Interpolator Grid: Proposed thinning 5 segments

BORG meeting
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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*

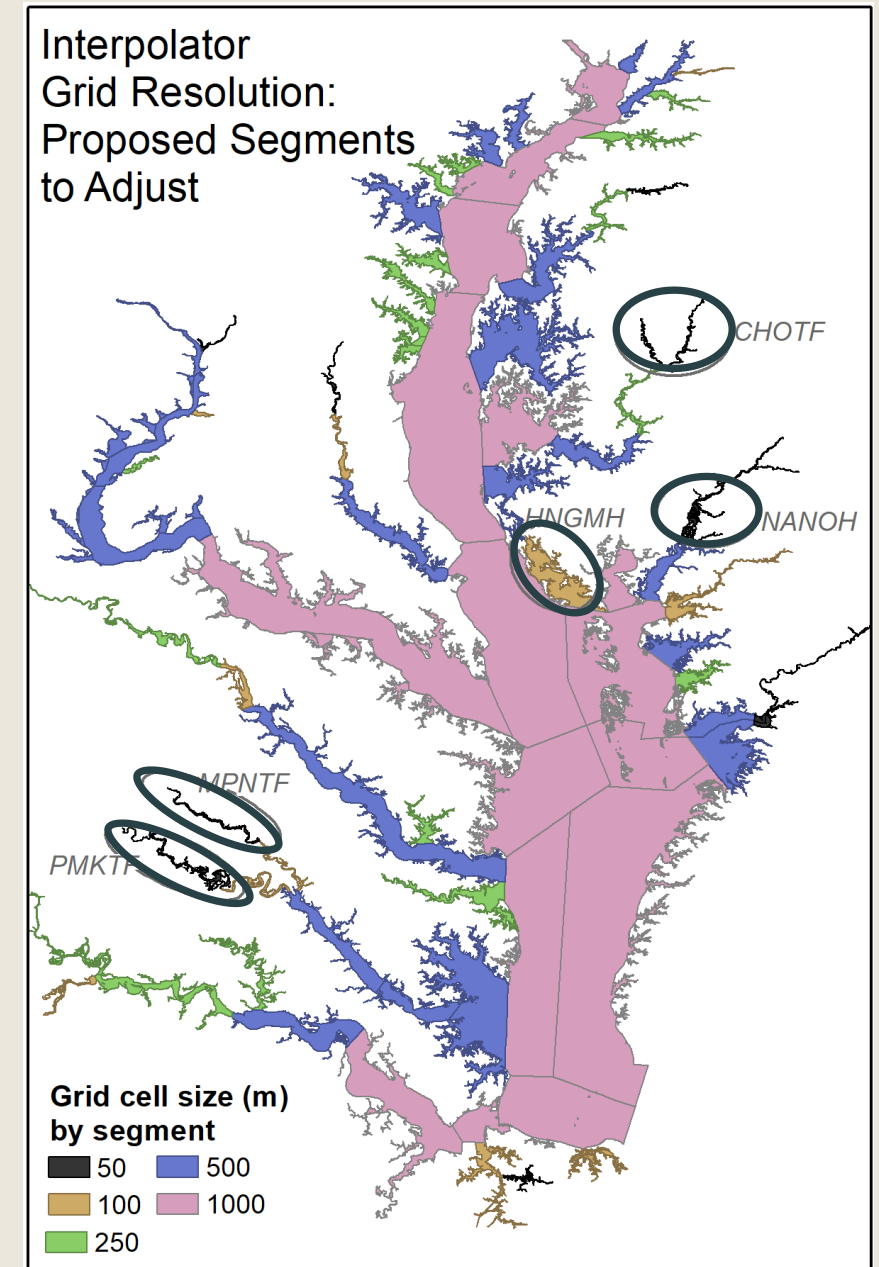- For consistency, we intended to use that same grid for the 4-D spatial output.

