle Nanticoke River	17,995	4,482	yes
NANTF_MD	MD	Upper Nanticoke, MD	1,339	348	
PAXTF	MD	Upper Patuxent River	4,406	1,105	
POCOH_MD	MD	Middle Pocomoke River, MD	4,161	1,066	
POCTF	MD	Upper Pocomoke River	1,788	454	
WBRTF	MD	Western Branch Patuxent	45	14	
EBEMH	VA	Eastern Branch Elizabeth	2,584	652	
MPNTF	VA	Upper Mattaponi River	7,203	1,813	yes
PMKTF	VA	Upper Pamunkey River	11,452	2,864	yes
POCOH_VA	VA	Middle Pocomoke River, VA	3,039	775	

Originally 100 m segments

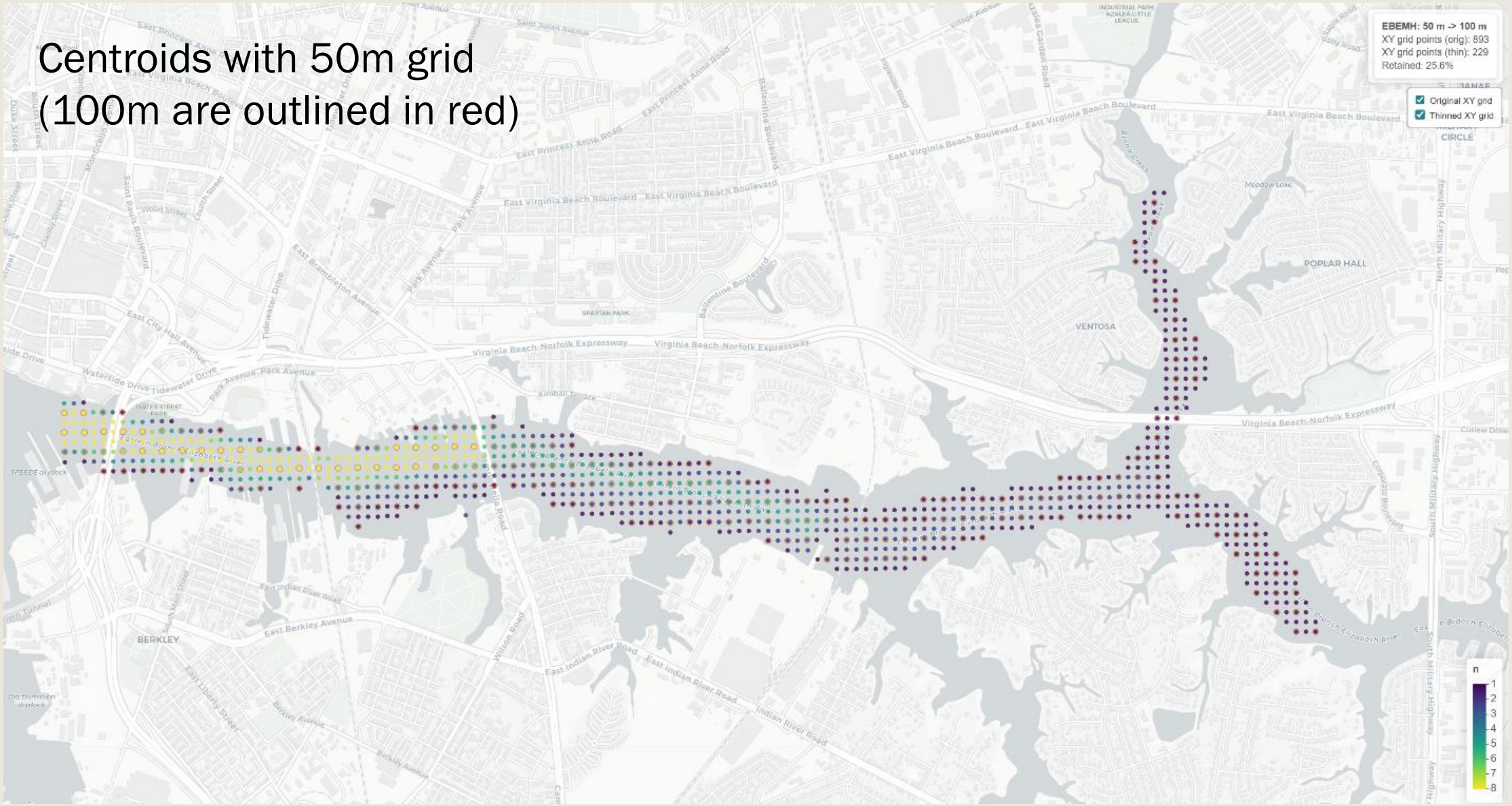
segment	state	description	count at 100m	count at 200m	discussed previously
C&DOH_DE	DE	C&D Canal, DE	790	177	
C&DOH_MD	MD	C&D Canal, MD	1,623	421	
HNGMH	MD	Honga River	18,568	4,654	yes
PAXOH	MD	Middle Patuxent River	2,718	669	
PISTF	MD	Piscataway Creek	285	71	
WICMH	MD	Wicomico River	5,642	1,450	
APPTF	VA	Appomattox River	151	36	
ELIPH	VA	Mouth to mid Elizabeth	11,753	2,945	
LAFMH	VA	Lafayette River	339	85	
LYNPH	VA	Lynnhaven River	1,676	406	
MPNOH	VA	Lower Mattaponi River	3,341	844	
PMKOH	VA	Lower Pamunkey River	6,668	1,634	
RPPOH	VA	Middle Rappahannock	5,355	1,328	
SBEMH	VA	Southern Branch Elizabeth	2,773	682	
WBEMH	VA	Western Branch Elizabeth	631	162	

Maps of grid difference

- All maps are available on the April meeting's website (two sets of zip files):

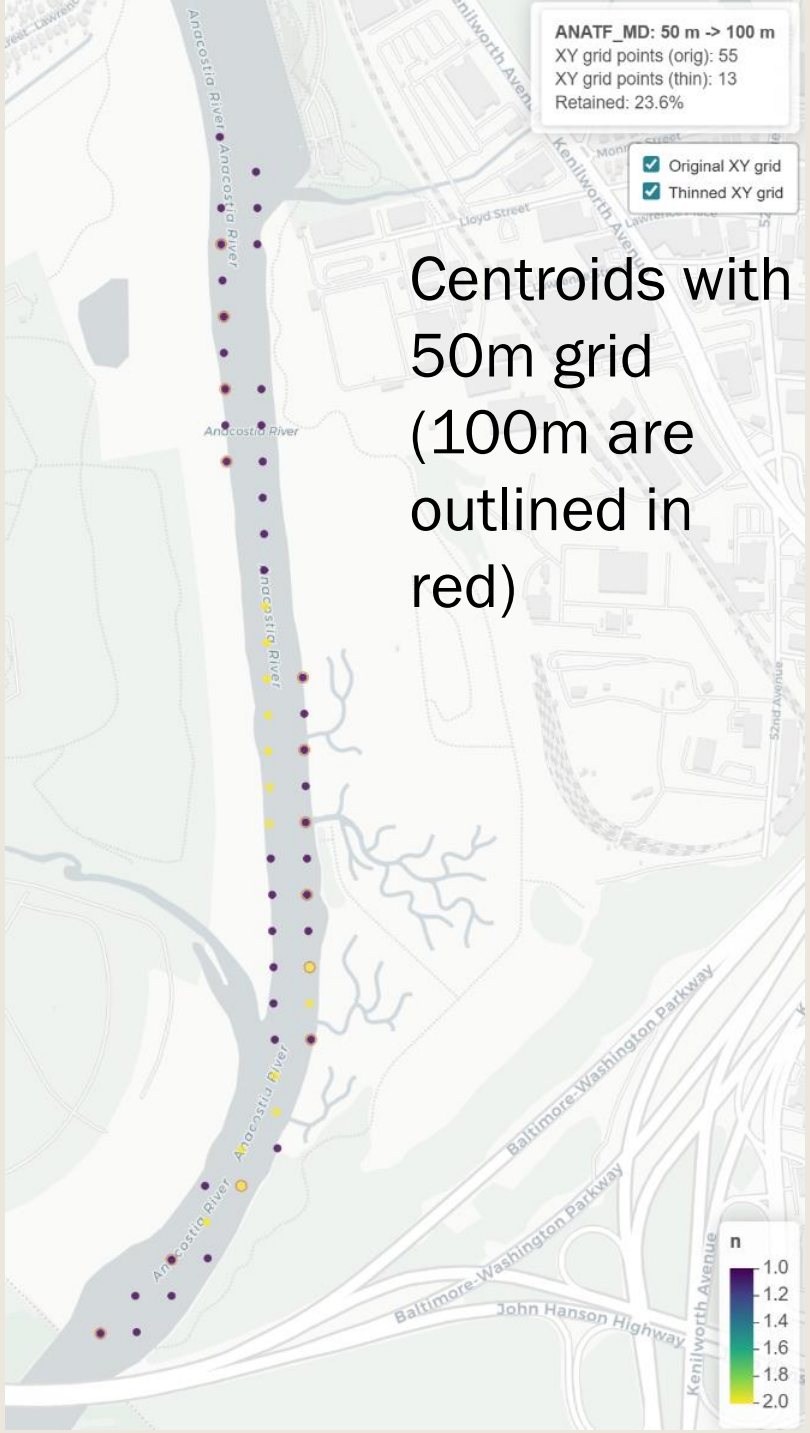
https://www.chesapeakebay.net/what/event/bay-oxygen-research-group-monthly-meeting-april-2026

Virgina’s Eastern Branch Elizabeth River (EBEMH)

