HOW TO ASSESS THE SPATIAL REPRESENTATION OF FISHERY’S REVENUES?

A METHOD COMPARISON

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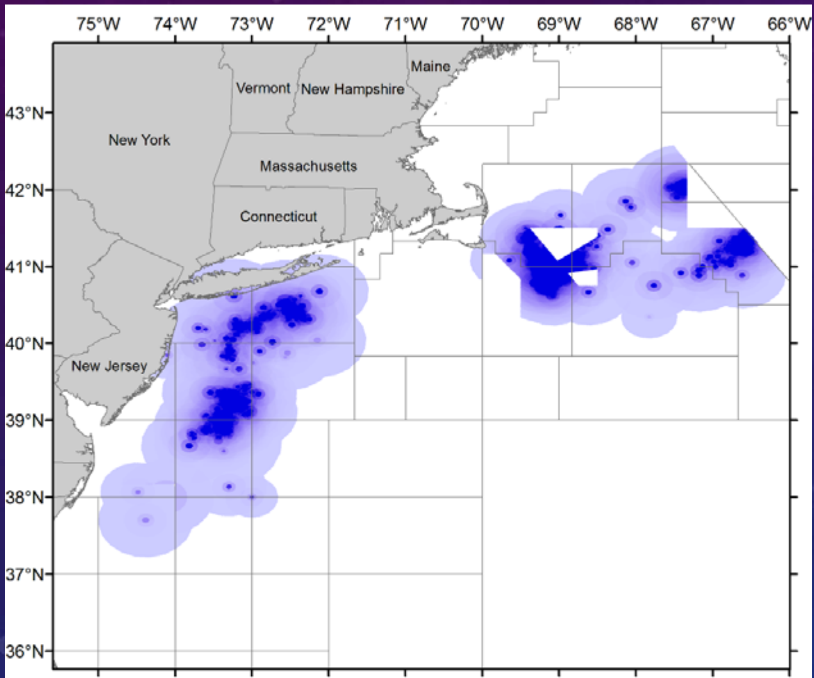
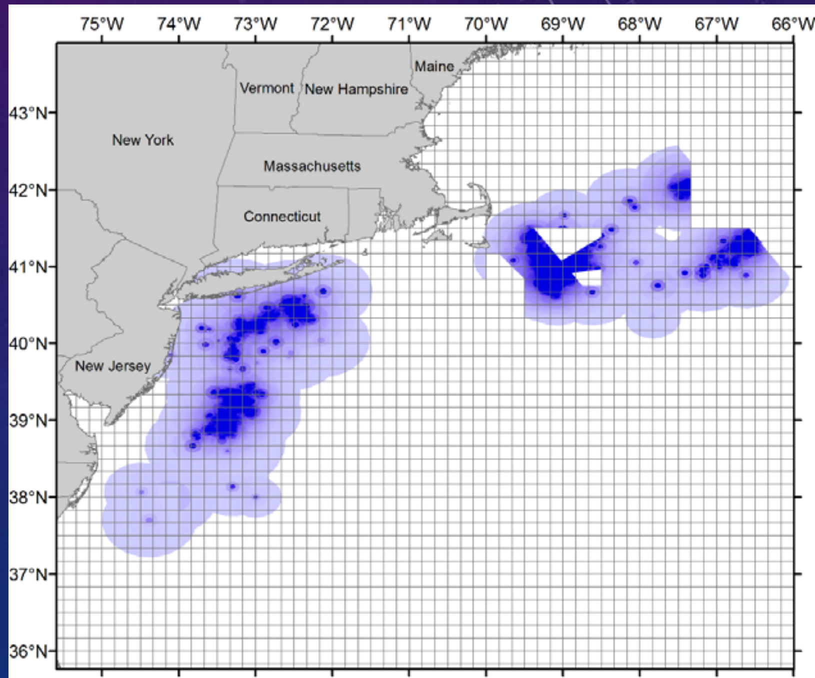
MOTIVATION



To highlight the differences in the spatial distribution of generated revenues created by the method applied



Example: Scallop revenues 2012

METHOD

- Data
  - Scallop Limited Access Category trips – FY2000-2014 – Scallop dredges
  - Only observed trips (3,228 trips)
  - Metrics: Scallop Revenues

- Method: Transferring revenues into (1) statistical areas and (2) 10’-square grid (TMSQ) based on:

  Baseline: Fishing time spend in the area – Observer data

  1. Aggregation of fishing location – logbook data (single lat/lon per gear & statistical area)
  2. Probabilistic distribution of fishing revenues– logbook data (CDF of single lat/lon per gear & statistical area)
  3. Aggregation of VMS predicted location & weighted fishing time