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

Existing Interpolator Grid Resolution

Grid cell size (m) by segment
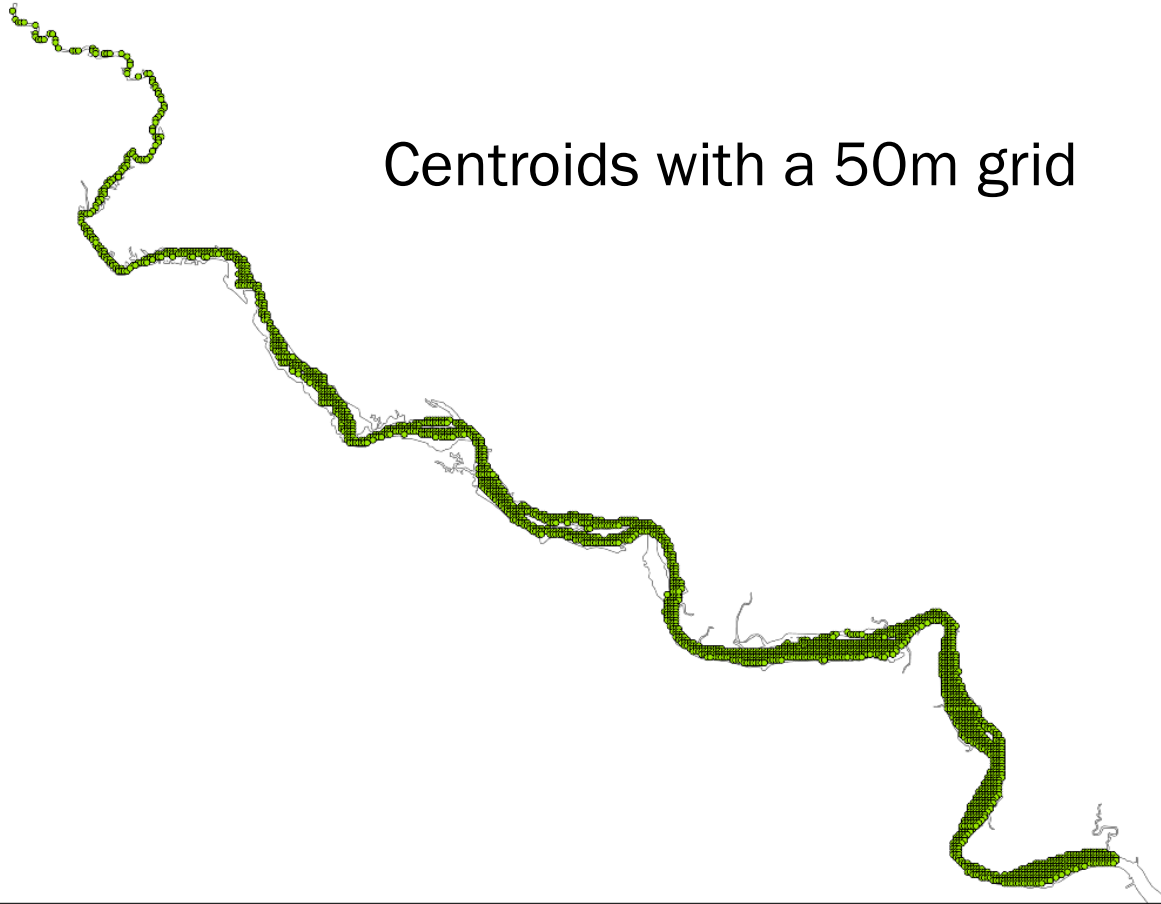- 50
- 100
- 250
- 500
- 1000
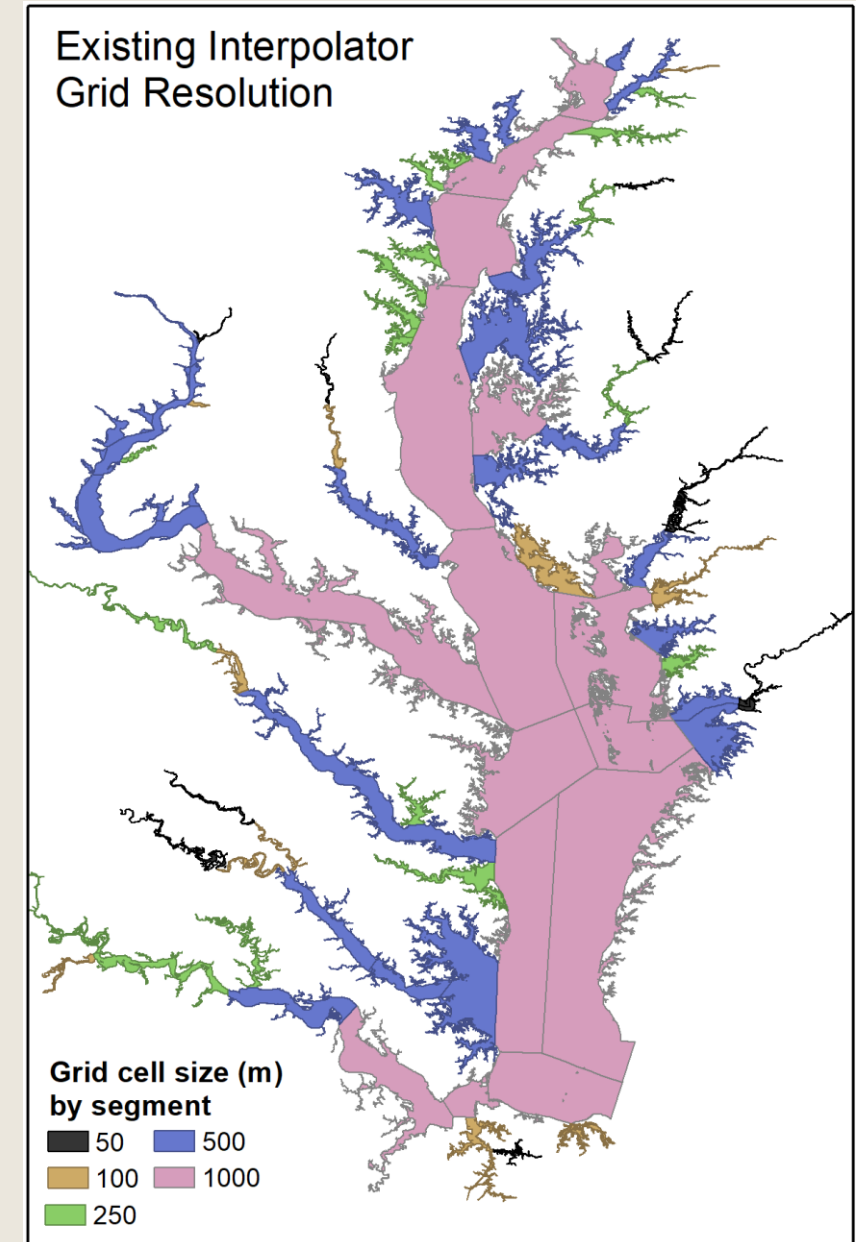
Testing with 4D