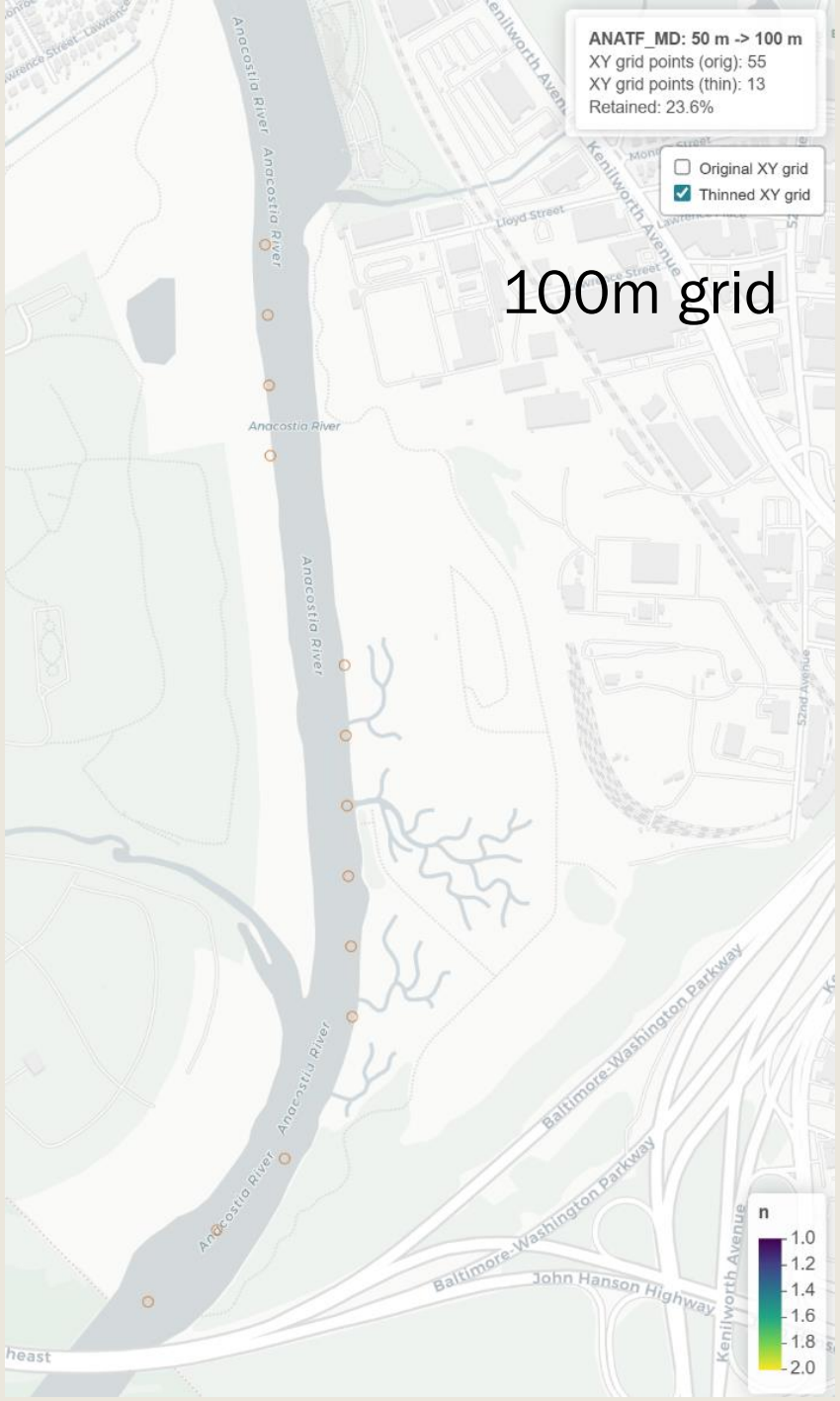


Virgina’s Eastern Branch Elizabeth River (EBEMH)

Maryland's Anacostia Tidal Fresh segment (ANATF_MD)



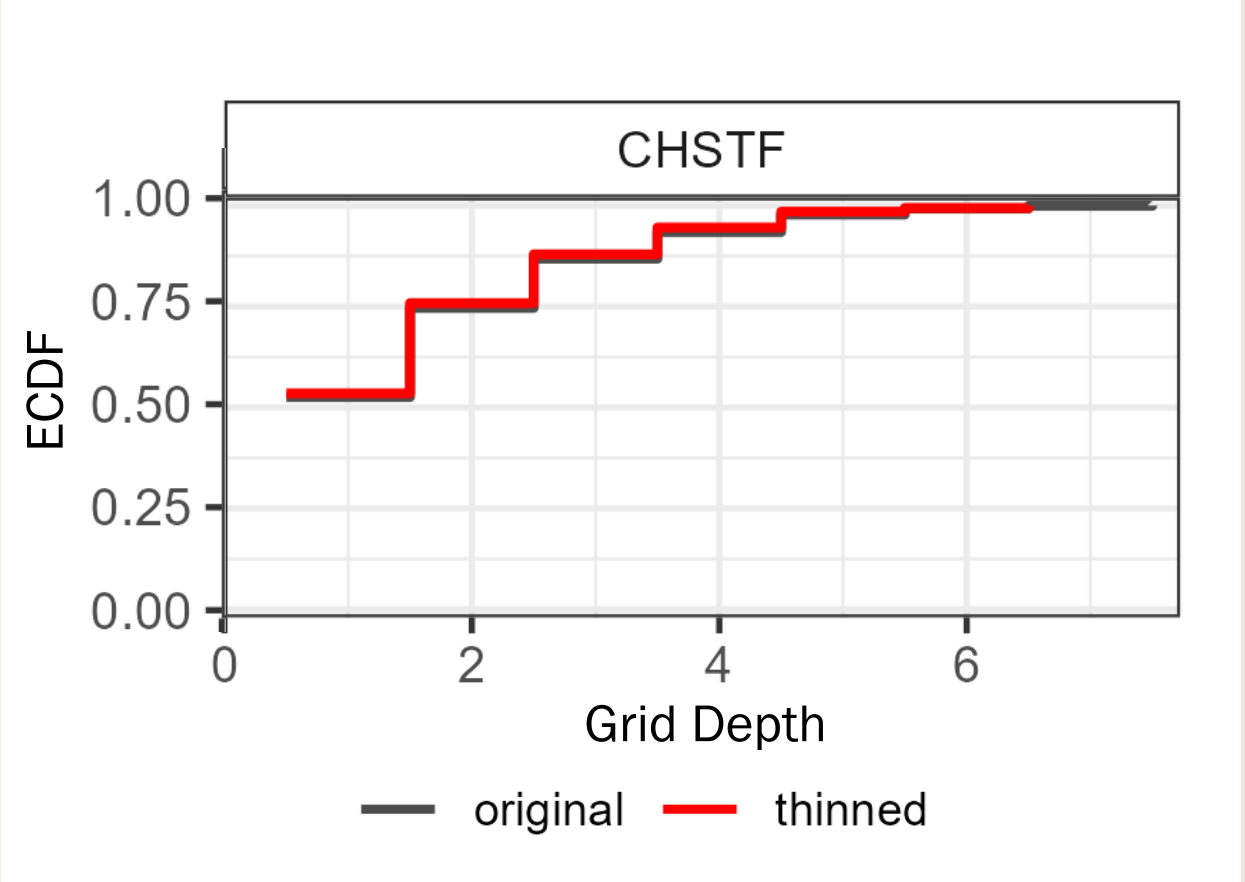
Centroids with 50m grid (100m are outlined in red)