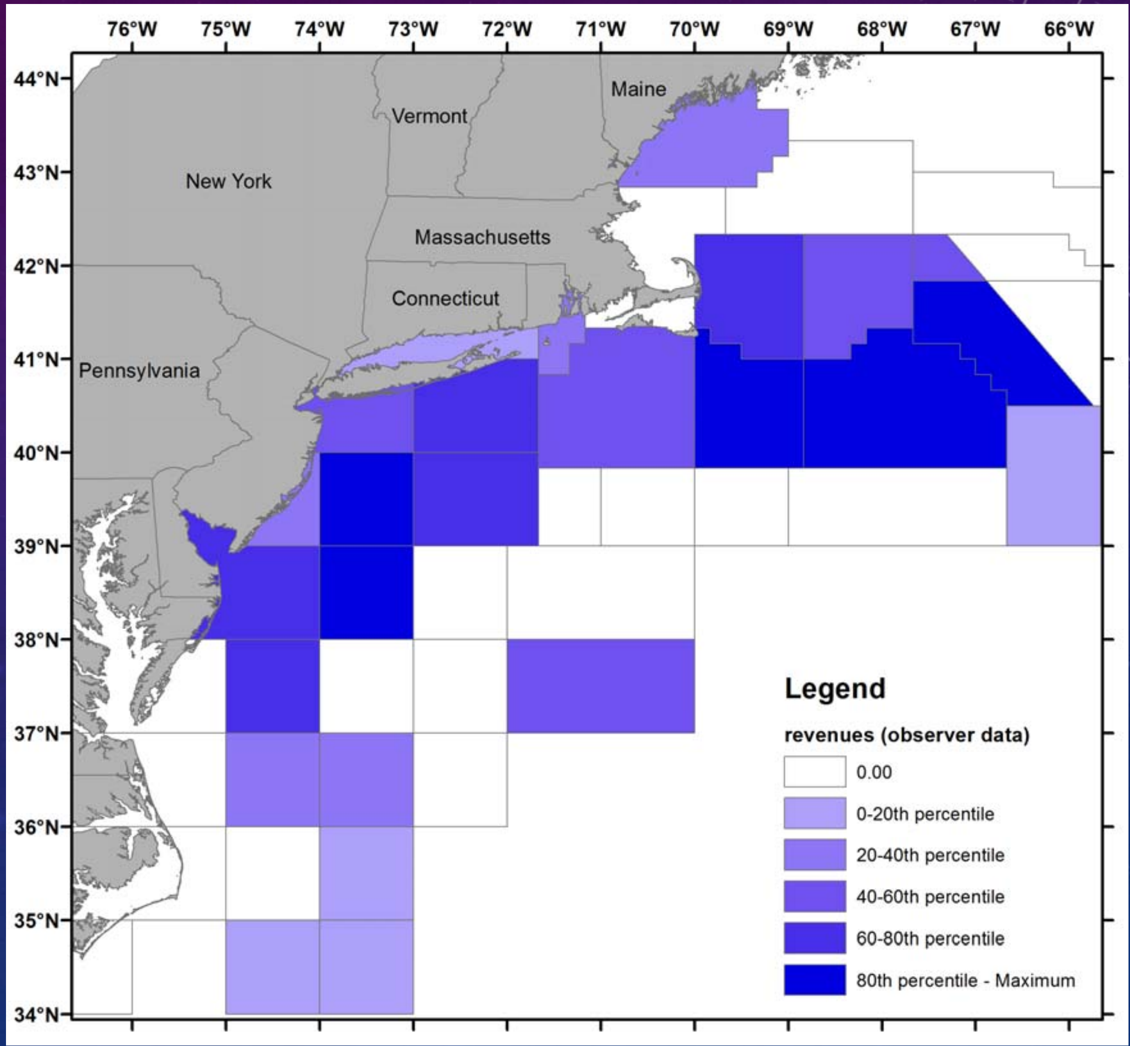
VMS - AGGREGATION

- $\Pr(\mathrm{Y} = 1 \mid \mathrm{x}) = \mathrm{F}(\mathrm{x}, \beta) = \frac{e^{x'\beta}}{1+e^{x'\beta}}$
- Y=1 → observed fishing at VMS poll
- x- covariates including: speed, speed range, seabed depth, time, ….
- E(Pr(Y=1)) if $\Pr(V_i) \geq \Pr(\bar{V}_t)$ with V_i -VMS poll i and V_t all VMS polls belonging to a trip
- $w_i = \Pr(V_i) / \sum_{t_n=1}^{N} \Pr(V_i)$ if $\Pr(V_i) \geq \Pr(\bar{V}_t)$
- Weighted fishing time: $w_i(t_{V_i} - t_{V_{i-1}}) / \sum_{t_n=1}^{N} t_{V_i}$ if $\Pr(V_i) \geq \Pr(\bar{V}_t)$ with $t_{V_i} - t_{V_{i-1}}$ - lag time of VMS fishing poll i
- Fraction of weighted fishing time as base to distribute revenues of the trip

RESULTS

STATISTICAL AREAS

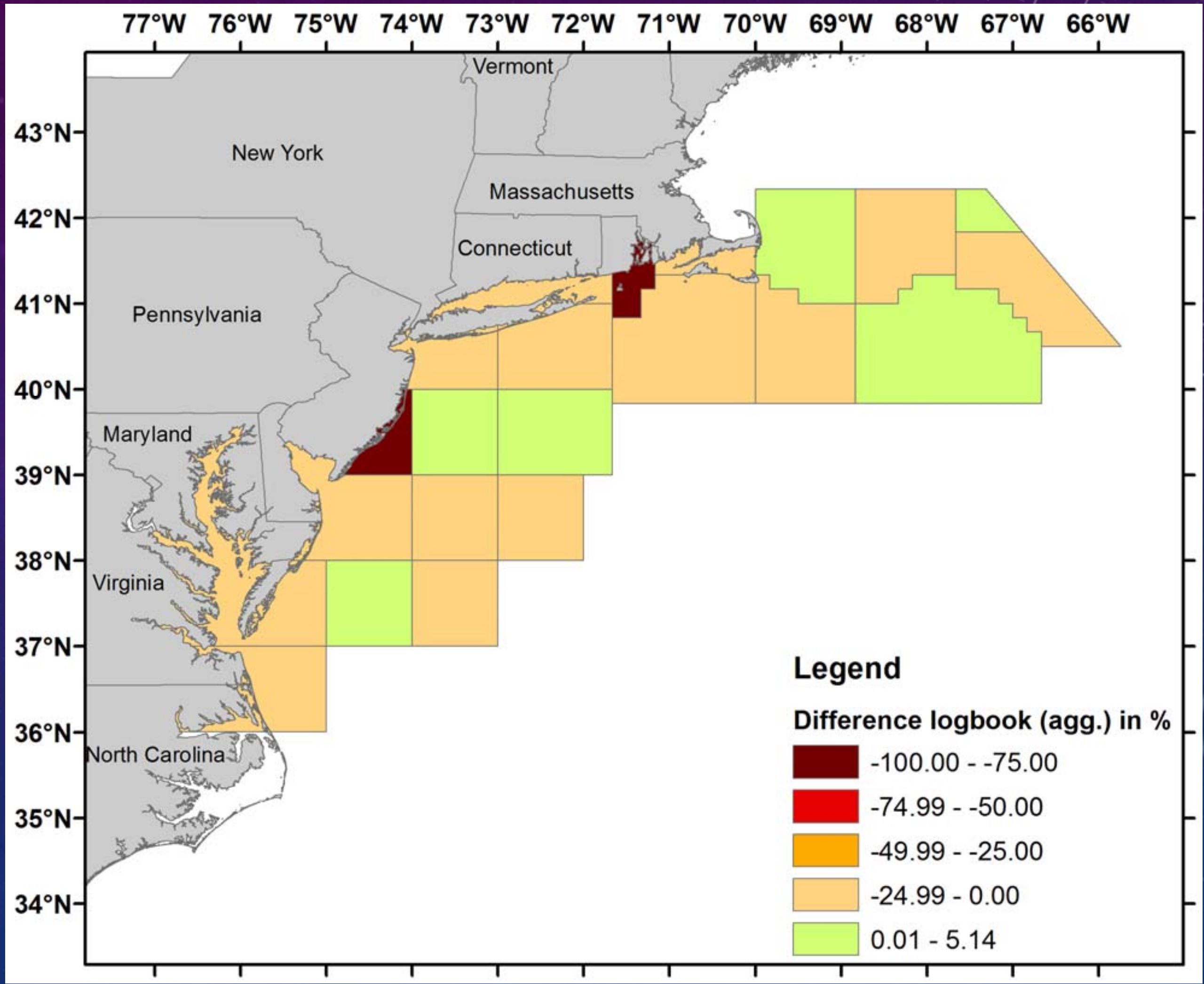
- Spatial distribution of revenues according to observed fishing time (median for FY2000-14)