- One of our goals is usability on a standard 32-GB laptop for ease of transfer to you.

- Testing the 4-D simulation runs in every segment indicated five segments that either didn't run (or inconsistently ran) on a laptop. They all ran on a workstation with more RAM.

- When the grid was thinned for each of these, they ran on the laptop.

Segment	Run time [min]	
	Current Grid (128 GB workstation)	½ Thinning (32 GB laptop)
CHOTF	6.85	2.41
MPNTF	12.81	5.59
NANOH	28.32	3.21
PMKTF	19.61	6.67
HNGMN	24.98	8.70

Interpolator Grid Resolution: Proposed Segments to Adjust

CHOTF
NANOH
HNGMH
MPNTF
PMKTF

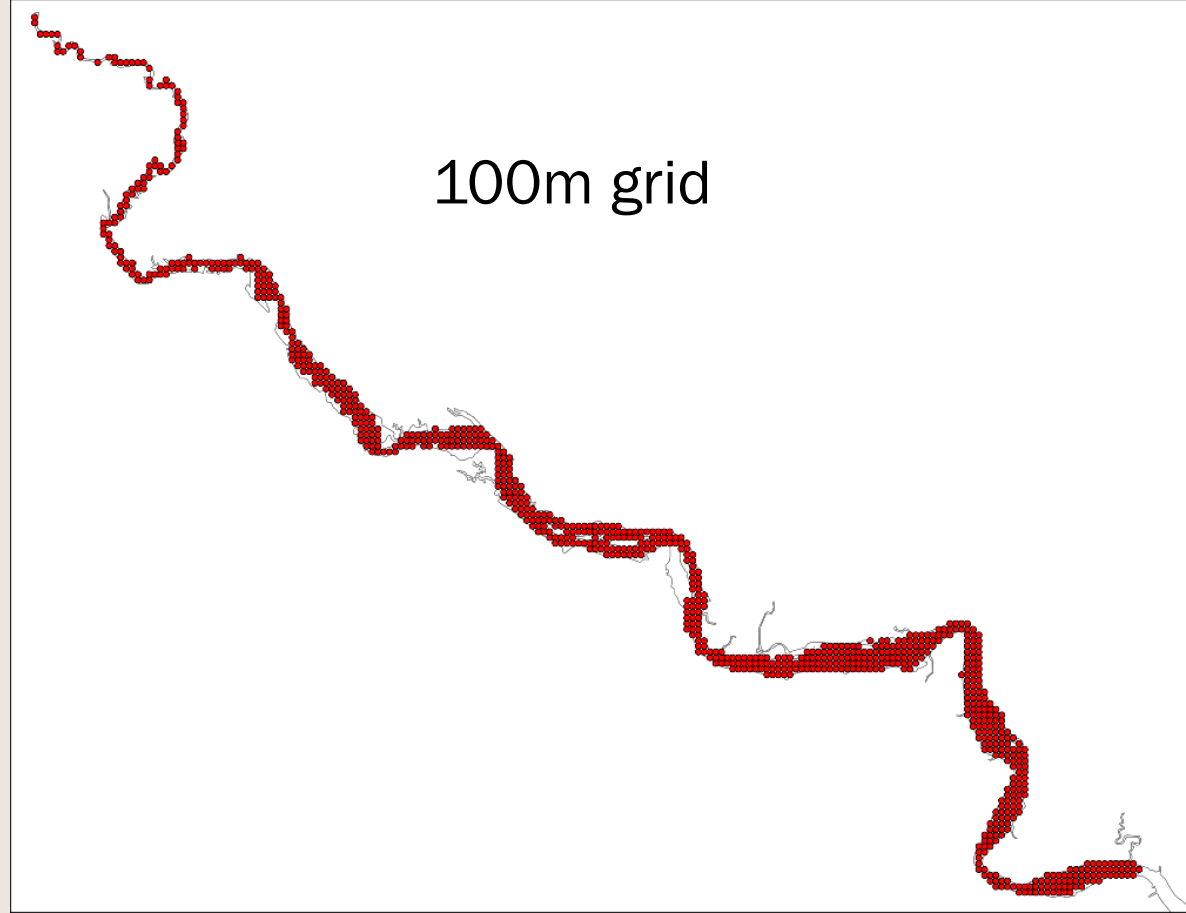Grid cell size (m) by segment
- 50
- 100
- 250
- 500
- 1000

