Using the best available data in the CBP models

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WQGIT 5/24/2021

Principles

- Maintain integrity of TMDL calculations as defined by the partnership
- Use best available data
- Maintain consistency in tools

Principles

- Maintain integrity of TMDL calculations as defined by the partnership
- Use best available data – Always Improve
- Maintain consistency in tools – Never Change

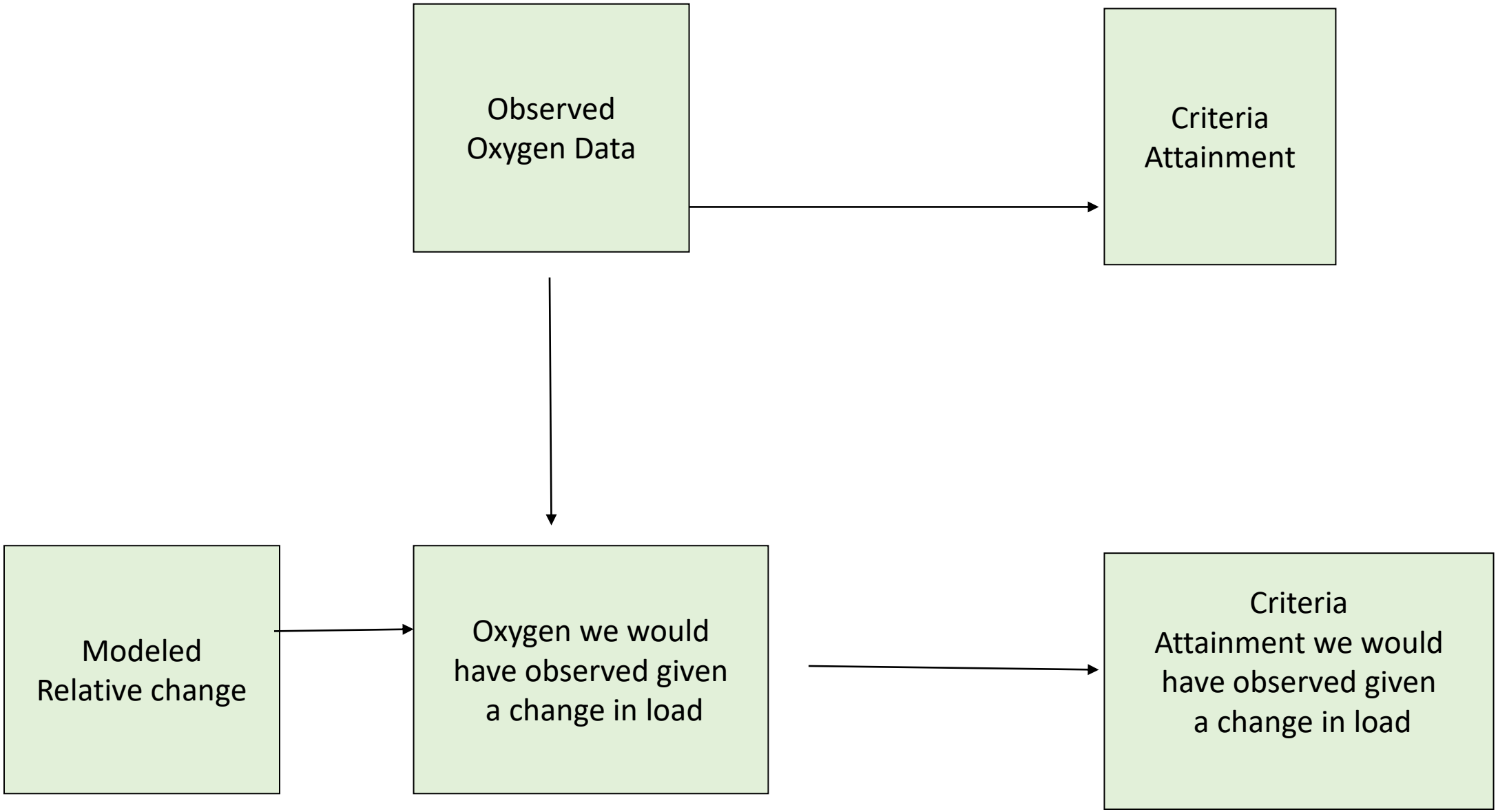
- How can we resolve the conflict between consistency and incorporation of new data while maintaining the integrity of the TMDL?
- Not a new issue – we've been dealing with it since the phase 2 model.

Theory and Practice

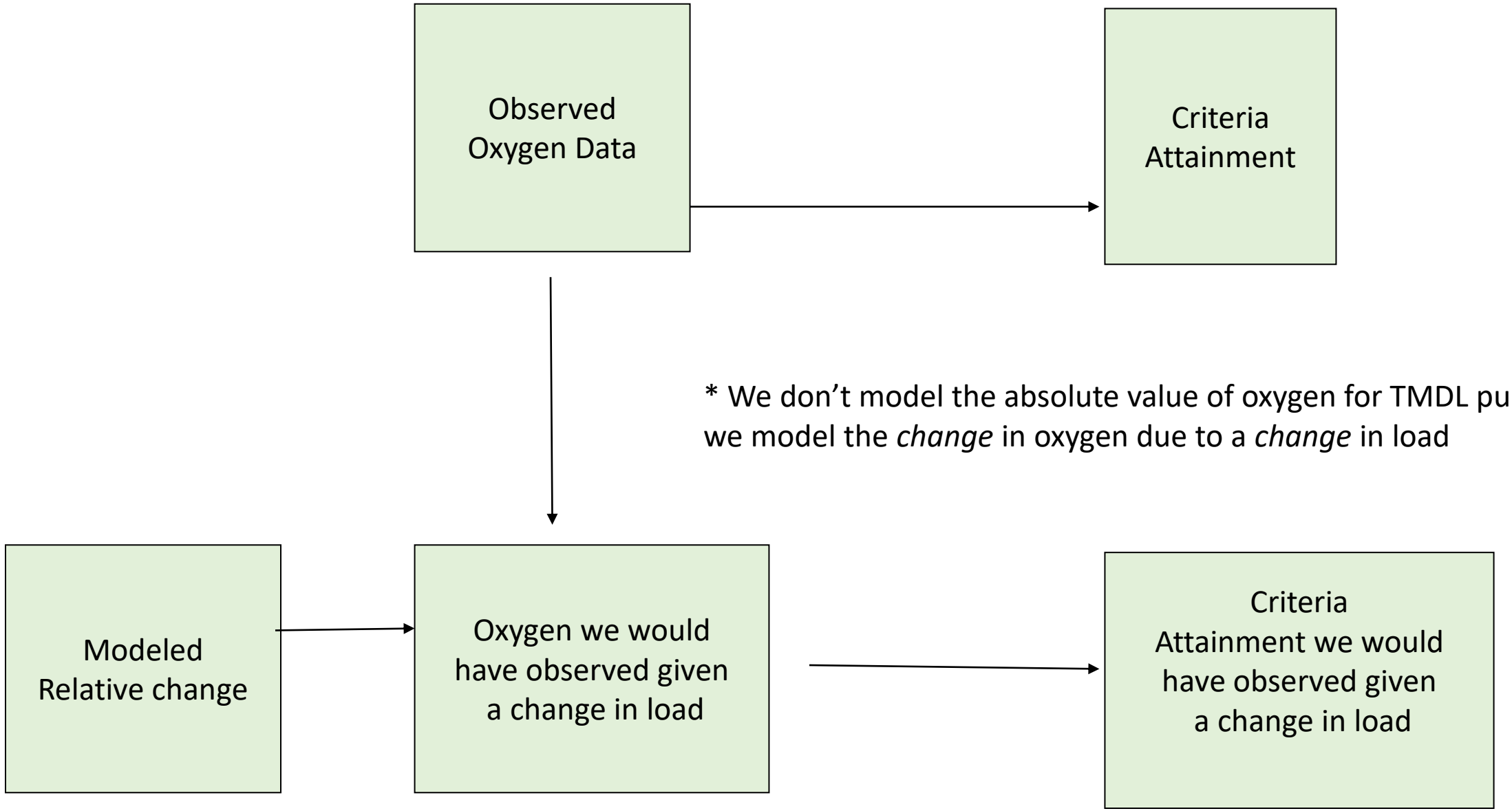
- Deep dive into TMDL calculations and history
  - C2K agreement – modeling for TMDL avoidance
  - 2017 Midpoint Assessment modeling
    - TMDL integrity
    - Fairness and partnership decisions
- Current examples
  - Boat pump outs
  - Tidal point sources
  - Application to Land use
- Looking forward