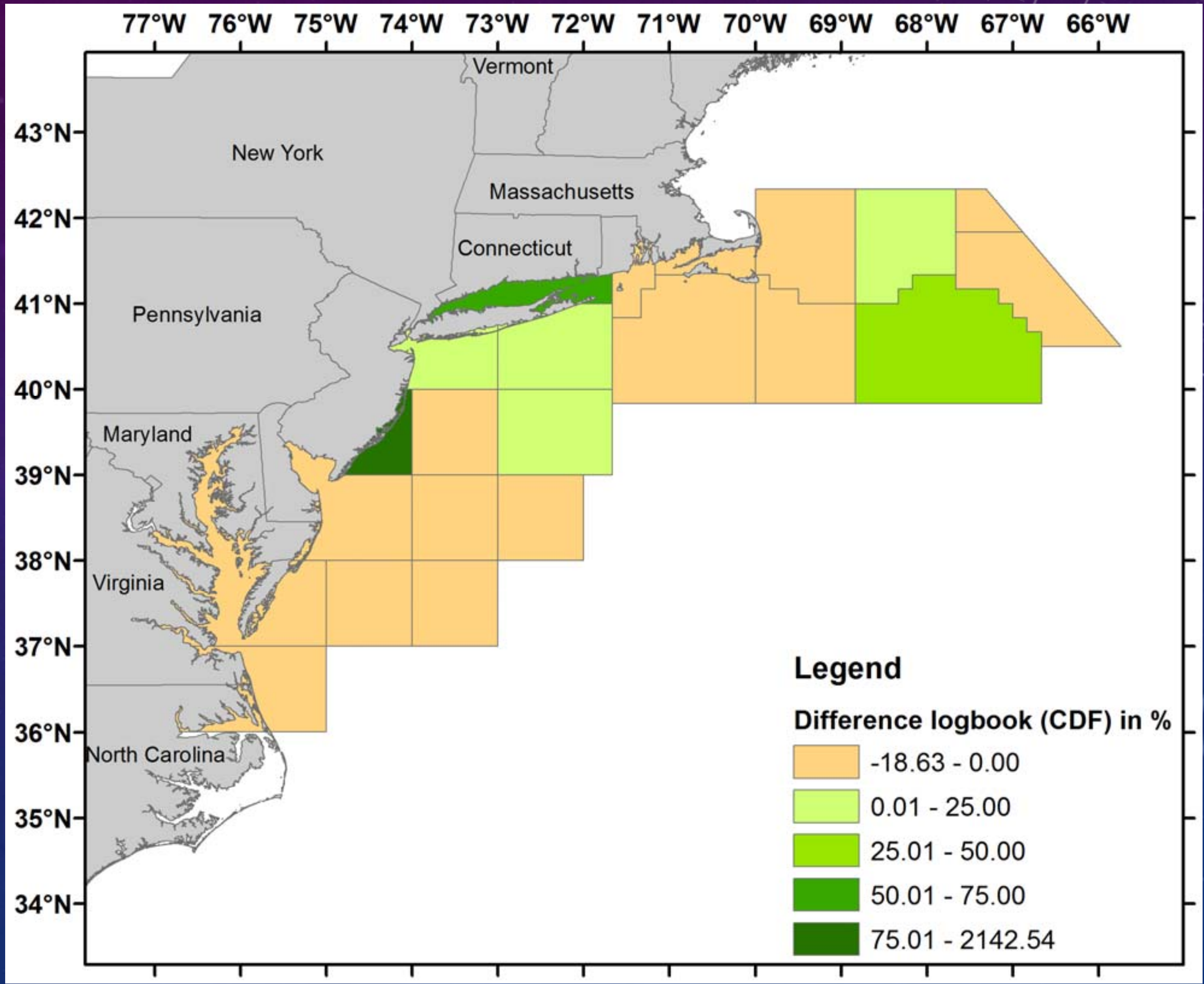
RESULTS

STATISTICAL AREAS

- Spatial distribution of difference between logbook (agg.) and observer data (median for FY2000-14)
- 10-90% of CDF between -100-24.8 %