MPNTF: Mattaponi tidal fresh

Centroids with a 50m grid

100m grid

HNGMH: Honga mesohaline

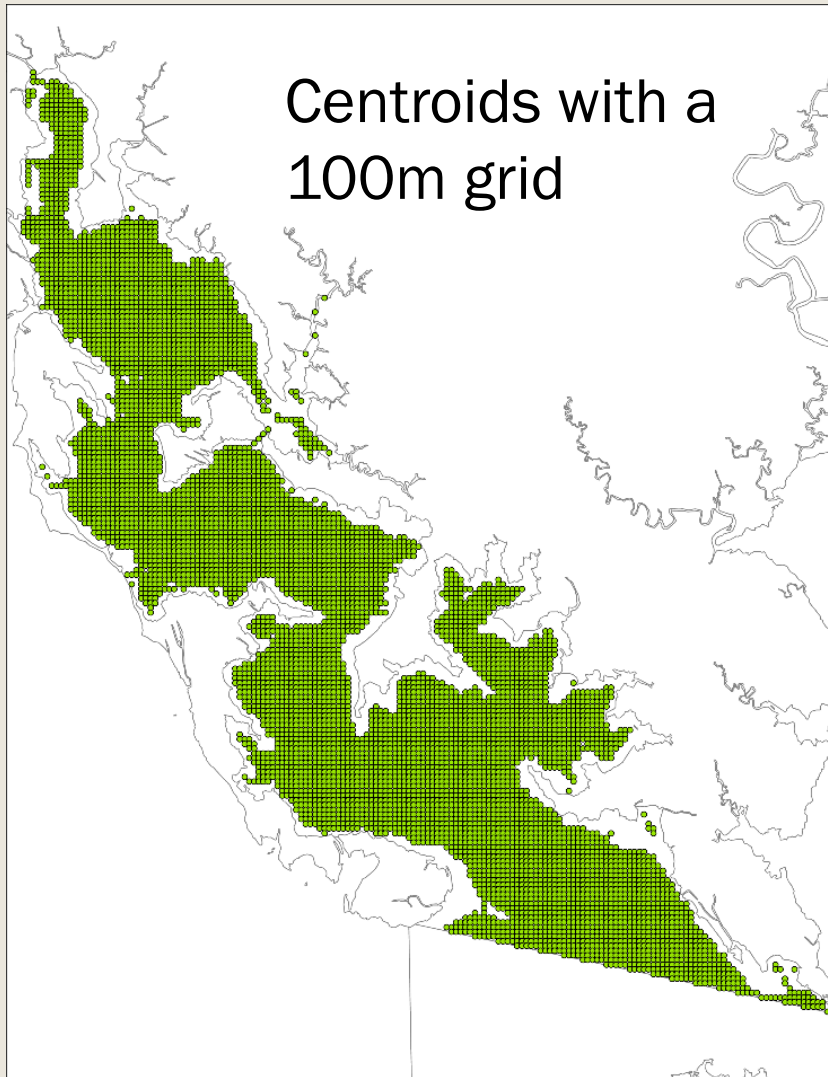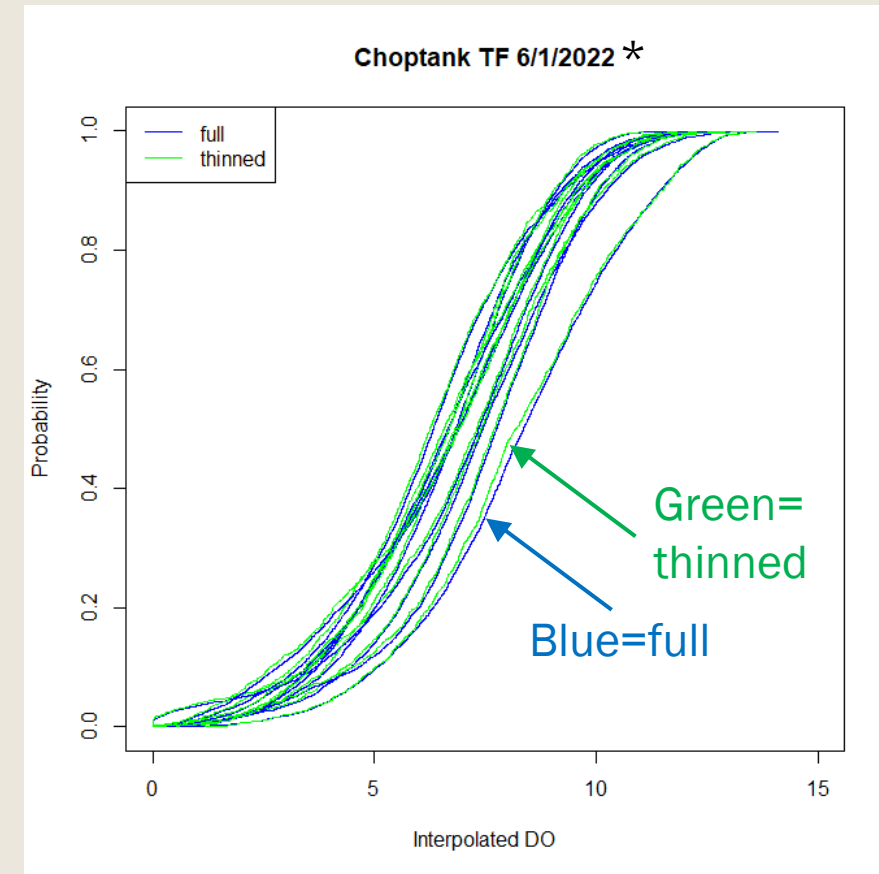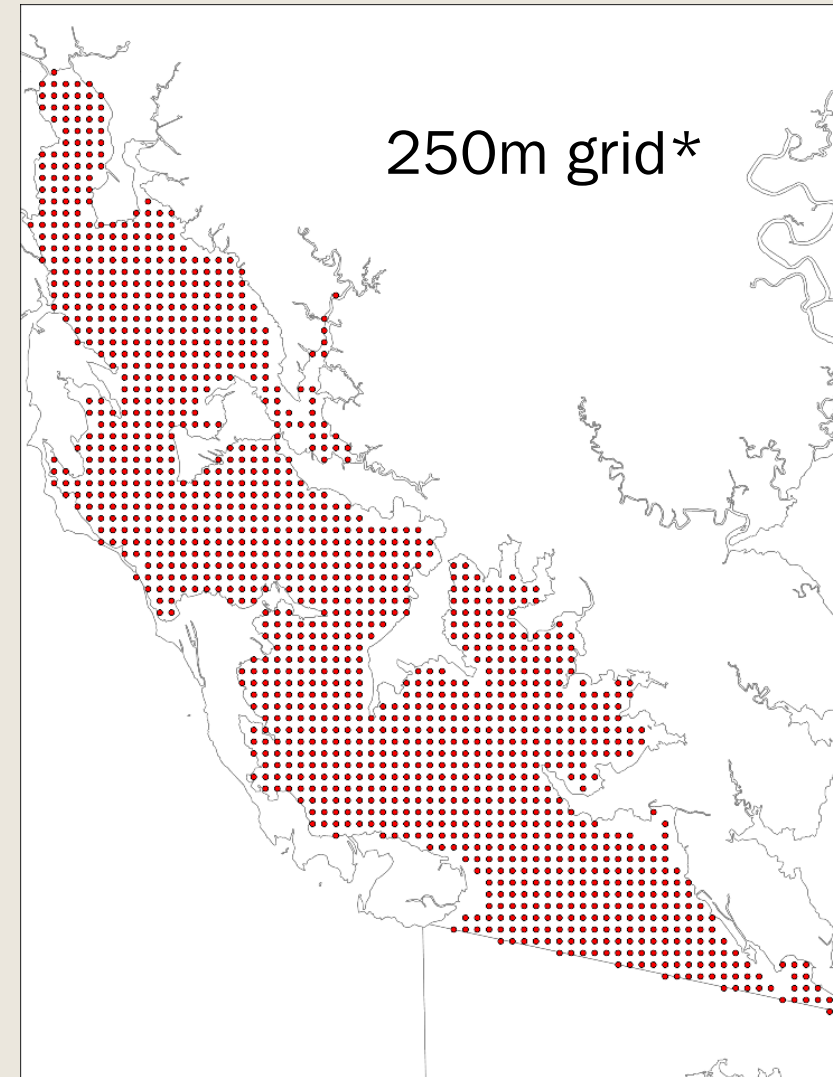Centroids with a 100m grid

250m grid*

*Note that numeric thinning tests were performed on 200m grid

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 2 of the segments.

- There is very little difference in the simulation results due to thinning.