From April of 2002

From April of 2002



From April of 2002



Basis for 2017 Decision

		Base
Run 223		325TN
11/29/17		21.9TP
CAST Loads		1993-1995
		Deep
Cbseg	State	Channel
CB4MH	MD	46%

Observed Data

1993
Progress
337TN
23.7
1993-1995
Deep
Channel
46%

Modified very slightly
For difference between
1993 and average of
1993-1995

From December of 2017

Basis for 2017 Decision

		Base	No Action	1985 Progress	1990 Progress	1993 Progress	2000 Progress	2010 Progress	2013 Progress	WIP+18%TN & +12%TP	WIP+6%TN & +4%TP	WIP2	WIP-6%TN & -8%TP	WIP-11%TN & -16%TP	E3	All Forest
										WIP2 +19M lbs TN	WIP2 +10M lbs TN		WIP2 - 9M lbs TN	WIP2 -21M lbs TN		
Run 223		325TN	404TN	347TN	338TN	337TN	317TN	266TN	253TN	224TN	205TN	195TN	185TN	174TN	133TN	40TN
11/29/17		21.9TP	41.7TP	30.4TP	27.7TP	23.7	21.9TP	16.9TP	15.9TP	14.8TP	14.4	13.7TP	13.0TP	11.9TP	8.6TP	3.9TP
CAST Loads		1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep	1993-1995 Deep
Cbseg	State	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel
CB4MH	MD	46%	53%	48%	47%	46%	43%	30%	27%	16%	9%	6%	3%	1%	0%	0%

Observed Data

Modified very slightly
For difference between
1993 and average of
1993-1995

Change in load
necessary to meet WQS
at 6.49%

From December of 2017

Basis for 2017 Decision

		Base	No Action	1985 Progress	1990 Progress	1993 Progress	2000 Progress	2010 Progress	2013 Progress	WIP+18%TN & +12%TP	WIP+6%TN & +4%TP	WIP2	WIP-6%TN & -8%TP	WIP-11%TN & -16%TP	E3	All Forest
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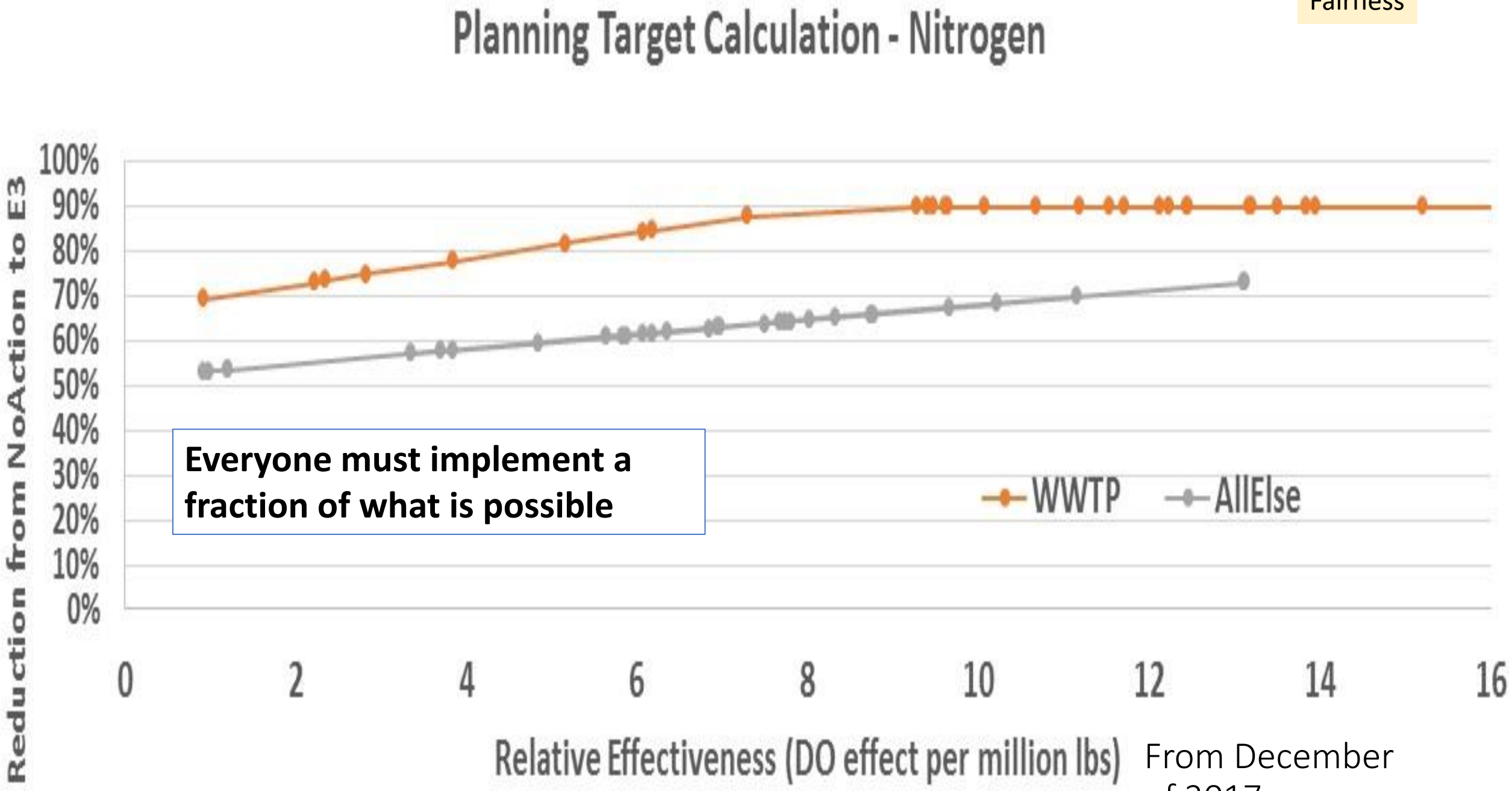
Cbseg	State	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel	Channel
CB4MH	MD	46%	53%	48%	47%	46%	43%	30%	27%	16%	9%	6%	3%	1%	0%	0%