RESULTS
STATISTICAL AREAS

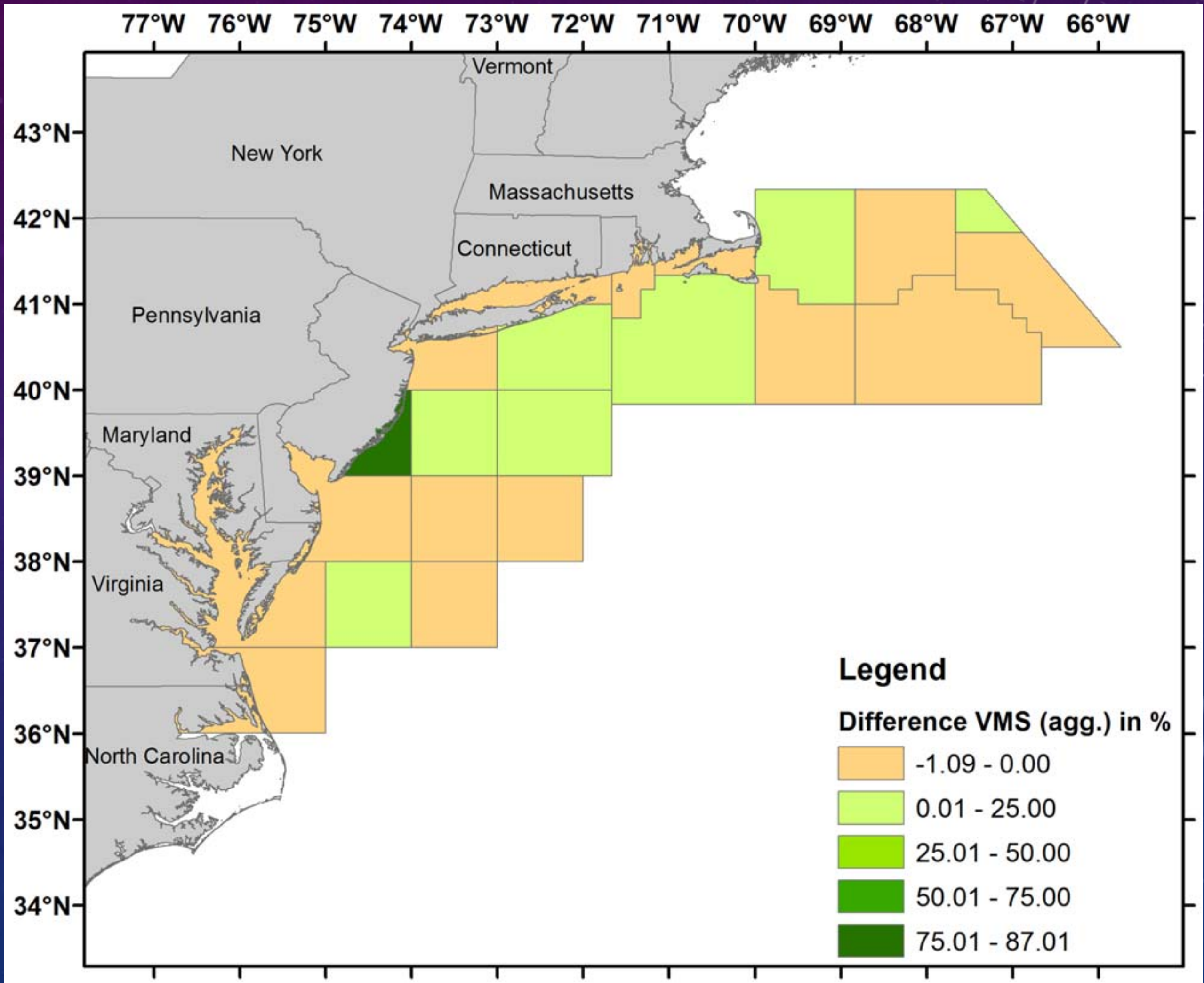


- Spatial distribution of difference between logbook (CDF) and observer data (median for FY2000-14)
- 10-90% of CDF between -33.8-158.9 %

RESULTS
STATISTICAL AREAS

- Spatial distribution of difference between VMS (agg.) and observer data (median for FY2000-14)