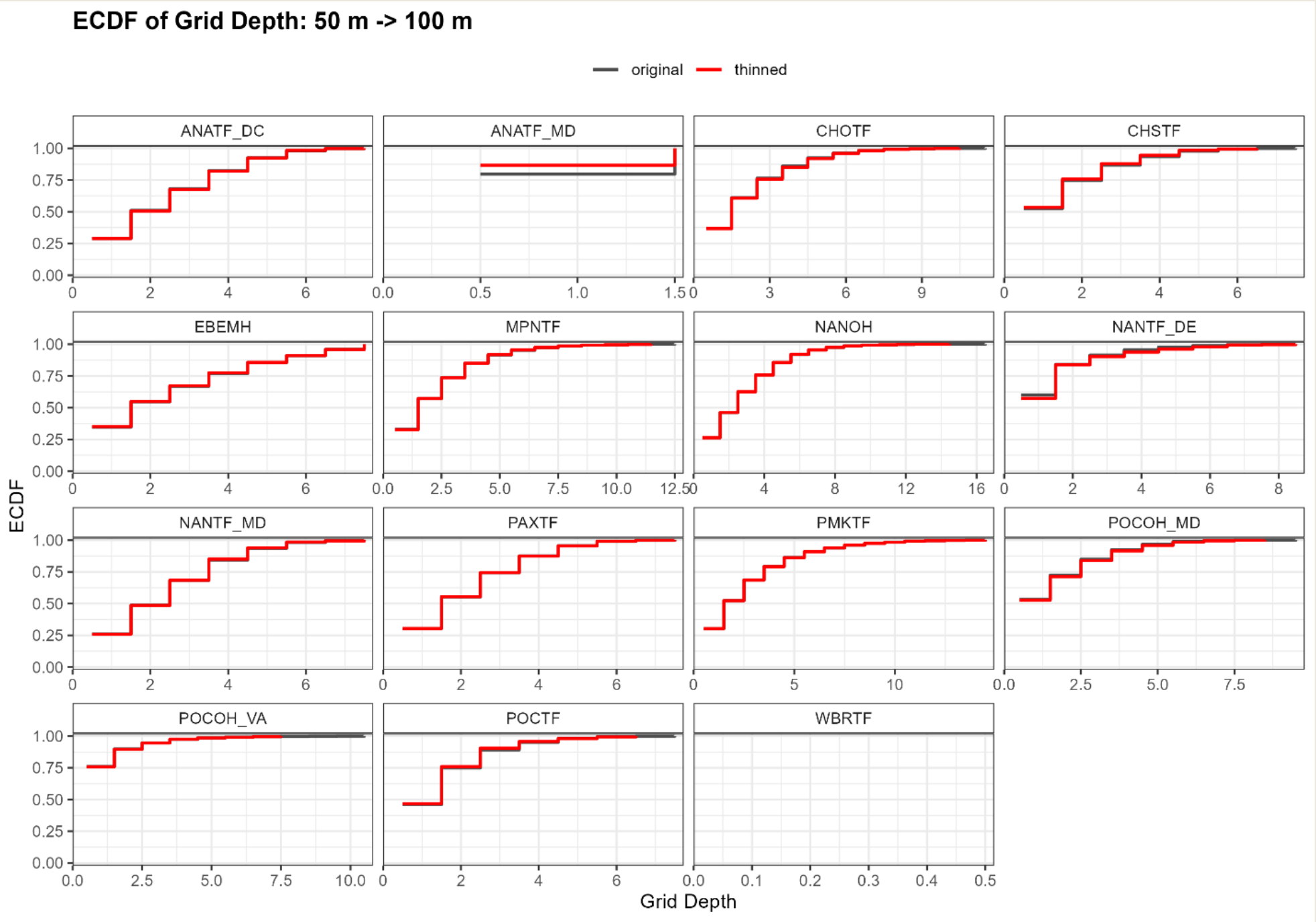


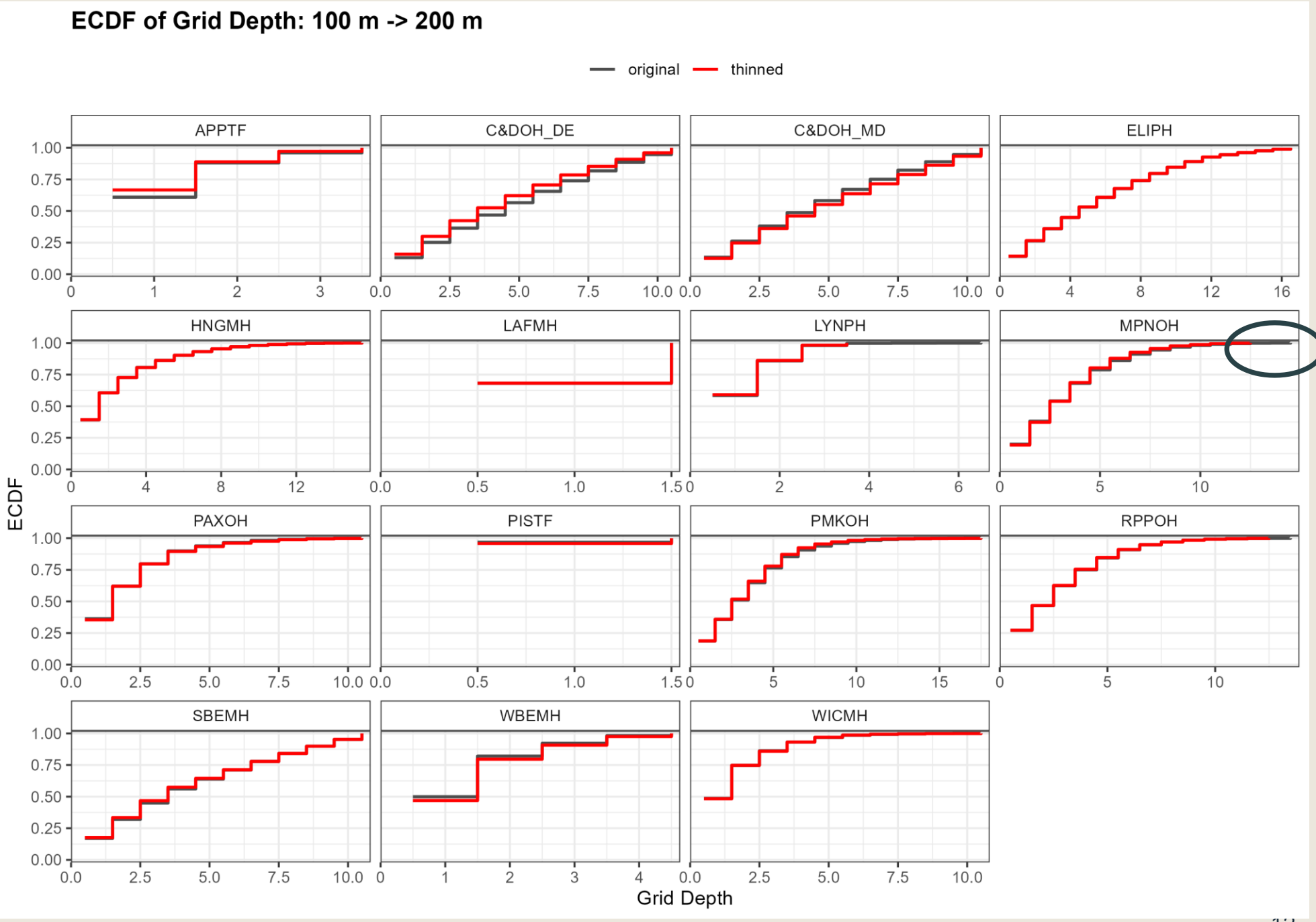
100m grid

Results: Depth distribution changes

- Examined distribution of grid cell depths for each segment with original vs. thinned grid cells.
- Question: Does thinning the segment grids result in a change in the vertical representation of the segment?
- Generated empirical cumulative density function graph (ECDFs) for each segment with black lines for the original grids and red lines for the thinned grids.




ECDF of Grid Depth: 50 m -> 100 m
original
thinned
ANATF_DC
ANATF_MD
CHOTF
CHSTF
EBEMH
MPNTF
NANOH
NANTF_DE
NANTF_MD
PAXTF
PMKTF
POCOH_MD
POCOH_VA
POCTF
WBRTF
ECDF
Grid Depth



Dug into results like this based on question in last meeting.

More details: Depth changes

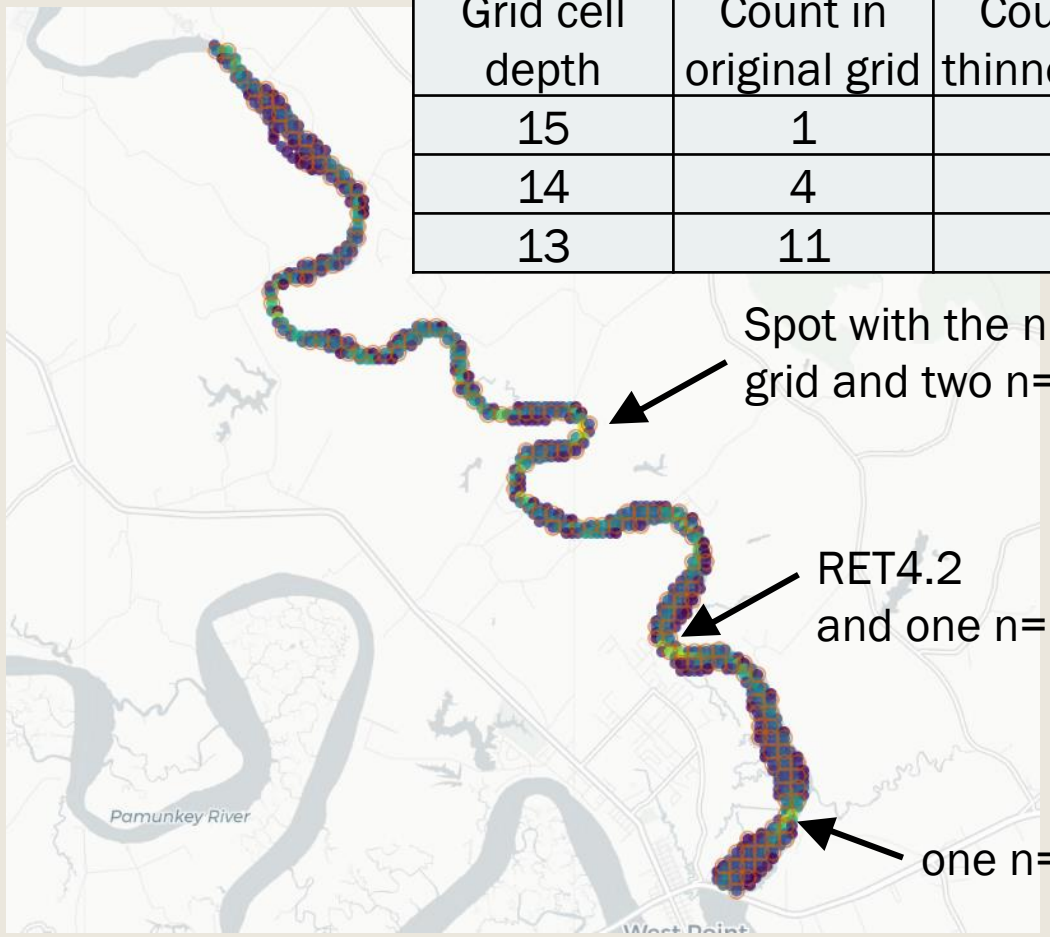
- If the black line is visible at the end of the plots, it means the deepest depth was thinned out of the grid.
- Question: Will this remove data from the interpolation?
  - *Answer: No, we are not removing any observations. All data, even at deeper depths than the grid, is still included. The impact is that there will be no interpolated DO at any depth that is thinned.*
  - *However, in almost all these cases, the deepest sampled depths in these segment are shallower than the deepest grid cells.*

Thinning category	Segment	Original deepest grid depth (m)	Thinned deepest grid depth (m)	Deepest DO data from 2015-2024 (m)
50 to 100	CHOTF	12	11	5.8*
50 to 100	CHSTF	8	7	6
50 to 100	MPNTF	13	12	5
50 to 100	NANOH	17	15	6
50 to 100	POCOH_MD	10	9	9
50 to 100	POCOH_VA	11	8	7
50 to 100	POCTF	8	7	6.6
100 to 200	LYNPH	7	4	2.5
100 to 200	MPNOH	15	13	18
100 to 200	RPPOH	14	13	8

*sample is in CHOOH

MPNOH grid/depths

Grid cell depth	Count in original grid	Count in thinned grid
15	1	0
14	4	0
13	11	1