Issue of TMDL integrity:

Measure change:
Not valid to make a model alteration that would make the calculations of loads in 1995 and any future scenario inconsistent because that would not accurately reflect change in load

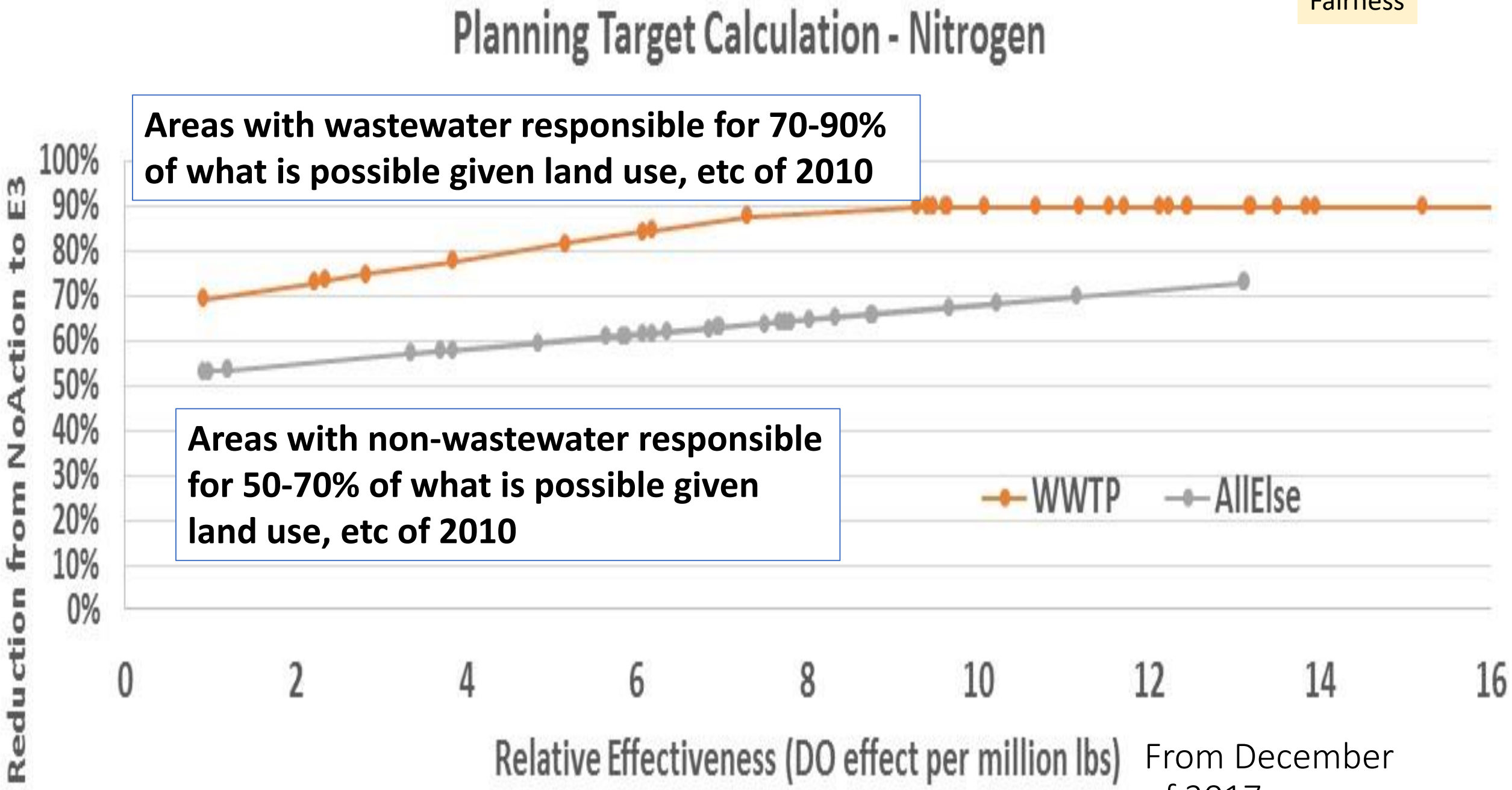
Keep 1995 consistent:
Not valid to make a model alteration that, if applied consistently, would change the load in 1995 because that would change the relationship between 1995 and the planning target