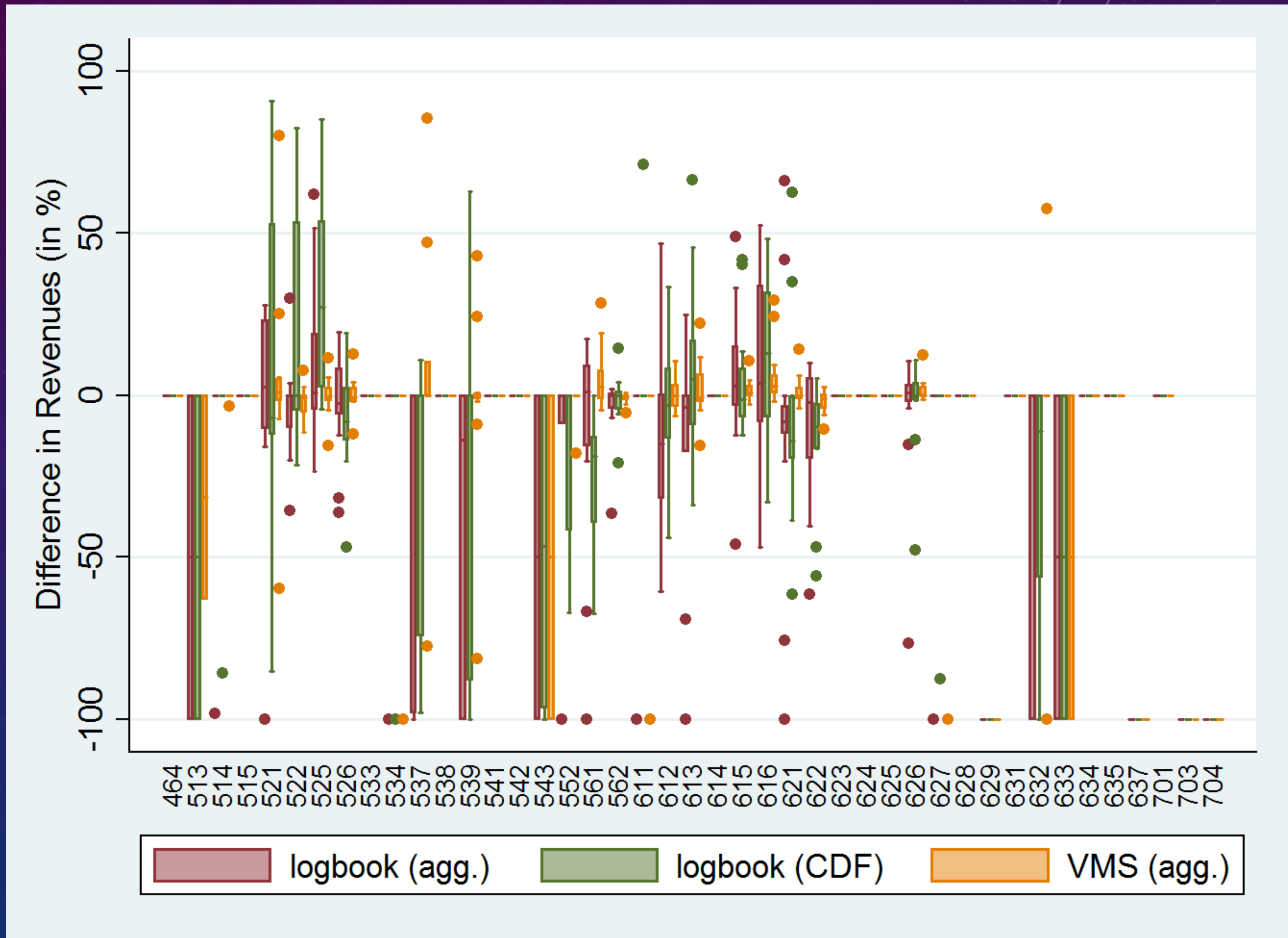
- 10-90% of CDF between -7.1-16.6 %



RESULTS

STATISTICAL AREAS

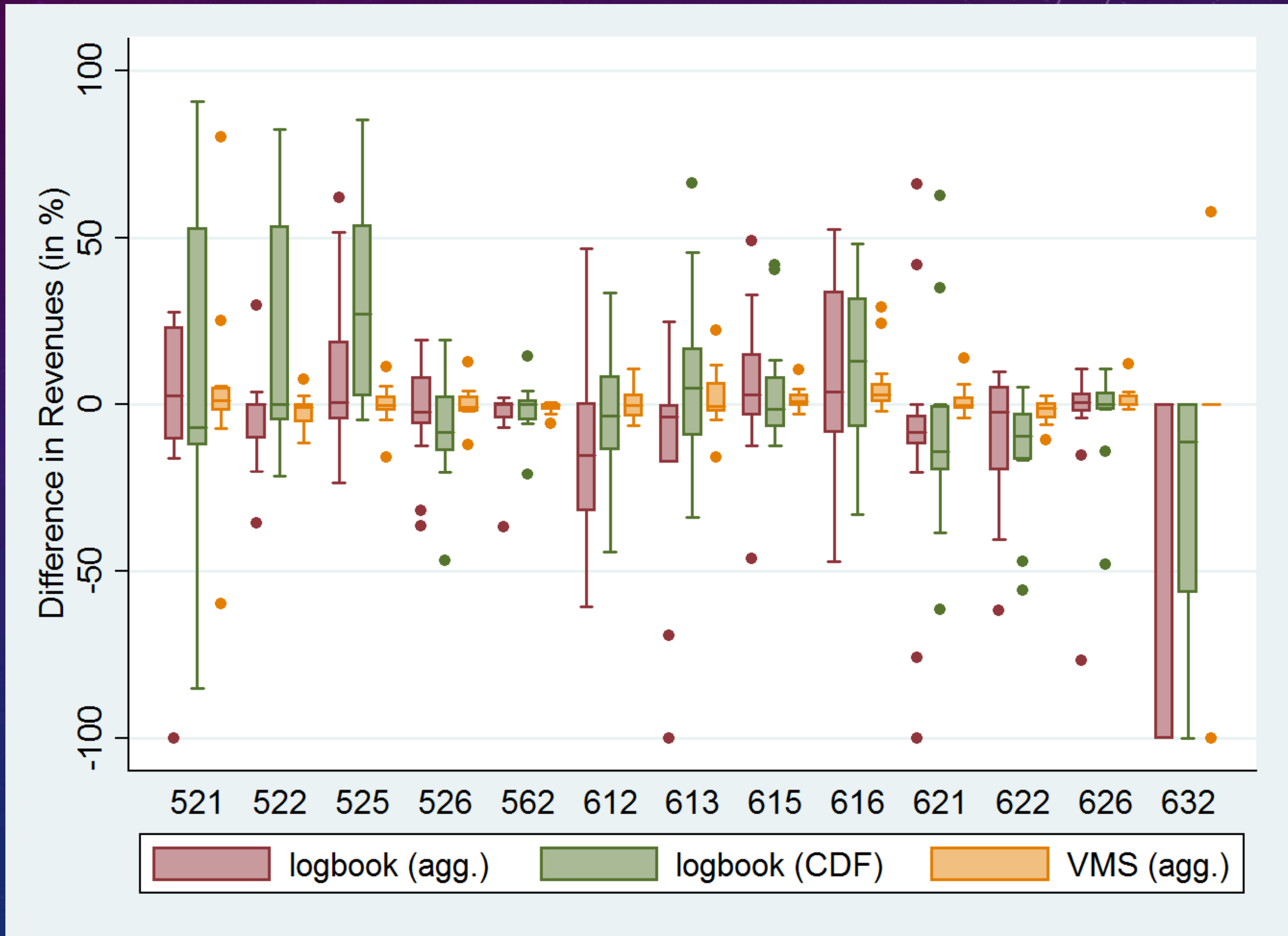
- Difference in spatial distribution of revenues
- All statistical areas FY2000-14
- Baseline: observer data