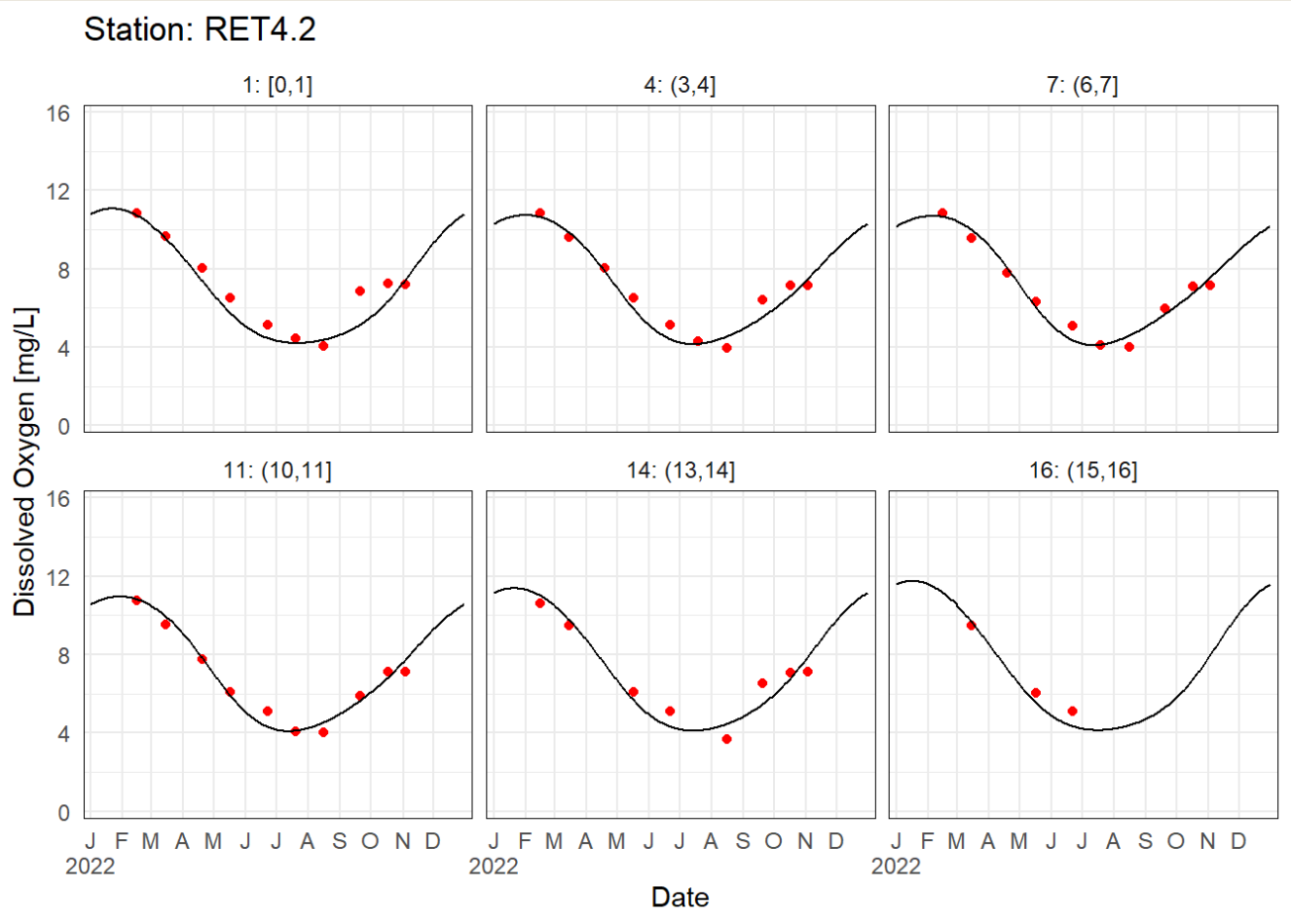


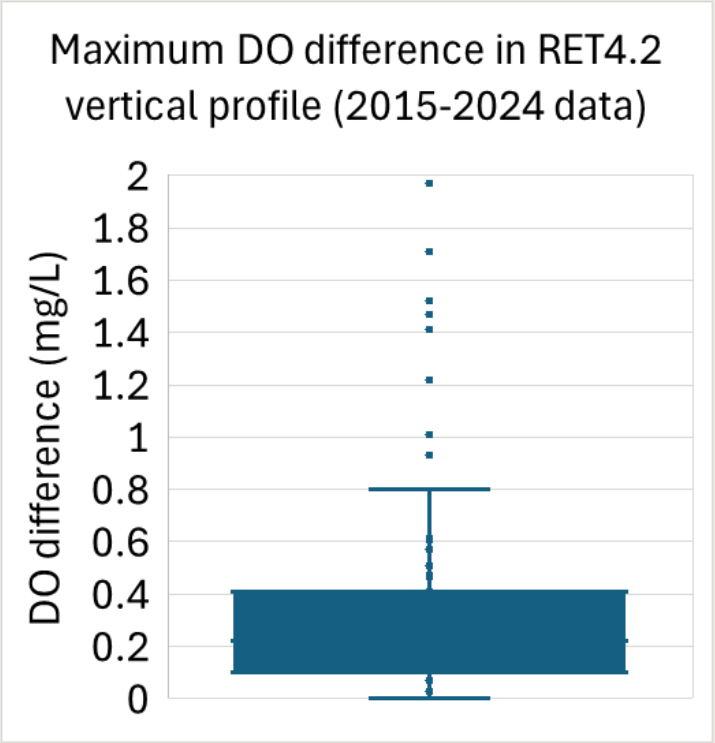
- Note that deepest grid cells are not all near RET4.2.
- RET4.2 is almost always sampled to 12-13 meters, but not always at the depths deeper than that.

History of sampled depths at RET4.2

RET4.2 DO observed depth (m)	count of DO from 2015-2024
1	113
2	112
3	112
4	112
5	112
6	112
7	112
8	112
9	112
10	111
11	110
12	104
13	94
14	74
15	50
16	34
17	18
18	1

MPNOH grid/depths



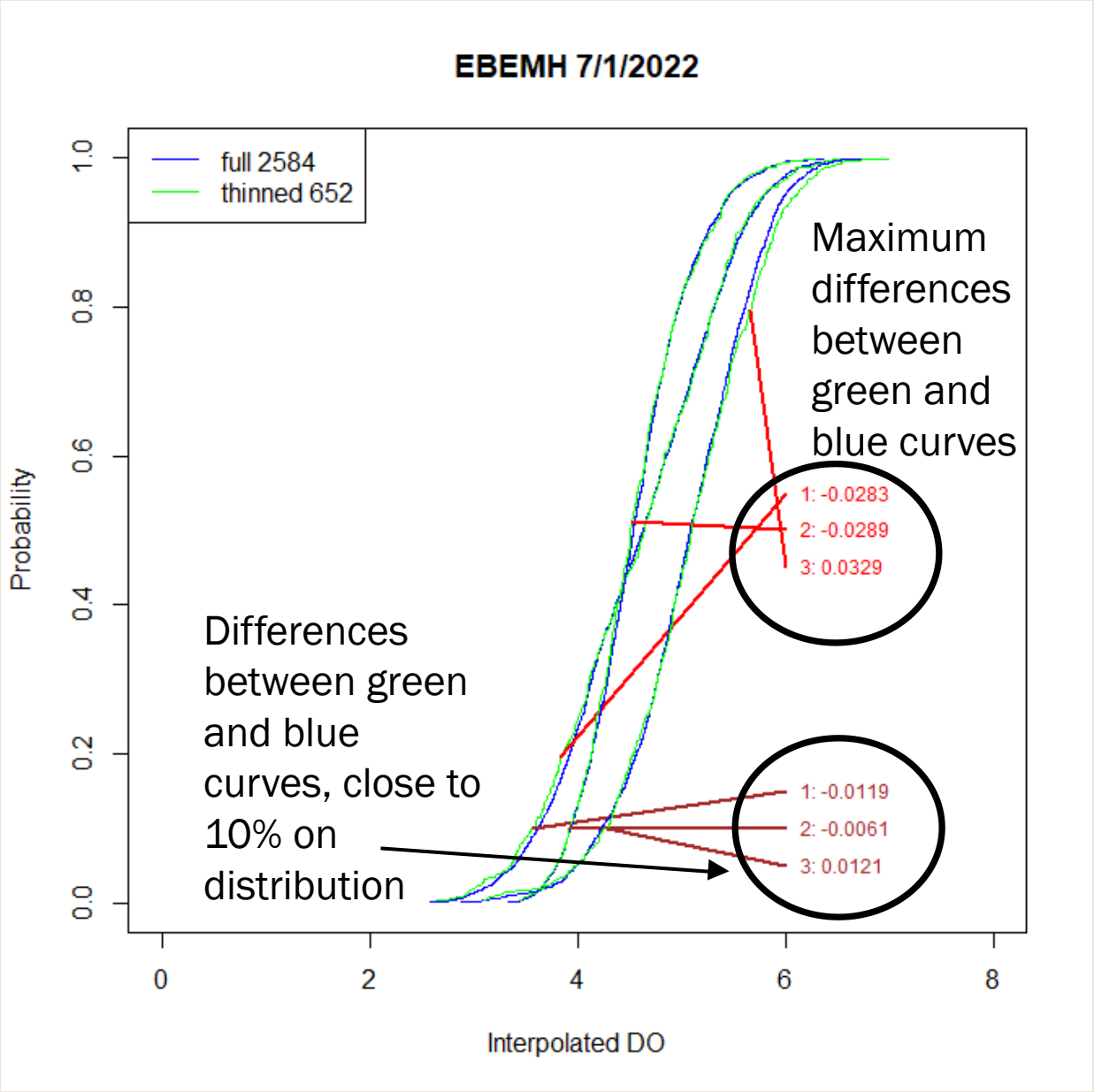


Take-aways:

- The DO is usually well-mixed at RET4.2, and likely throughout the segment.
- It does not look like we will miss low DO results by thinning these deepest depths.
- But if there is concern, it is okay to “not thin” this segment too.