Fairness



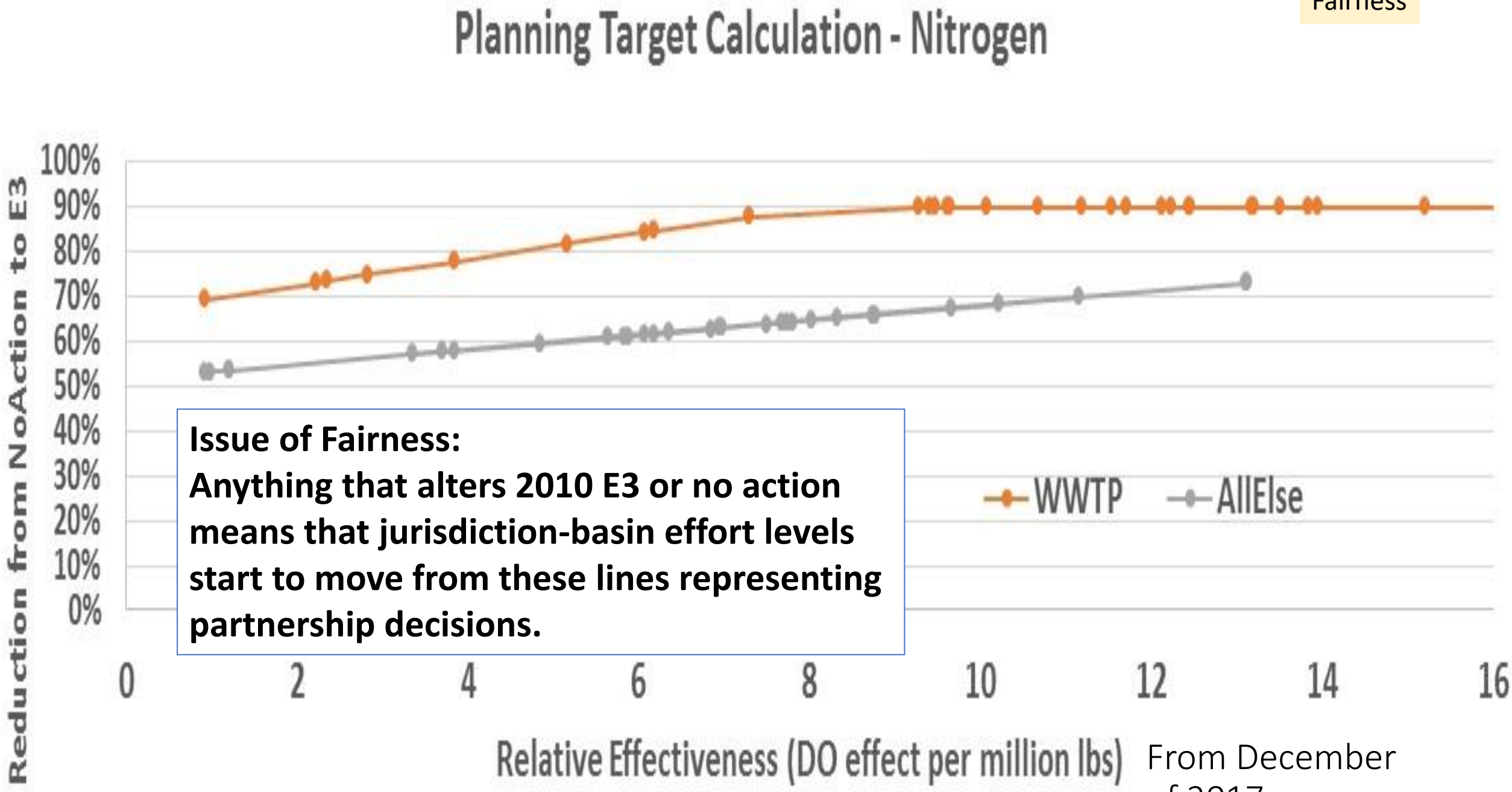
From December of 2017

Fairness



From December of 2017

Fairness



Issue of Fairness:
Anything that alters 2010 E3 or no action means that jurisdiction-basin effort levels start to move from these lines representing partnership decisions.

From December of 2017

Principles

- Maintain integrity of TMDL calculations as defined by the partnership
- Use best available data – Always Improve
- Maintain consistency in tools – Never Change

- 1995 loads must not change until planning targets change
- We ***can*** incorporate changes that more accurately represent changes between 1995 and any future scenario
- "Best available data" means the best available data on the **changes** in land use, BMPs, point sources, etc
- Extra care taken when dealing with changes prior to 2010

Example 1: MD boat discharge

- Just getting data now
  - Loads are 35k lbs higher than we thought
  - Loads are 20k lbs lower than they were in 1995

- Should Maryland be credited with a 20k lbs decrease or a 35k lbs increase

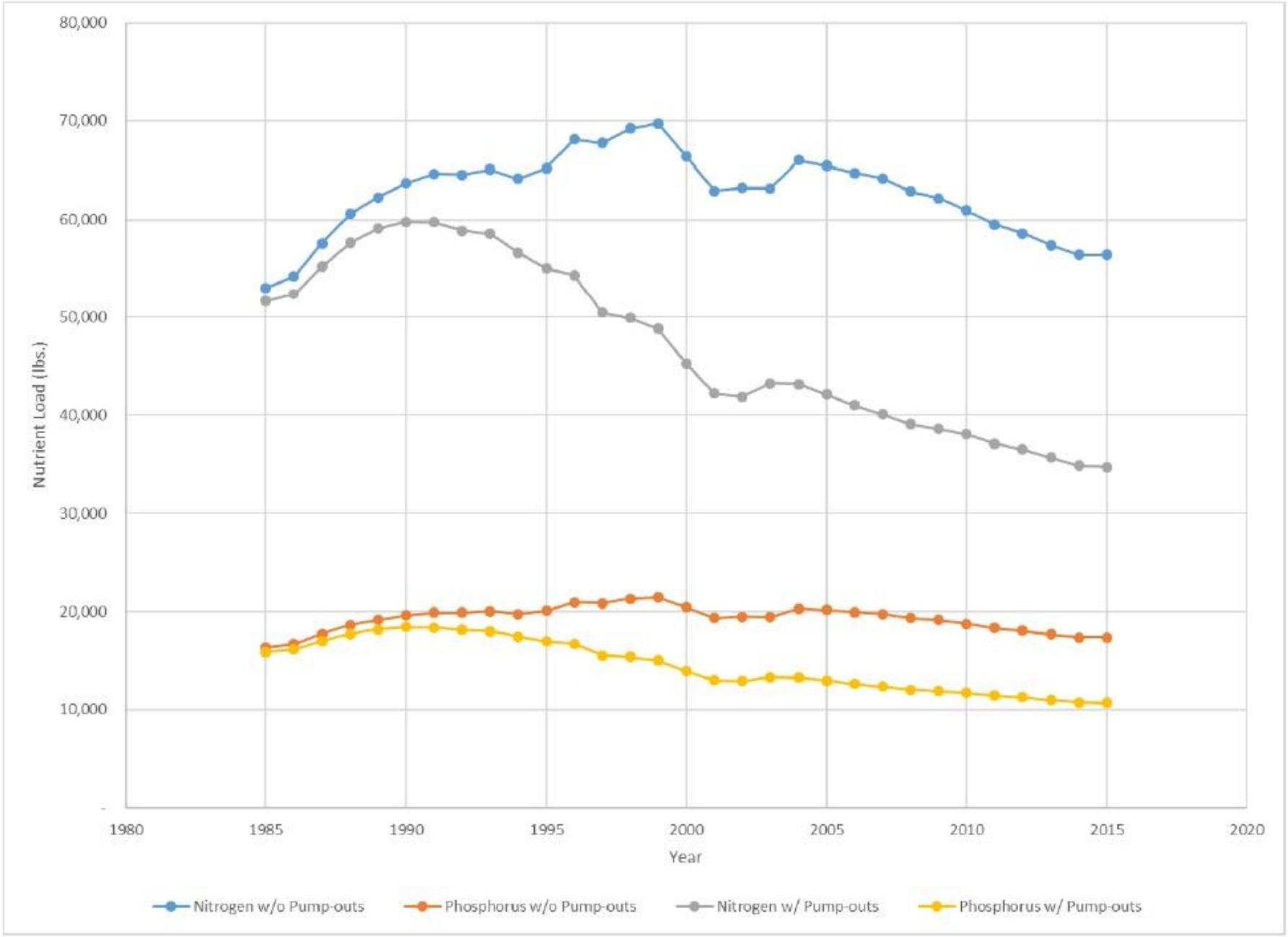


Figure 2. Estimated Nutrient Load Taking into Account Nutrient Removal by Boat Pumpout Facilities, Maryland 1985-2015

Example 1: MD boat discharge

- Estuarine model estimates change necessary to meet WQS

- If you run with a 35klb increase, WQ will get worse
- If you run with a 20klb decrease WQ will improve
- Which actually happened?