- This means that the thinner grids still represent the DO concentrations, bathymetry, and variability just as well as the dense grids.

- Specific EDF results will change slightly due to these being generated with a draft version of the tool.
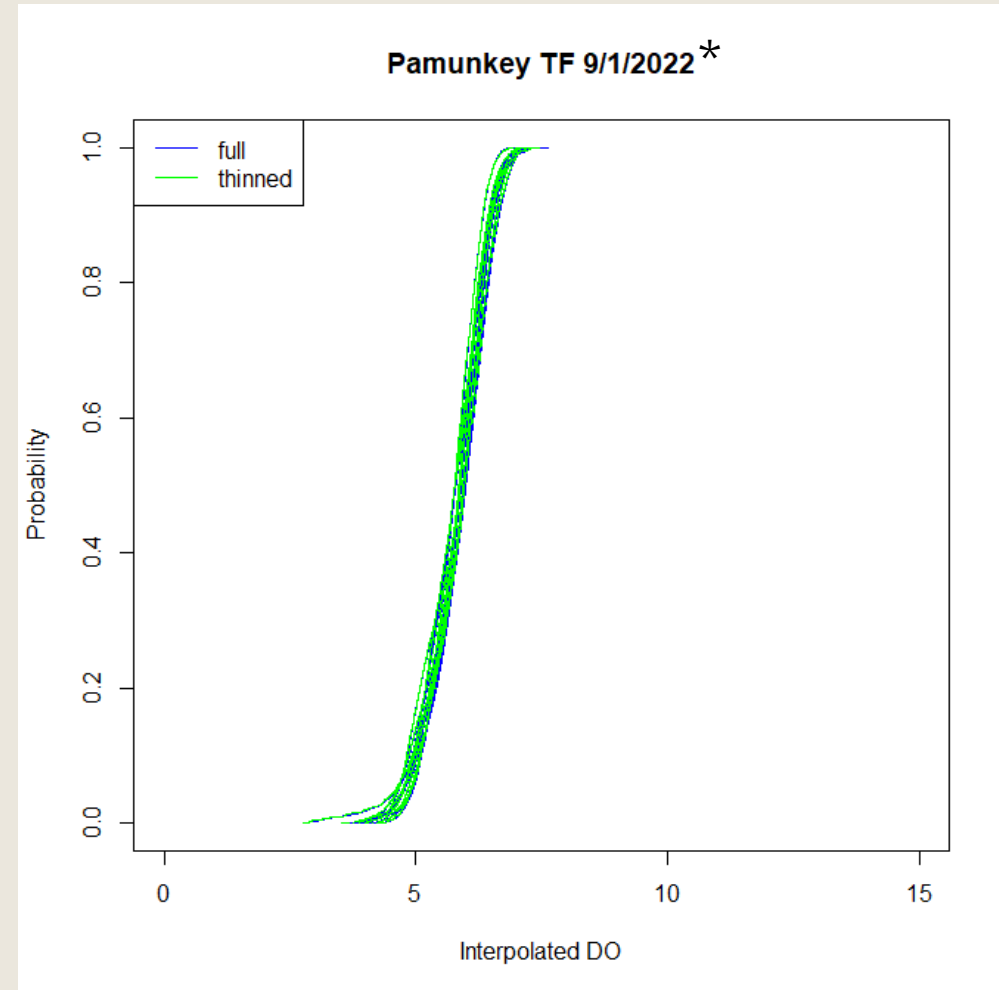

*EDF is from DRAFT 4-D simulation results and exact values and range of simulations will likely change.