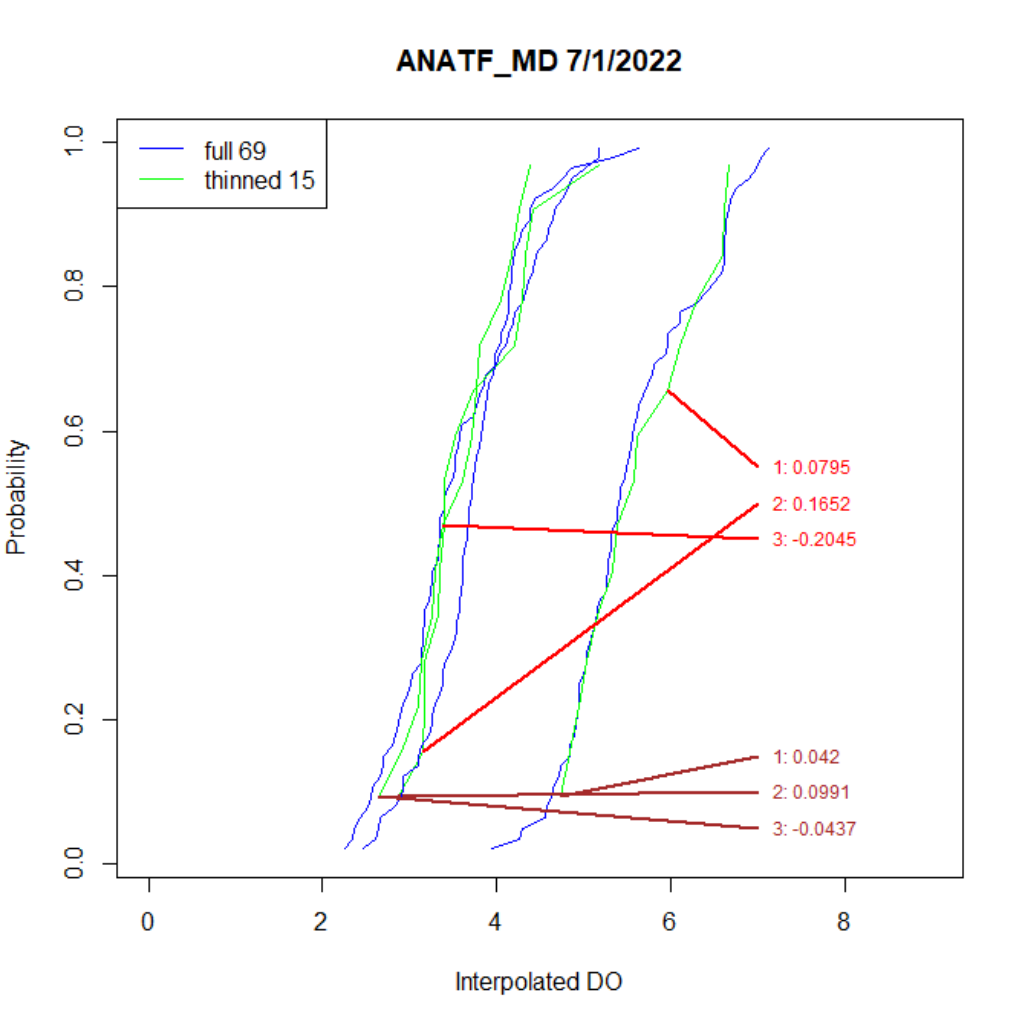
Impact: DO analysis

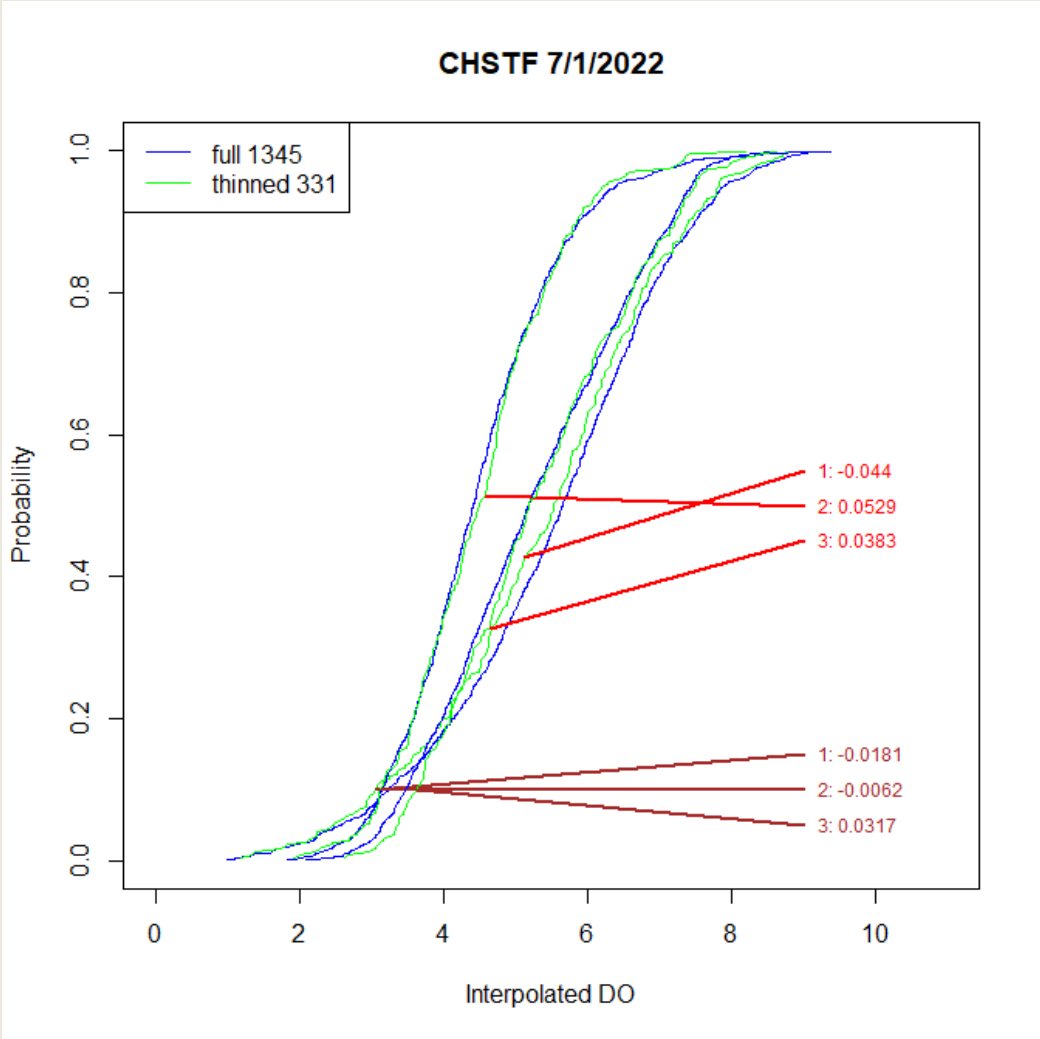
- Interpolation results were compared between the original grid and thinned grid.
- We superimposed empirical distribution functions (EDFs) of 4-D interpolator simulation results for the two grid resolutions.
- 12 months of comparisons were done for all of the segments (email me for all files).
- Three simulations.
- Many results, so we pulled out a few values for each.



*EDF is from DRAFT 4-D simulation results and exact values and range of simulations could change.