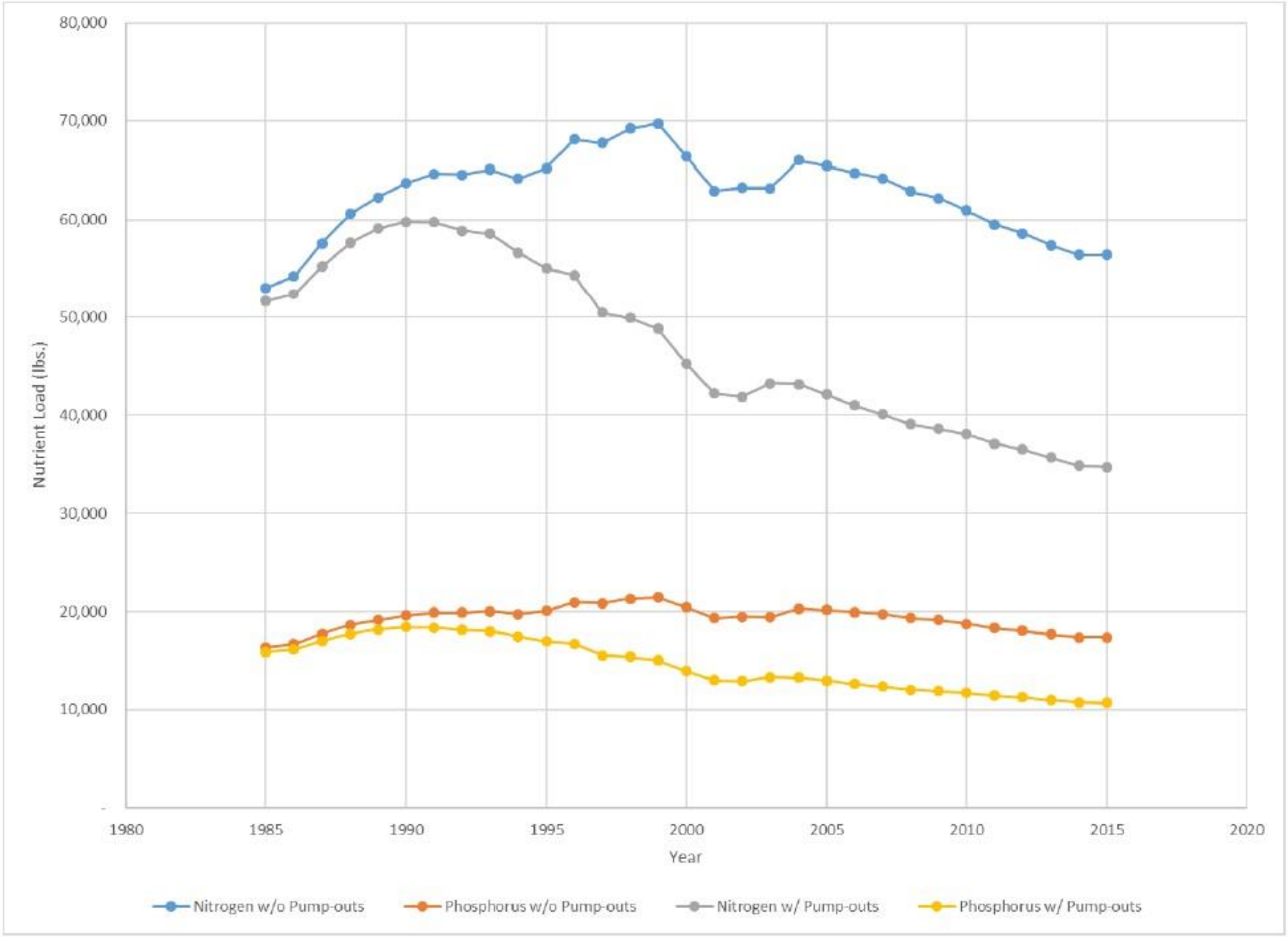
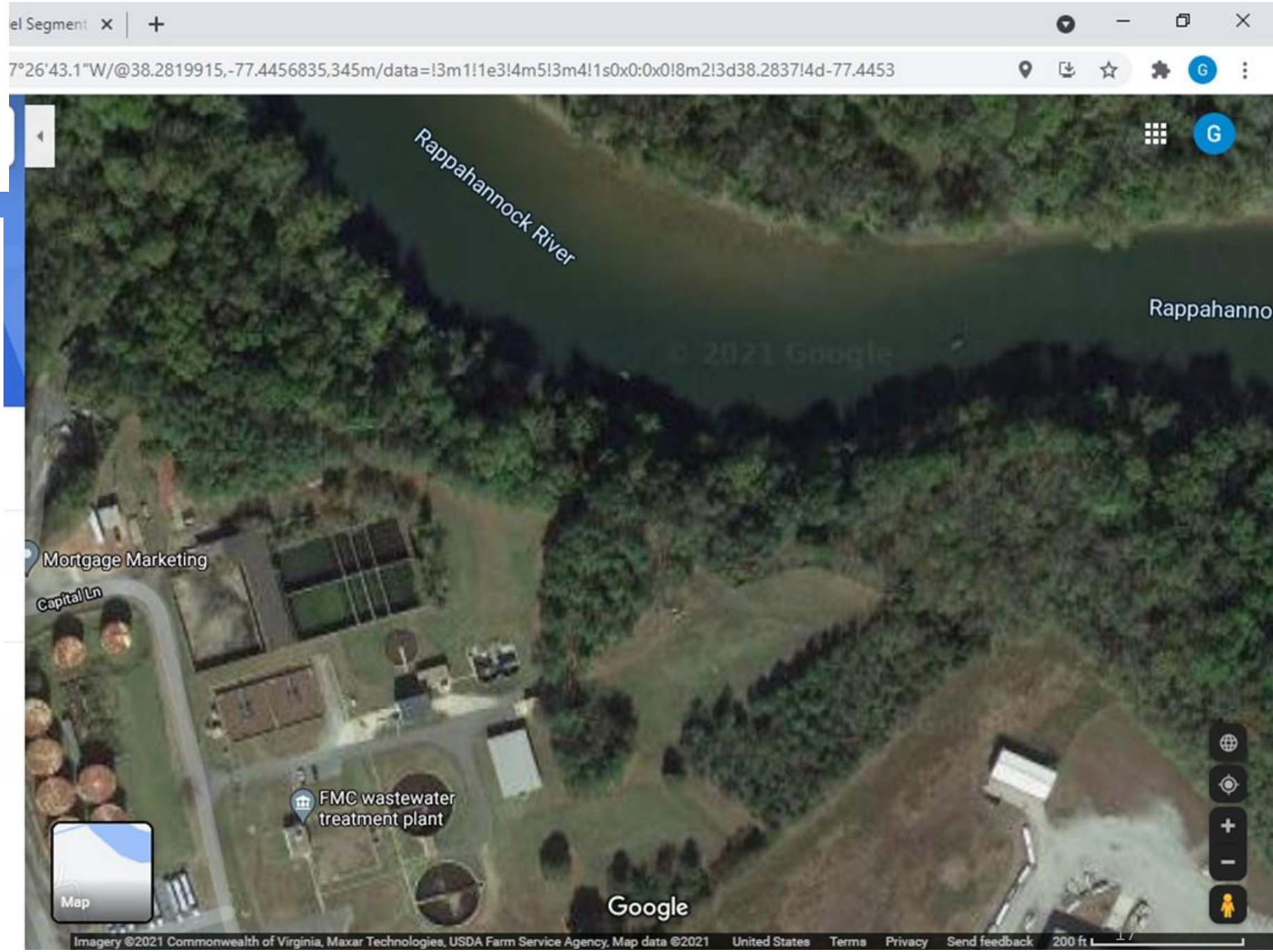