Impact: DO analysis

Choptank TF 6/1/2022*

Choptank TF 9/1/2022*

Green= thinned
Blue=full
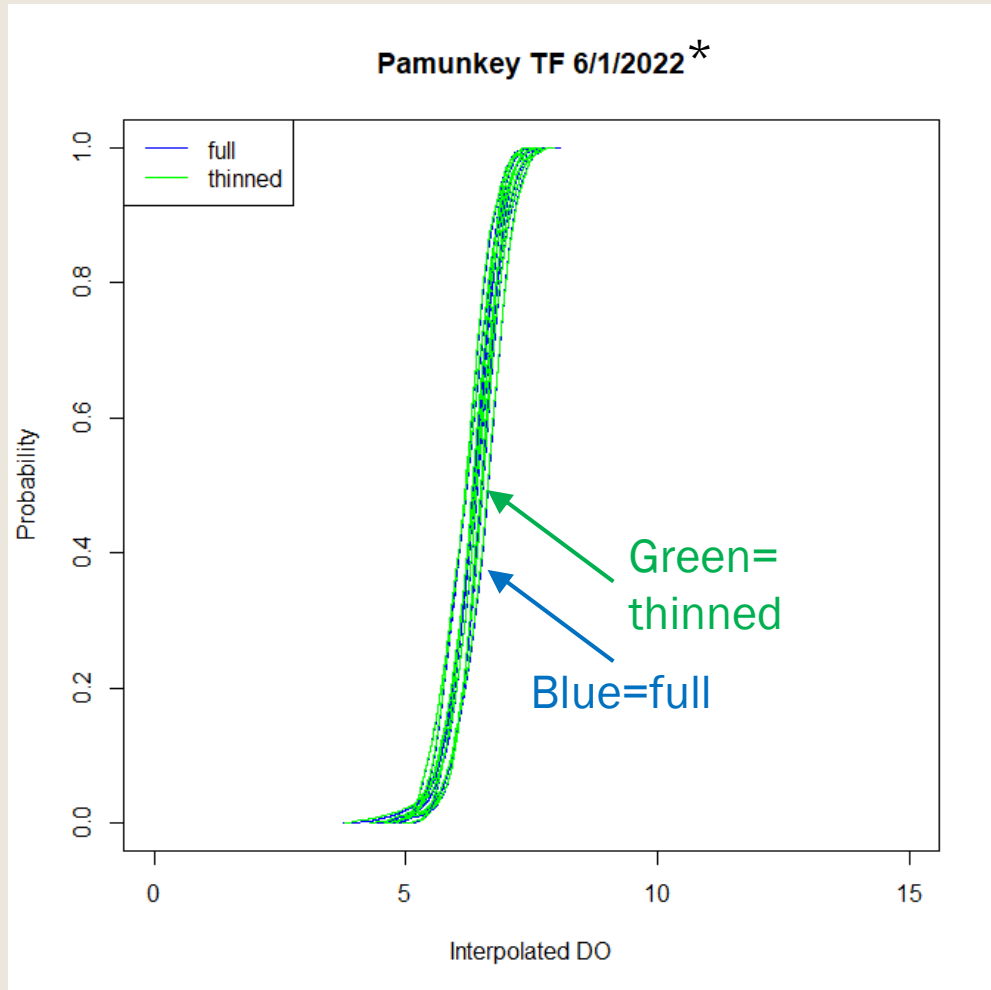
*EDFs are from DRAFT 4-D simulation results and exact values
and range of simulations will likely change.