Impact: DO analysis 50m-to 100m





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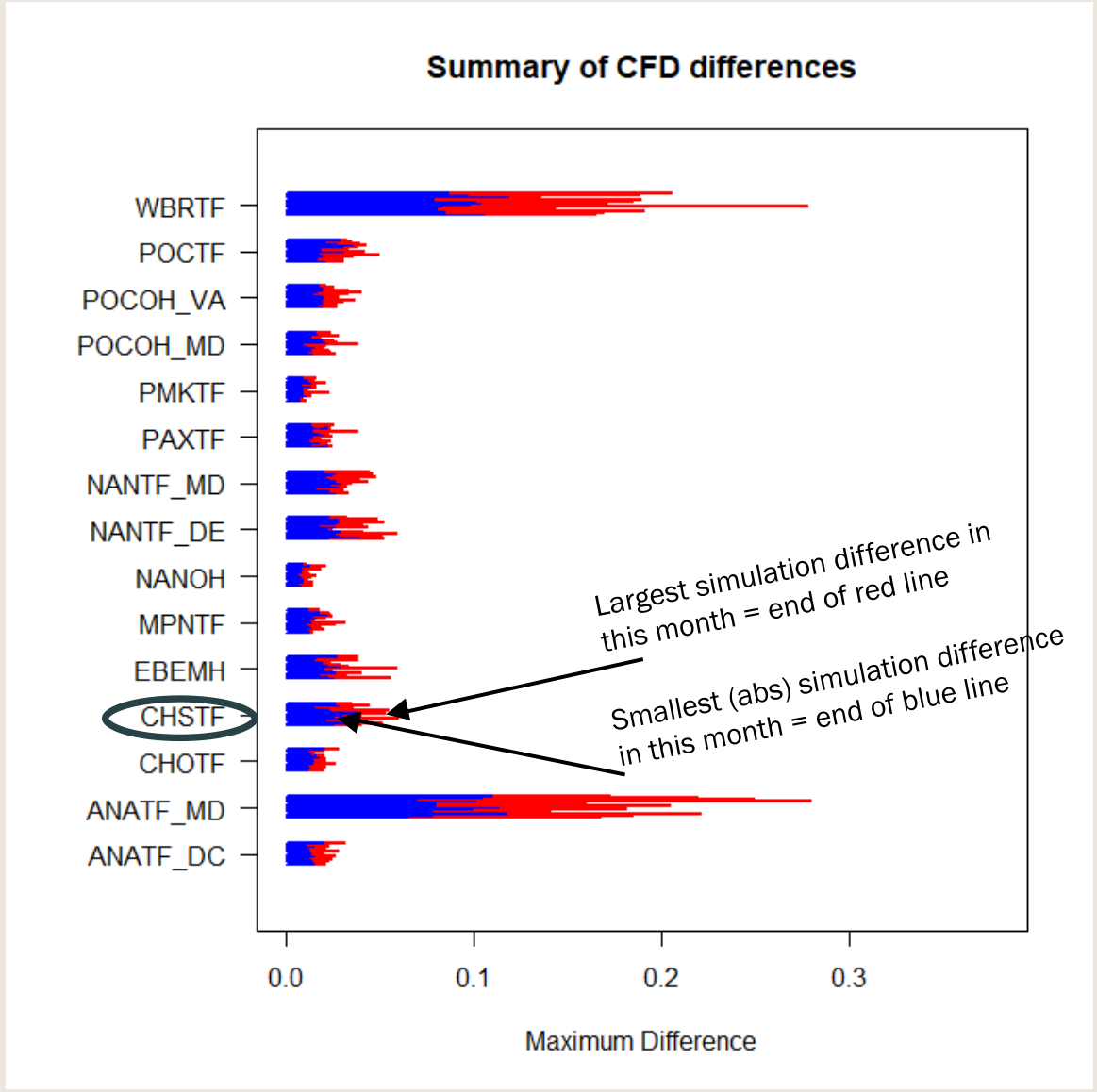
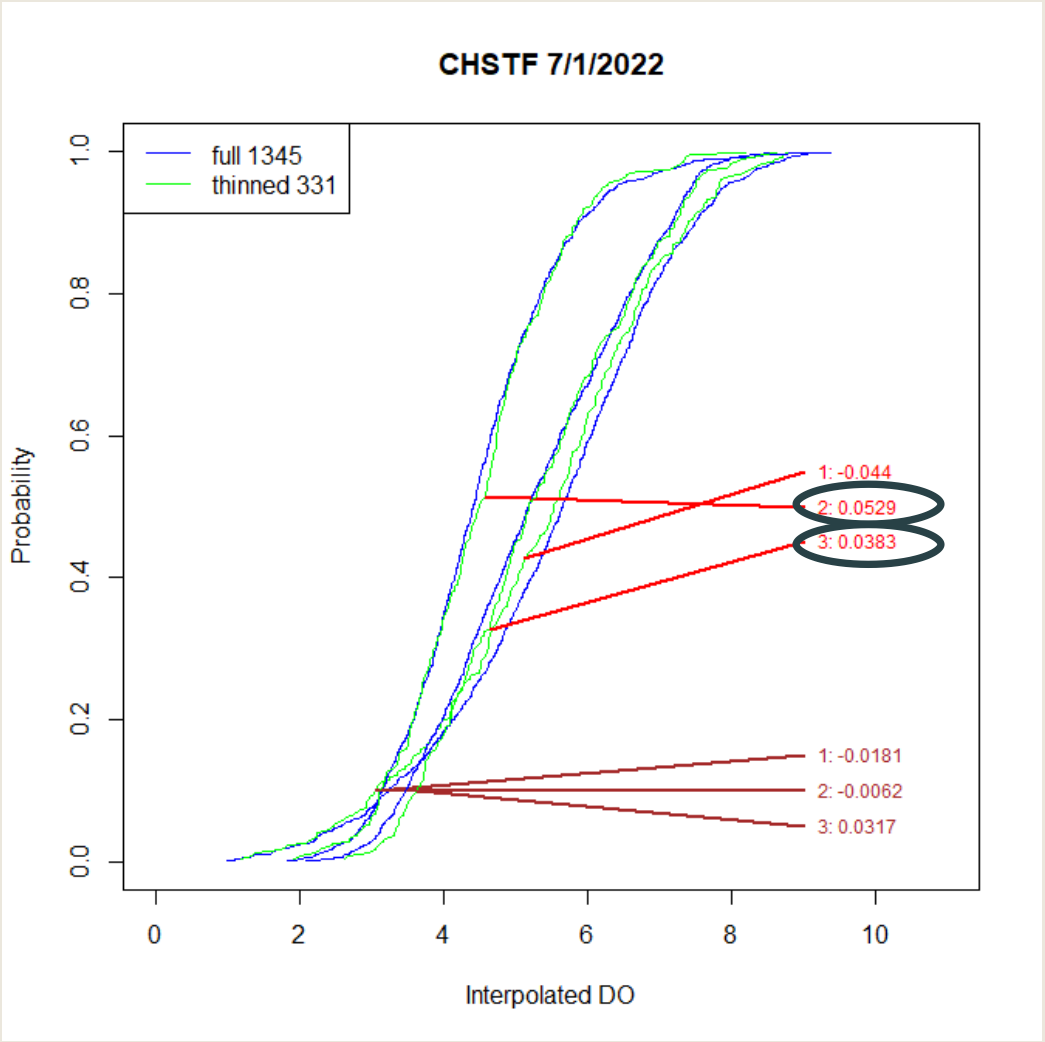
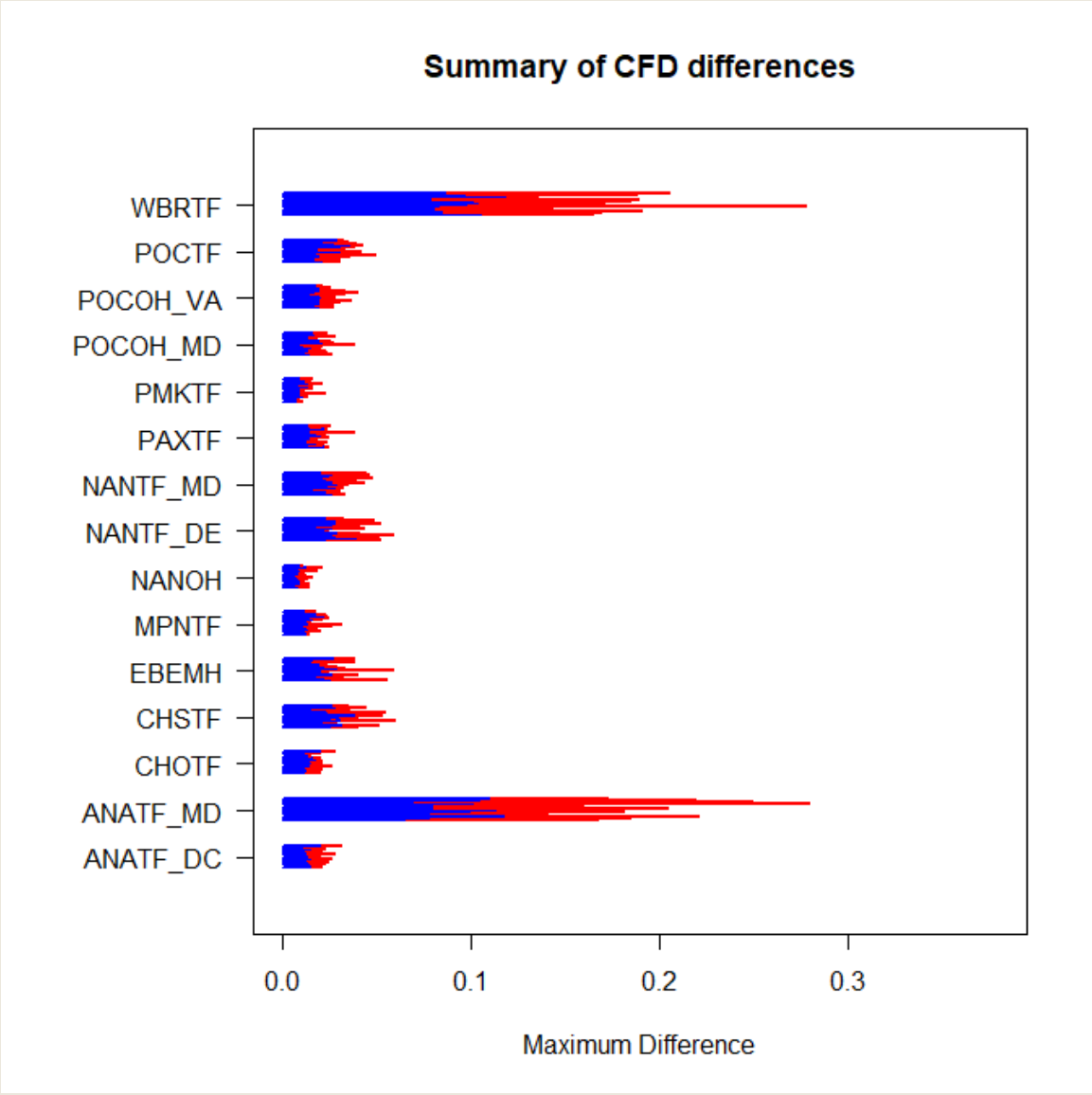
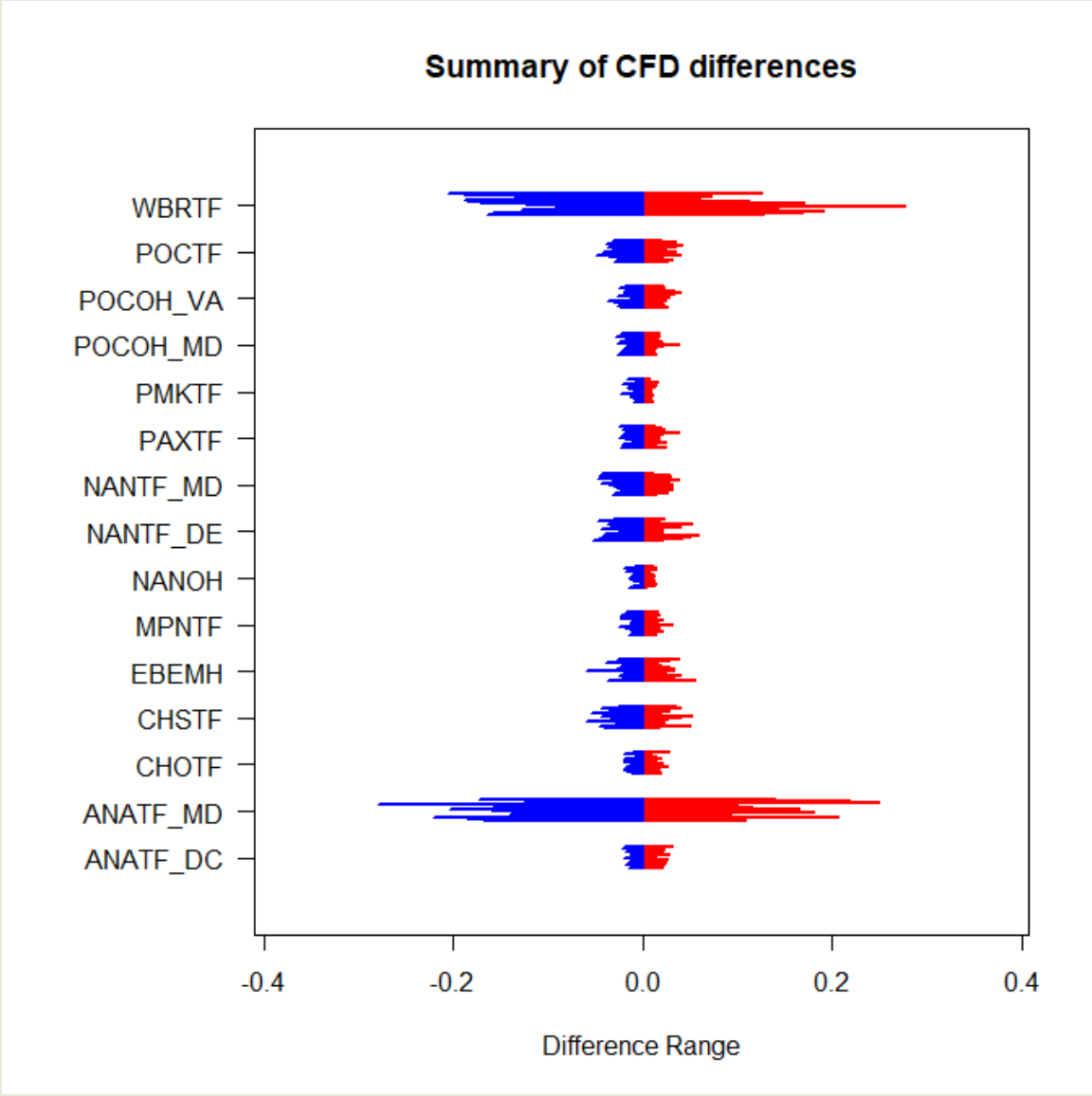
Impact: DO analysis 50m-to 100m