Figure 2. Estimated Nutrient Load Taking into Account Nutrient Removal by Boat Pumpout Facilities, Maryland 1985-2015

Example 2: VA point sources

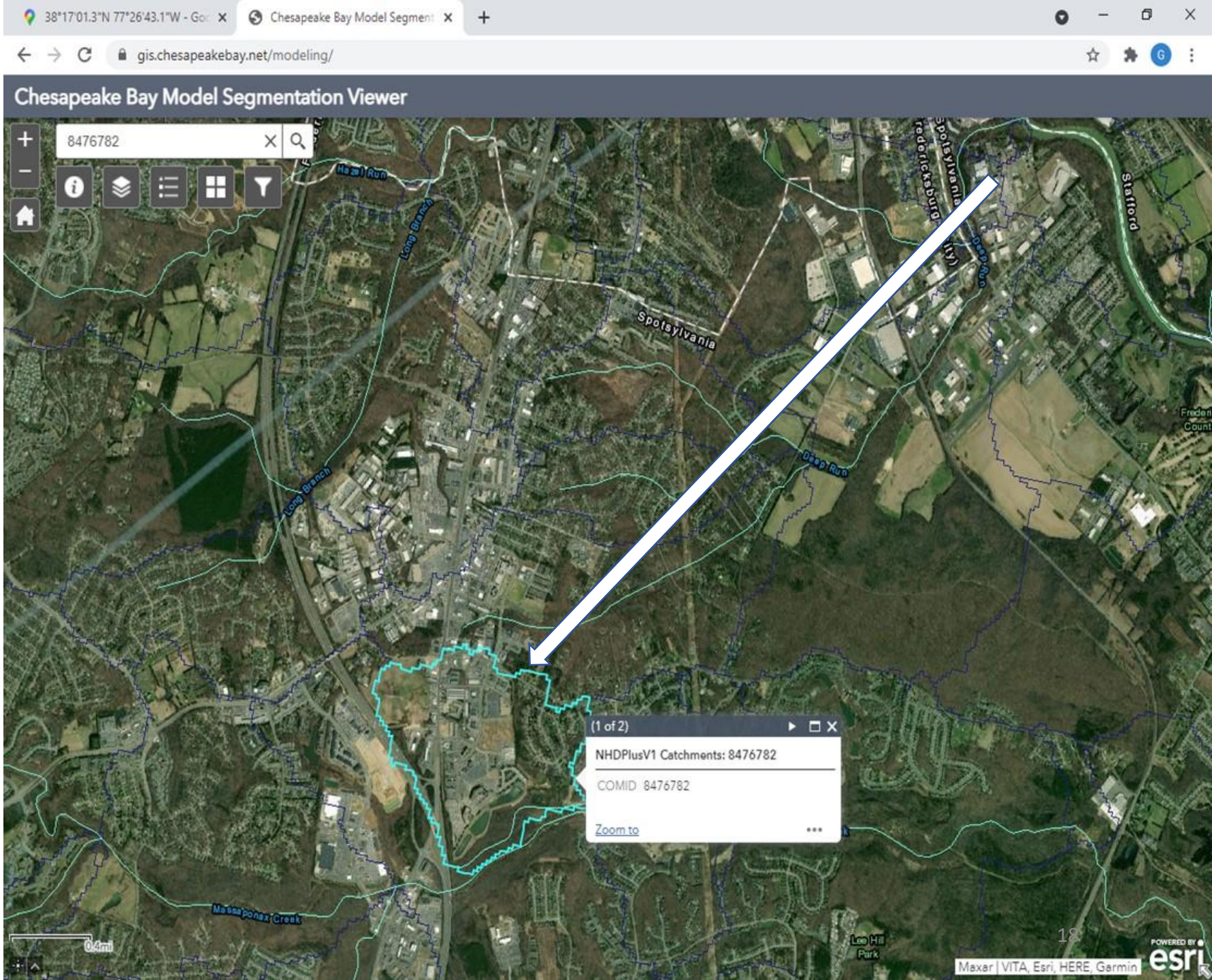
- FMC wastewater treatment plant clearly discharges to tidal Rappahannock



Example 2: VA point sources

- Lat/Long from database places outfall in business park which flows though multiple reservoirs

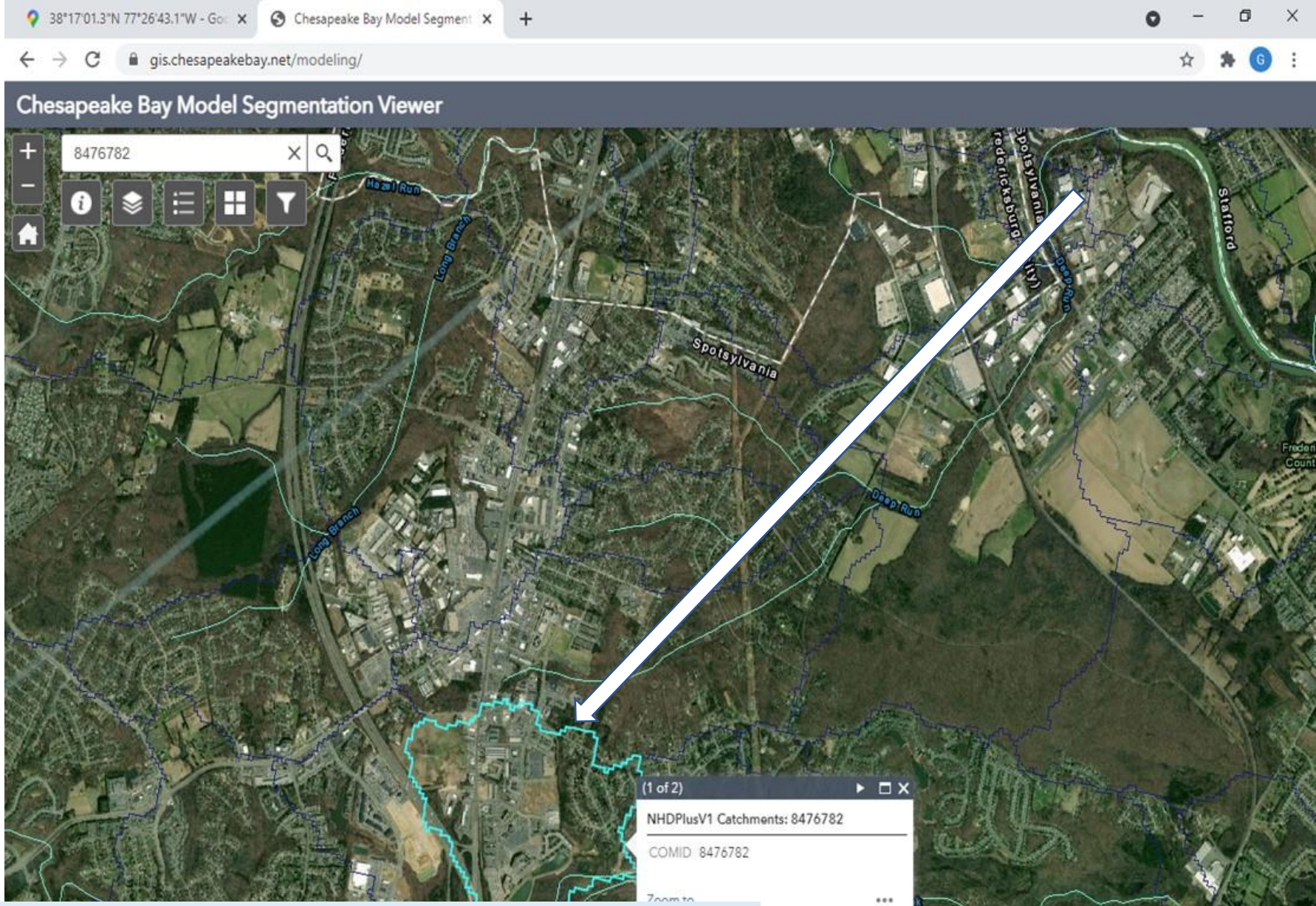
- 24% TN and 56% TP is removed in the model