Impact: DO analysis

Pamunkey TF 6/1/2022*

Pamunkey TF 9/1/2022*
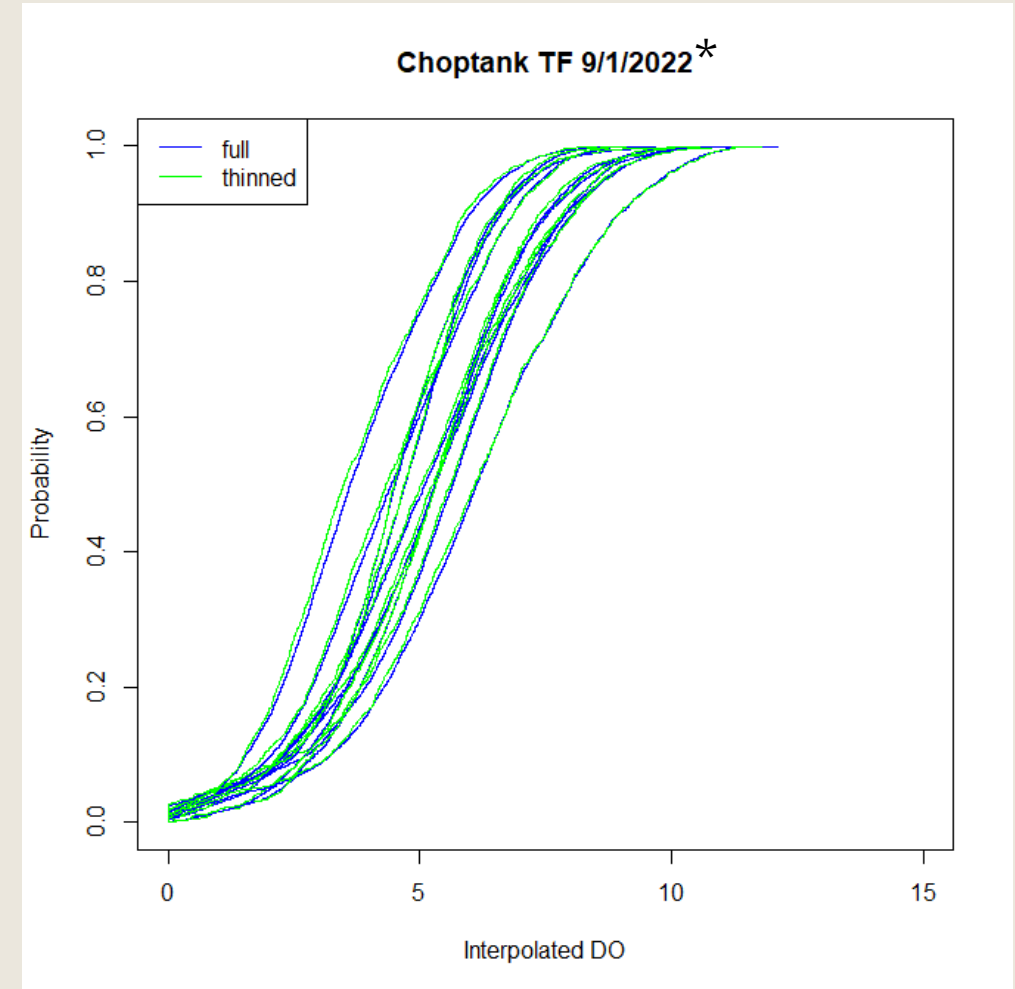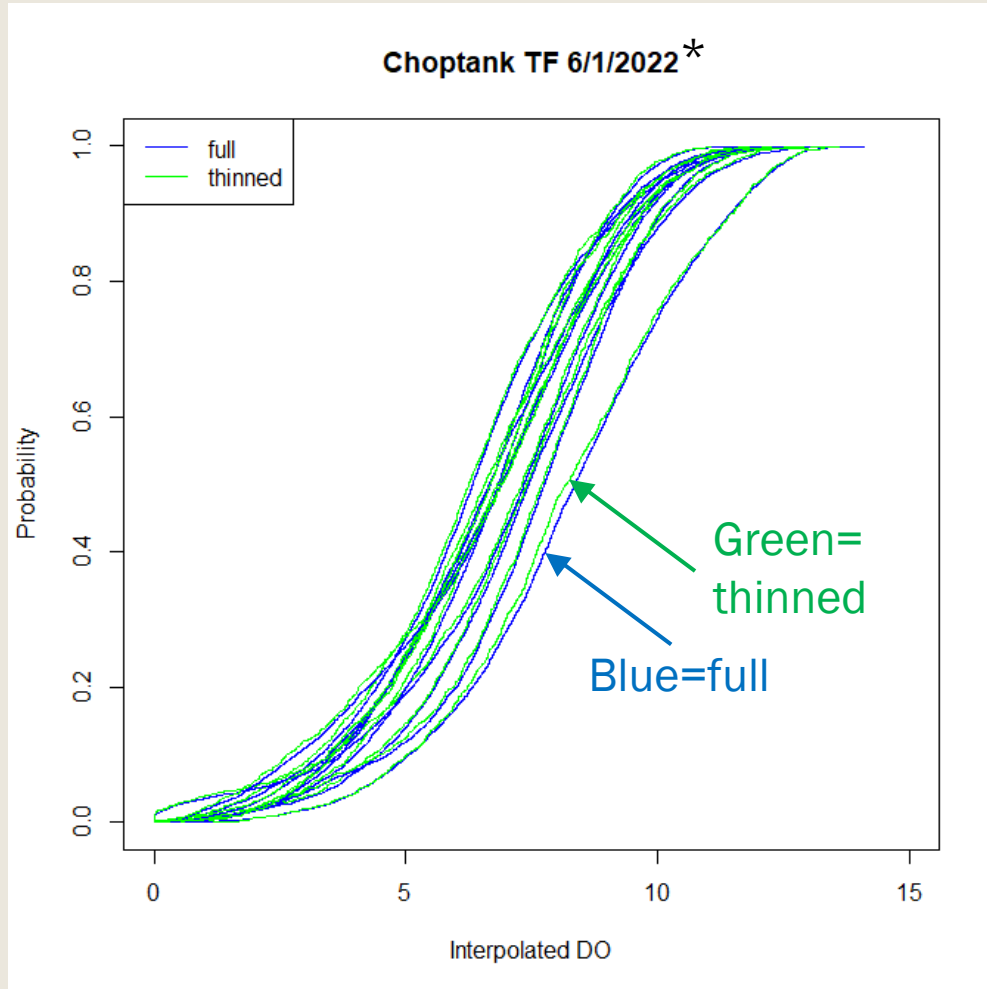
*EDFs are from DRAFT 4-D simulation results and exact values and range of simulations will likely change.

Summary

- The proposed adjustments are only to the horizontal grid resolution in 5 segments out of 92. And there are no adjustments proposed to boundaries of segments.

- We saw no impact of these grid changes on the shape of the EDF graphs for the DO interpolation results in two of the segments tested.

- Thus, it is not expected that this grid thinning will result in any different conclusions regarding criteria assessment.

- These grid resolution edits would, however, have a large impact on a user's feasibility of running the 4-D tool in terms of computing power needed and run time.

Interpolator Grid Resolution: Proposed Segments to Adjust

Grid cell size (m) by segment
- 50
- 100
- 250
- 500
- 1000