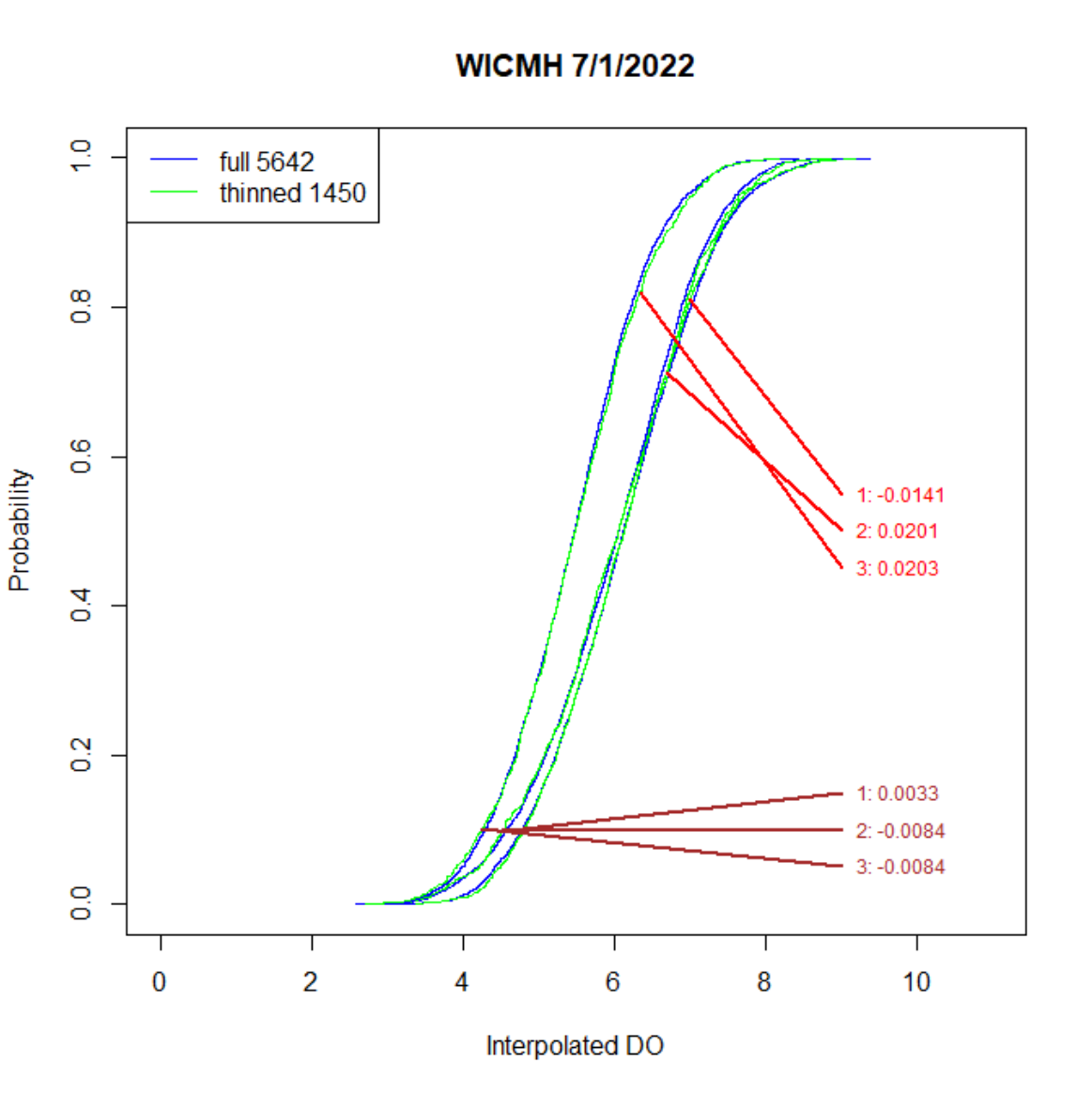


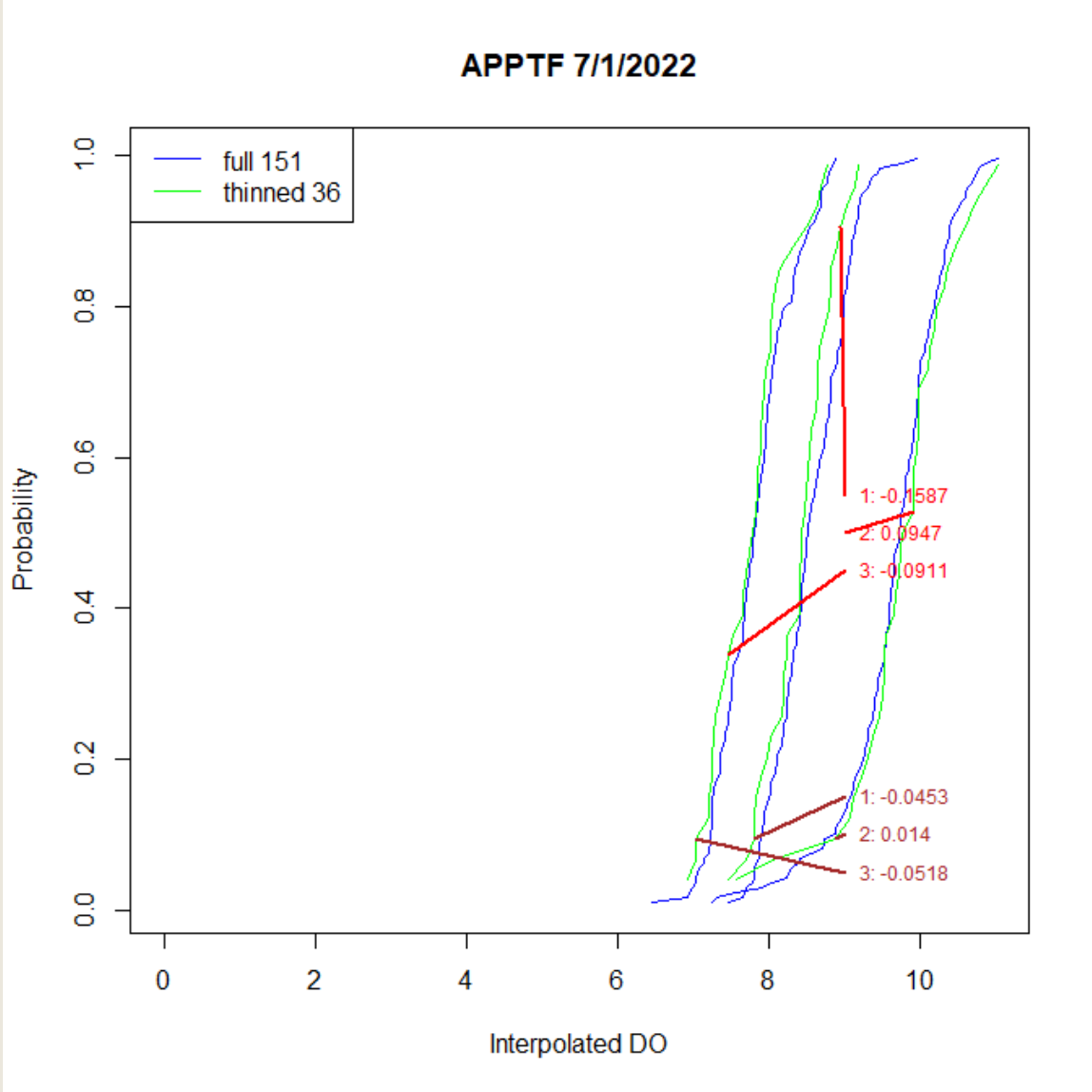
Impact: DO analysis 50m-to 100m





Impact: DO analysis 100m-to 200m





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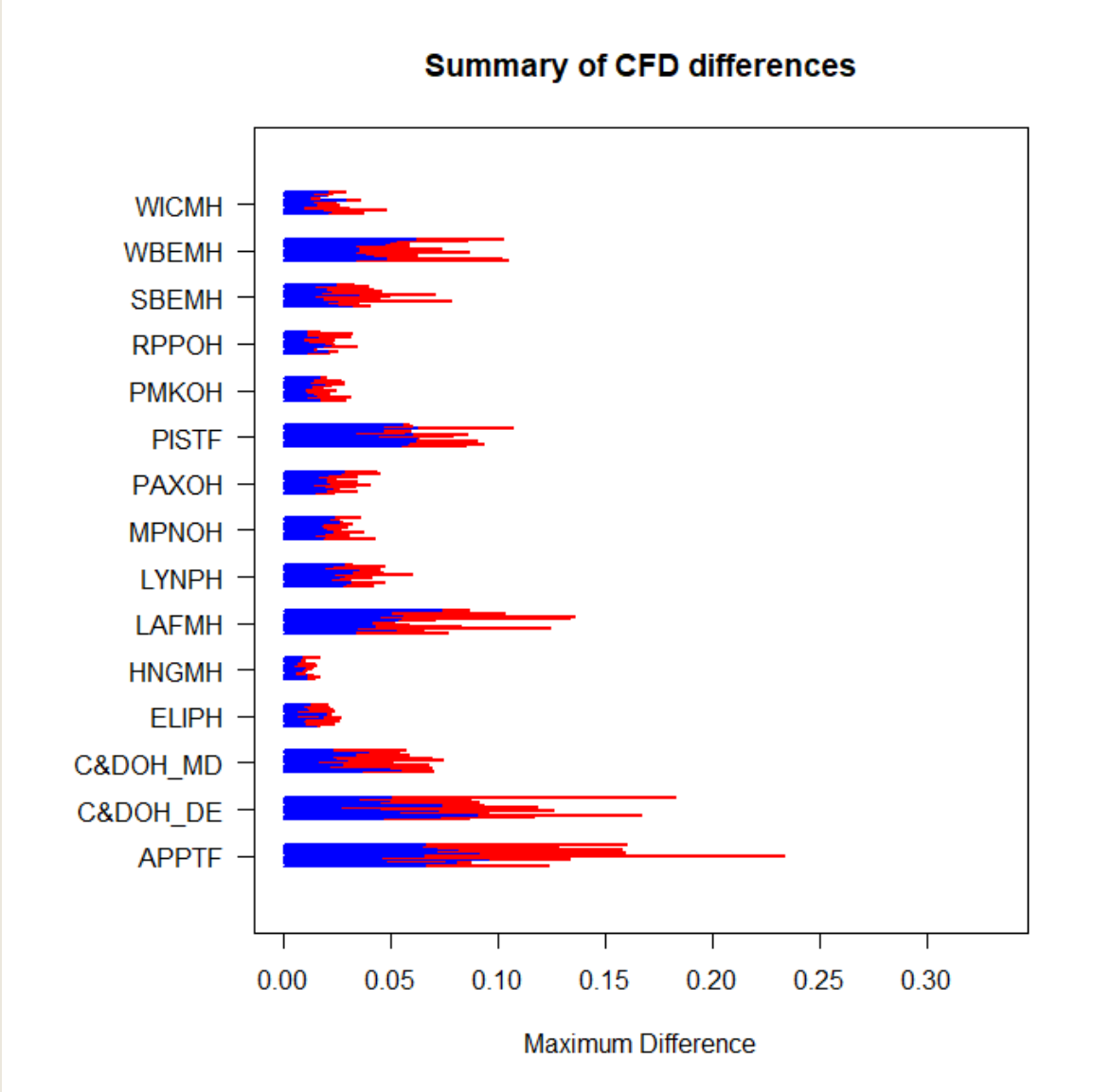
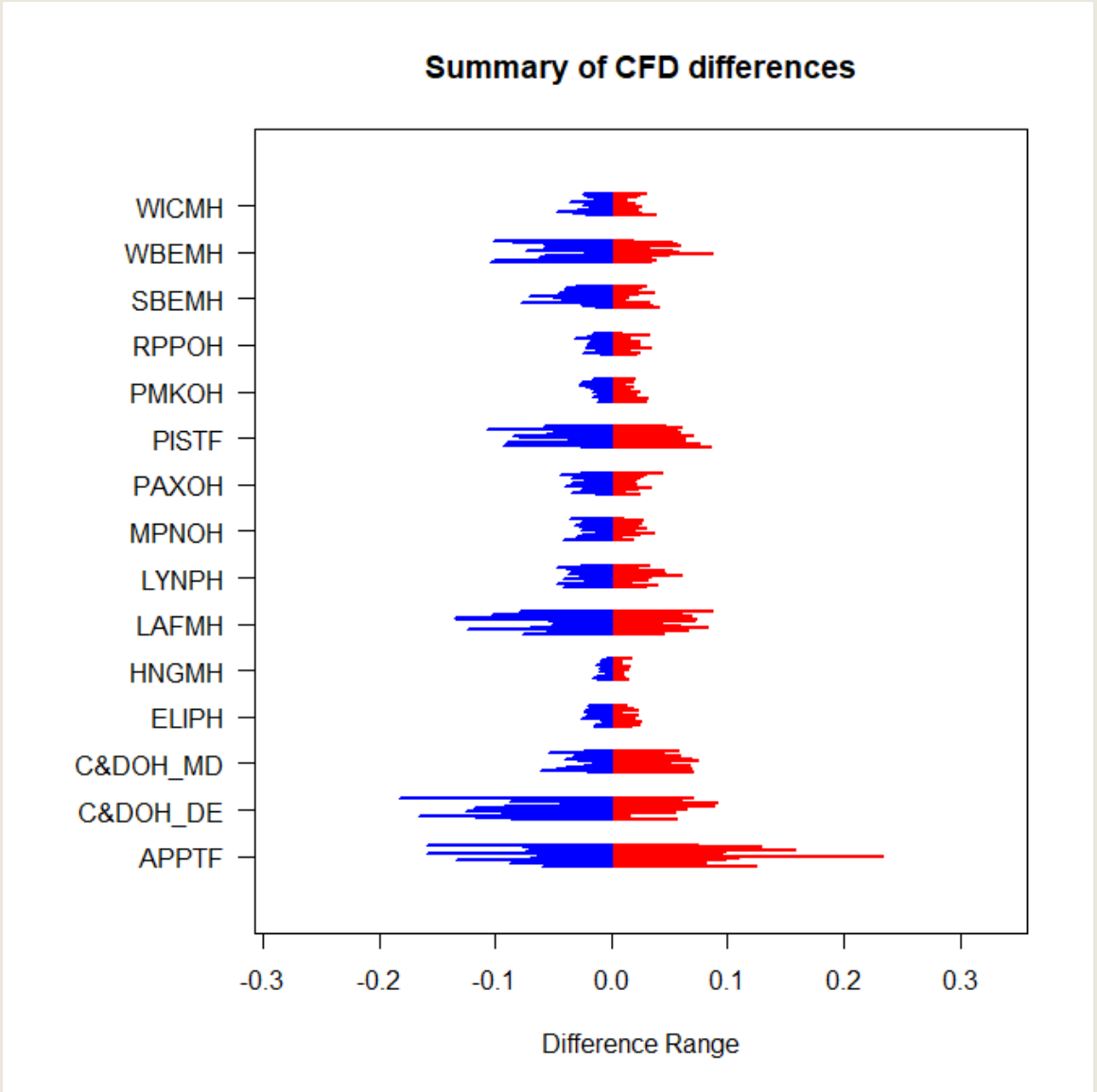
Impact: DO analysis 100m-to 200m