Example 2: VA point sources

- ‘Better data’ for loads could argue that loads are 19,000 lbs TN and 1600 lbs TP higher

- Not consistent with the TMDL:
  - If you made just that change and ran the models, you would show water quality degrading.



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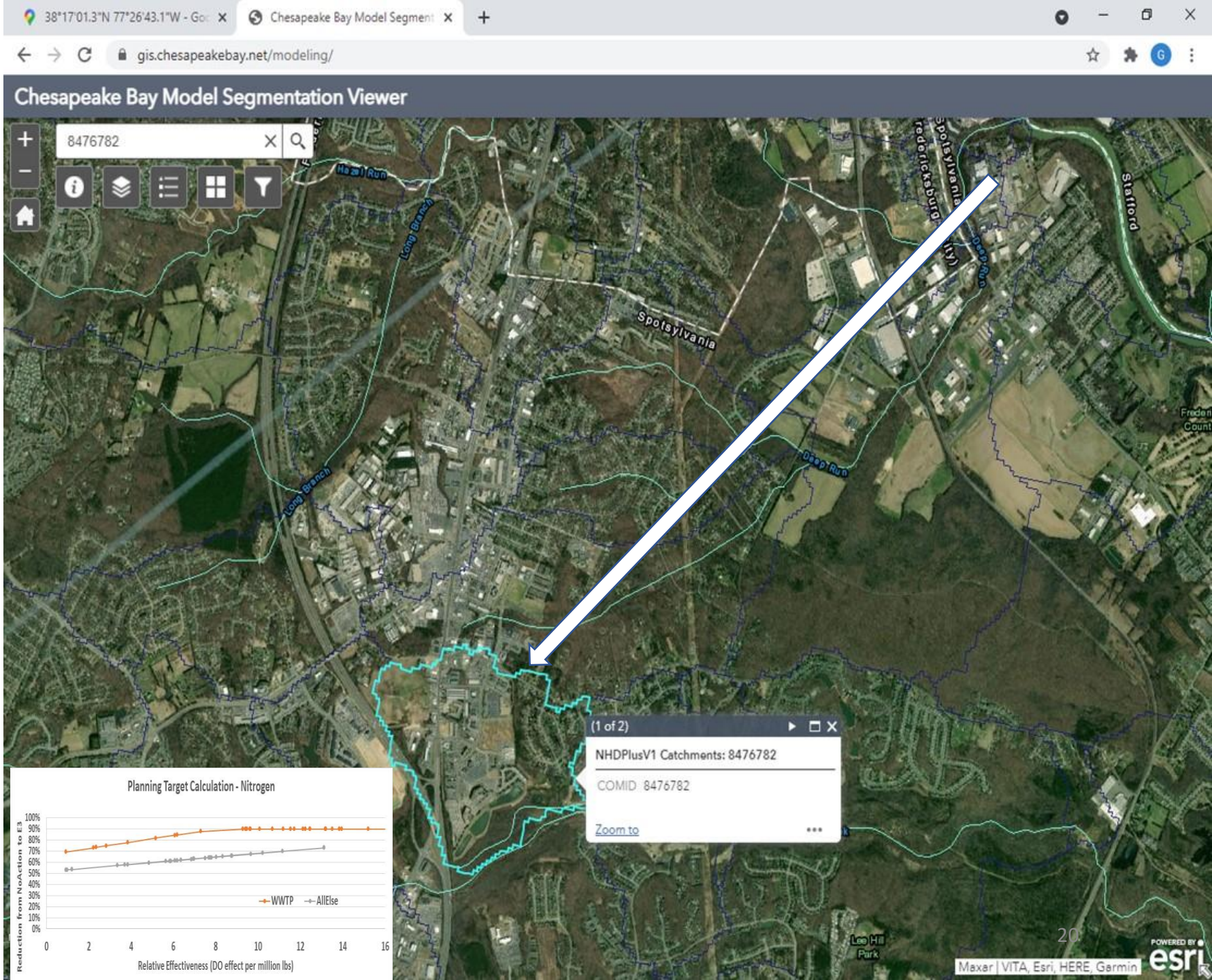
Example 2: VA point sources

- ‘Better data’ for loads could argue that loads are 19,000 lbs TN and 1600 lbs TP higher