RESULTS

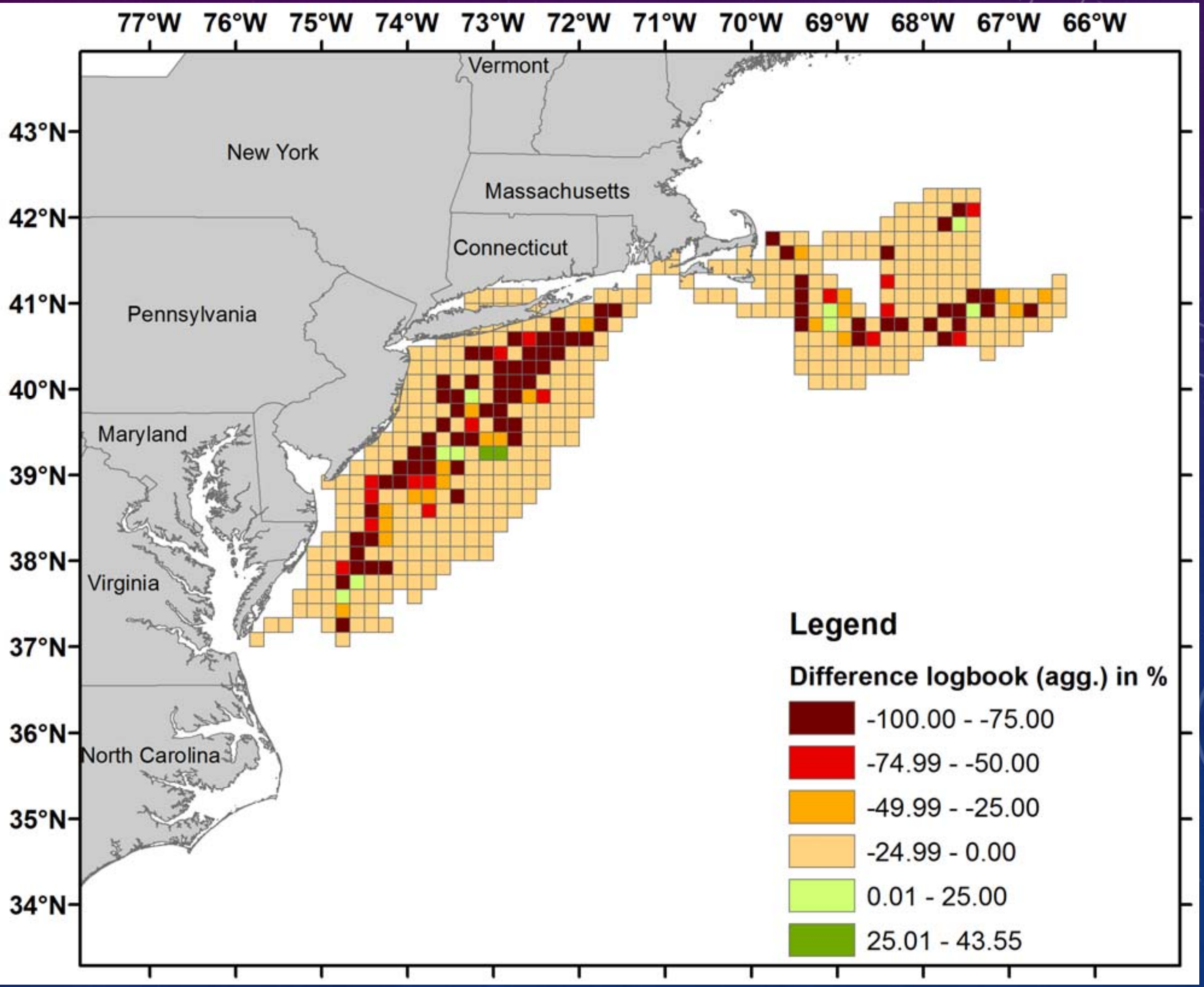
STATISTICAL AREAS

- Difference in spatial distribution of revenues
- Top5 statistical areas in the respective FY2000-14 (75 % of the revenues)
- Baseline: observer data