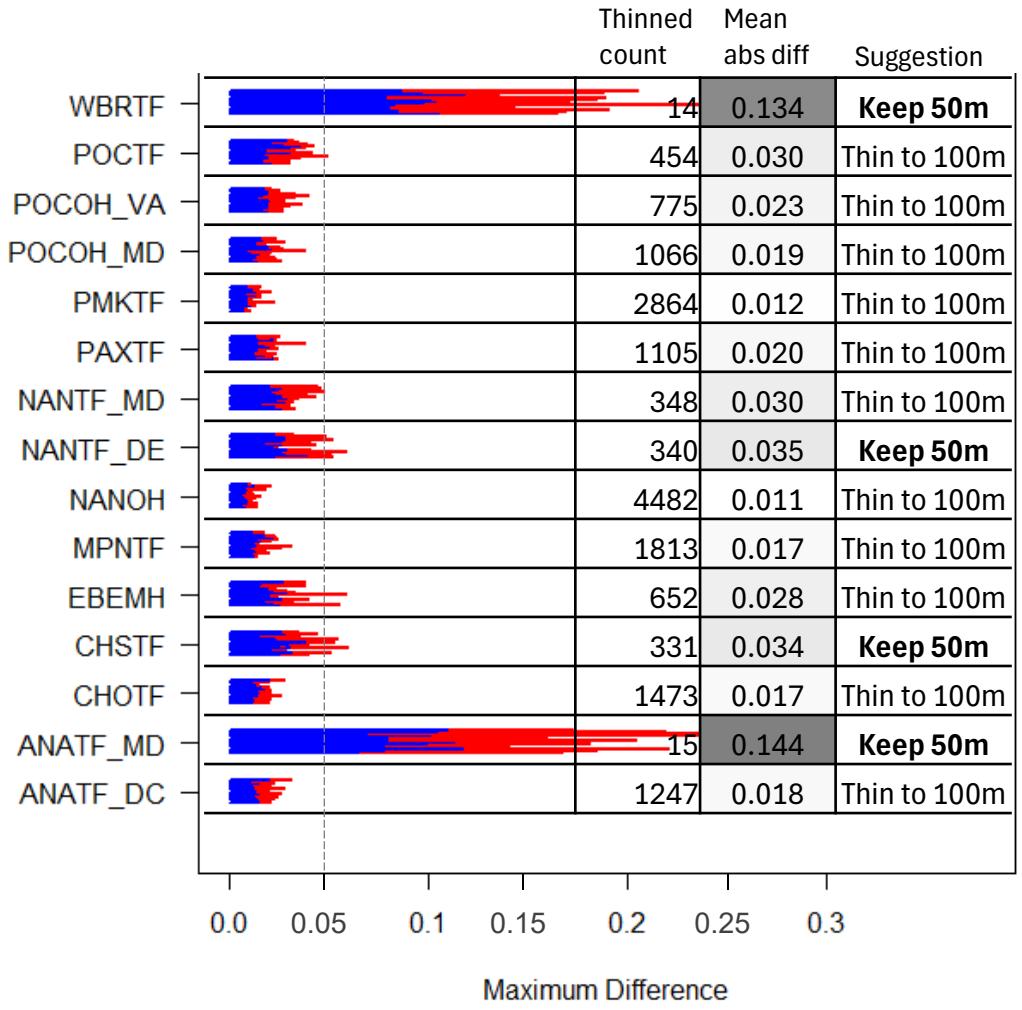


Considerations

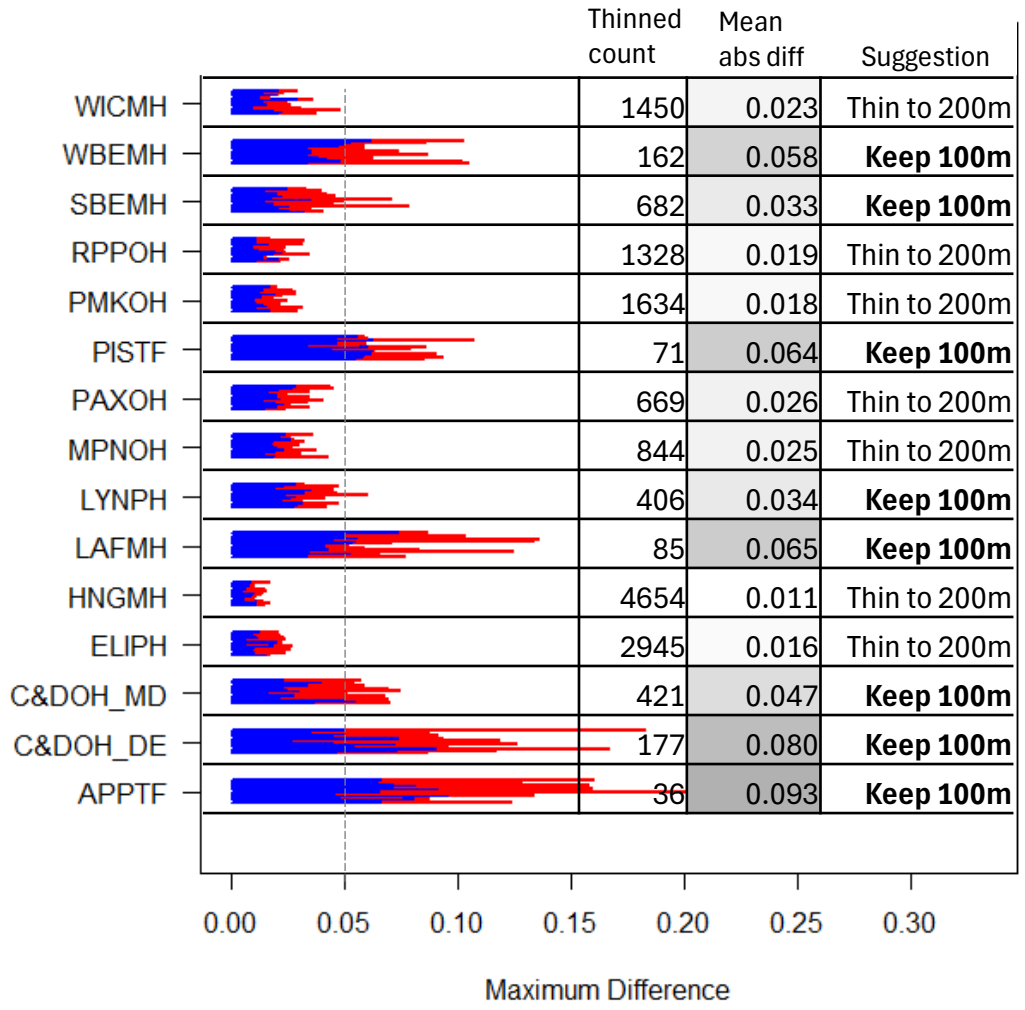
- Depth distributions do not change too much with these thinning options.
- We took a close look at every map of grid cell centroids, original and thinned. Some do get sparse due to segment size and/or narrow tributaries.
- Comparing DO interpolation results suggest no major changes in conclusions are likely with any of the thinning, but we can identify which ones have largest difference.

- Summary of results and some first-cut suggestions →

50m-to-100m Comparison Summary



100m-to-200m Comparison Summary



Summary

- The changes would be only to the horizontal grid resolution in these segments. There are no adjustments proposed to boundaries of segments.
- Looking for agreement that it's okay to move forward with using this set.
- When criteria approaches are implemented, might be necessary to look at the temperature interpolation and ensure no different conclusions.

segment	state	Discussed previously
Originally 50m, keep at 50m		
NANTF_DE	DE	
ANATF_MD	MD	
CHSTF	MD	
WBRTF	MD	
Originally 50m, thin to 100m		
ANATF_DC	DC	
CHOTF	MD	yes
NANOH	MD	yes
NANTF_MD	MD	
PAXTF	MD	
POCOH_MD	MD	
POCTF	MD	
EBEMH	VA	
MPNTF	VA	yes
PMKTF	VA	yes
POCOH_VA	VA	

segment	state	Discussed previously
Originally 100m, keep at 100m		
C&DOH_DE	DE	
C&DOH_MD	MD	
PISTF	MD	
APPTF	VA	
LAFMH	VA	
LYNPH	VA	
SBEMH	VA	
WBEMH	VA	
Originally at 100m, thin to 200m		
HNGMH	MD	yes
PAXOH	MD	
WICMH	MD	
ELIPH	VA	
MPNOH	VA	
PMKOH	VA	
RPPOH	VA	

Additional materials and contact:
https://www.chesapeakebay.net/what/event/bay-oxygen-research-group-monthly-meeting-april-2026
rmurphy@chesapeakebay.net