RESULTS
TMSQ

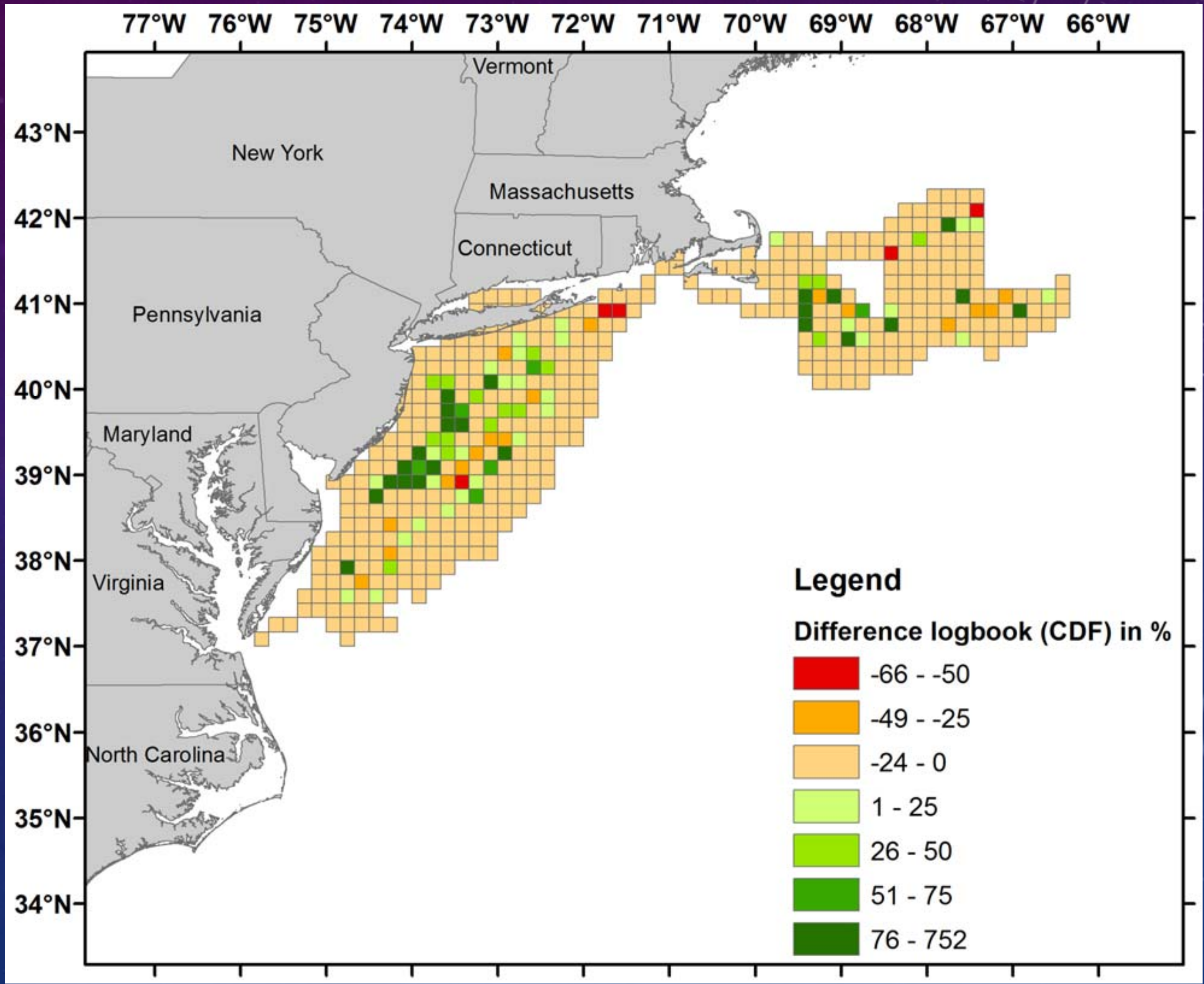
- Spatial distribution of difference between logbook (agg.) and observer data (median for FY2000-14)
- 10-90% of CDF between -100-0 %



RESULTS
TMSQ

- Spatial distribution of difference between logbook (CDF) and observer data (median for FY2000-14)

- 10-90% of CDF between -26.7-189.7 %

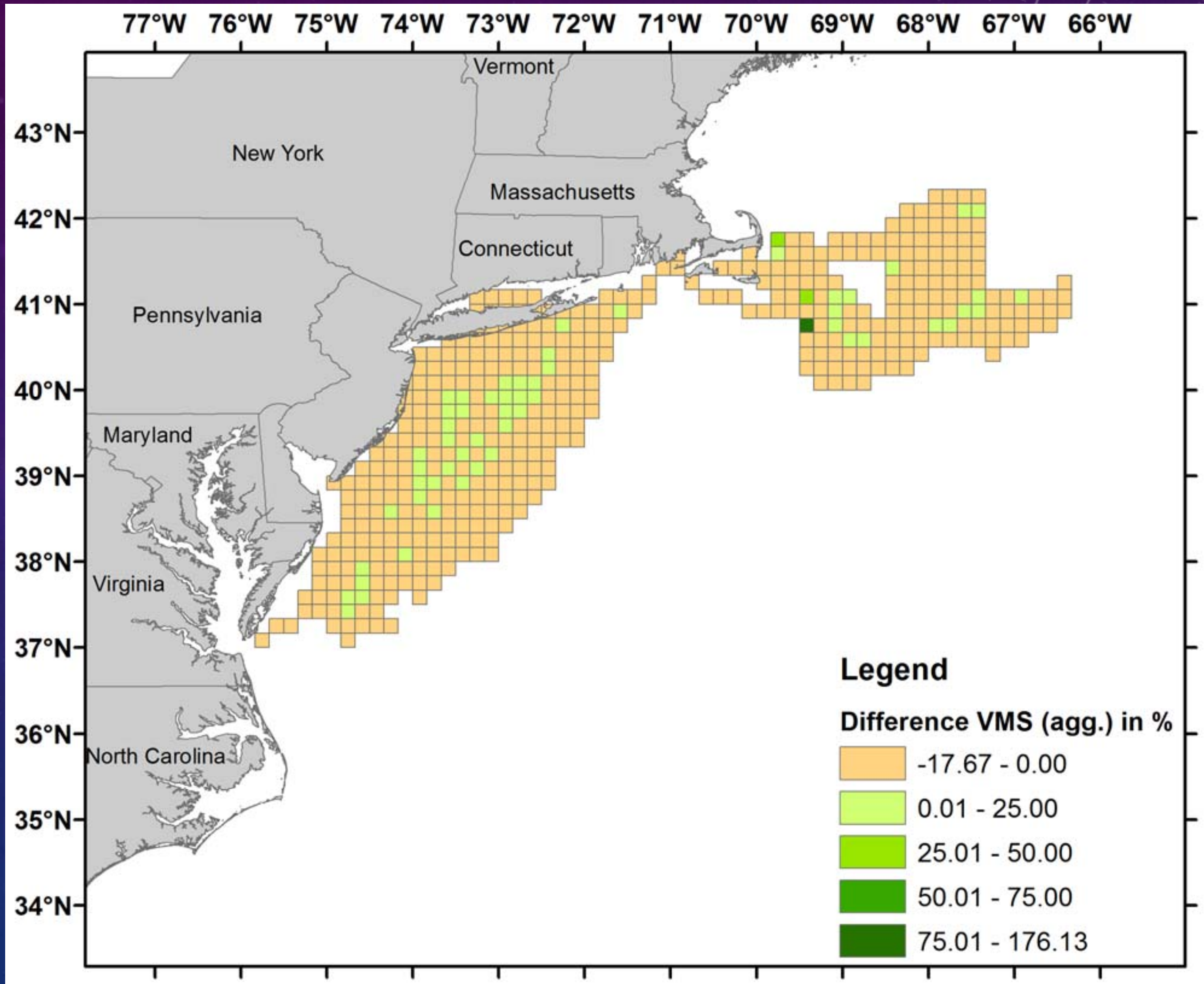


RESULTS

TMSQ

- Spatial distribution of difference between VMS (agg.) and observer data (median for FY2000-14)

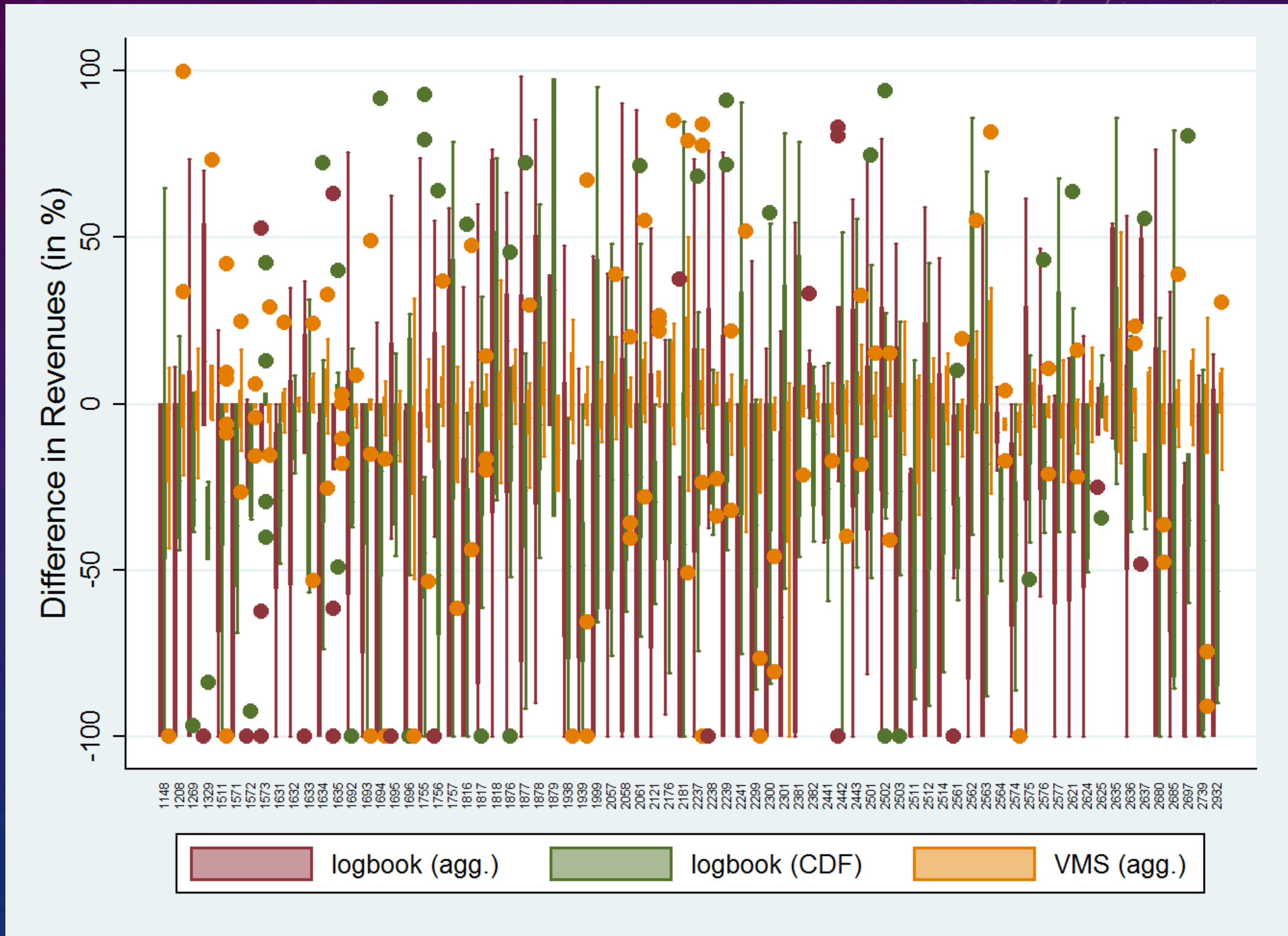
- 10-90% of CDF between -15.2-7.8 %



RESULTS

TMSQ

- Difference in spatial distribution of revenues
- Top10 TMSQ in the respective FY2000-14 (70 % of the revenues)
- Baseline: observer data



CONCLUSION

Statistical Area

- VMS approach comes closest to observer data
- VTR approaches (agg. & CDF) – mixed results

TMSQ

- VMS seems to be the most accurate prediction
- VTR (CDF) tends to over-predict slightly, while VTR (agg.) rather heavily under-predicts the generated revenues