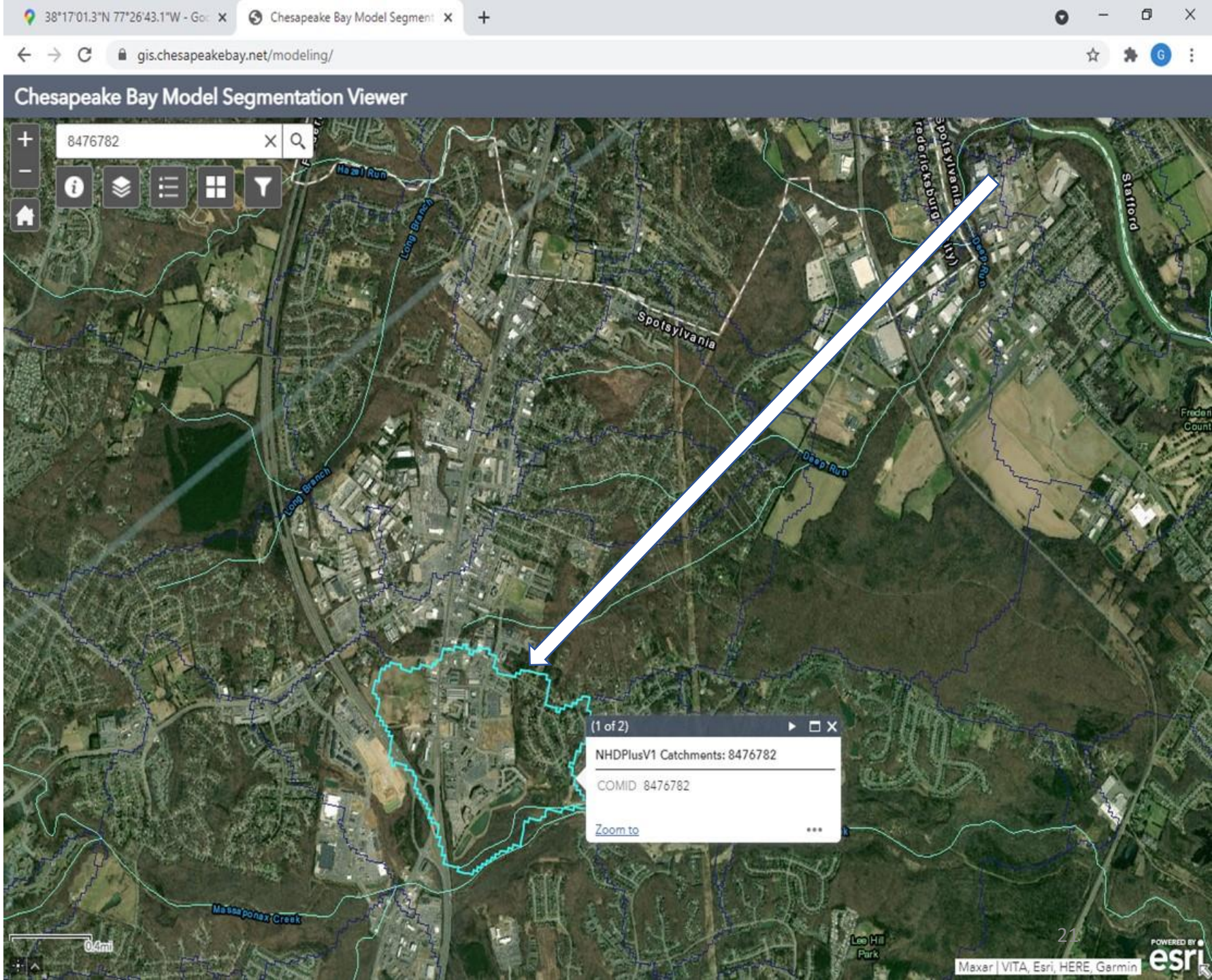
- Not fair:
  - Getting extra reduction from this source would take them to 96% TN and 97% TP level of effort



Example 2: VA point sources

- Best data available for change in load is no change

- Recent analysis shows effect is 173k lbs TN and 17k lbs TP in Virginia

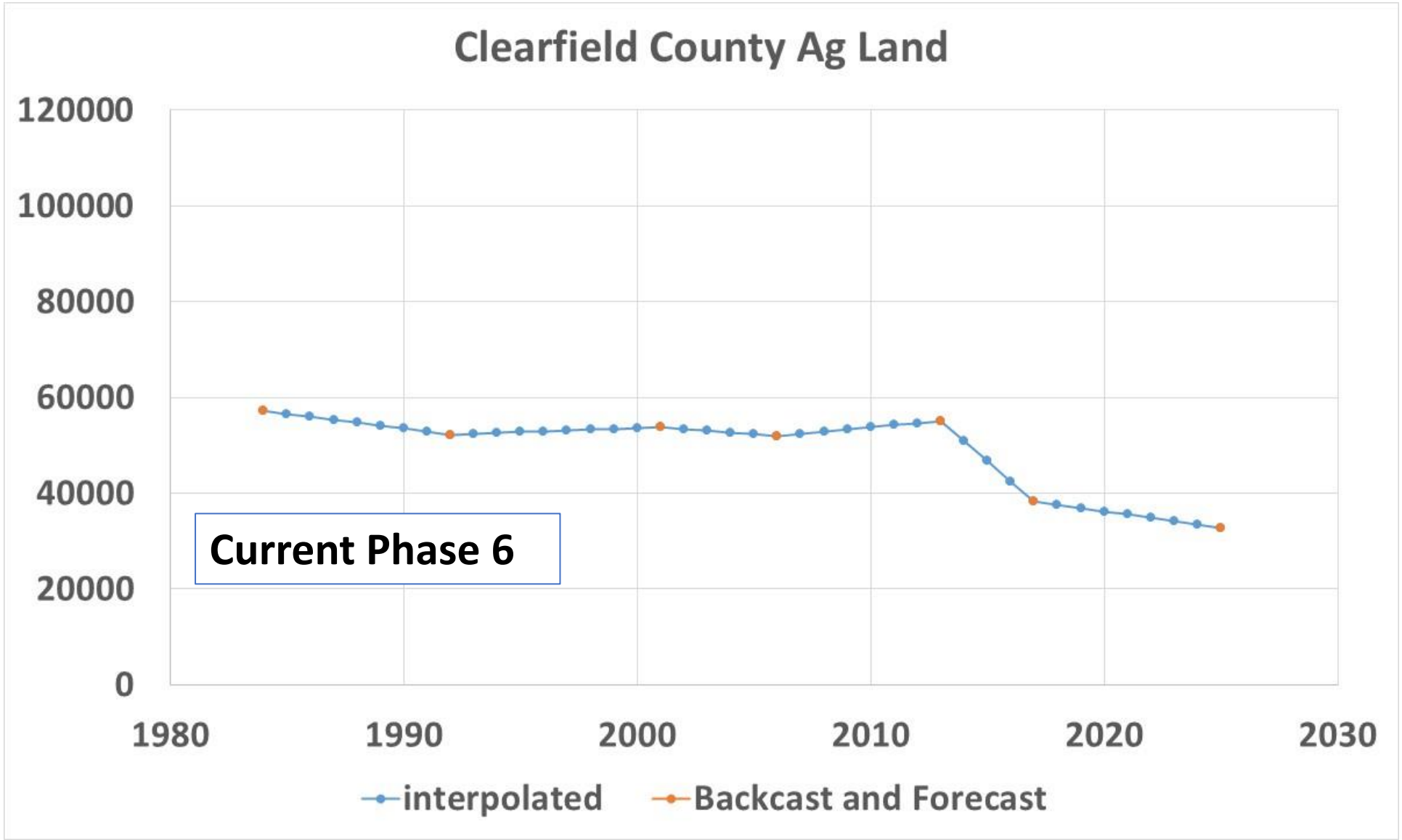


Example 3: Land use

- P6 land use is ‘anchored’ in 2013
- 1984-2012 data
  - 2013 is Backcast to 1984, 1992, 2001, and 2006
  - Interpolated between years
- 2014-2050 is forecast
  - 2013 is forecast to 2025 and 2050
  - Interpolated between years

- Change is accurately modeled due to the anchor of 2013

Example 3: Land Use – Clearfield, PA example



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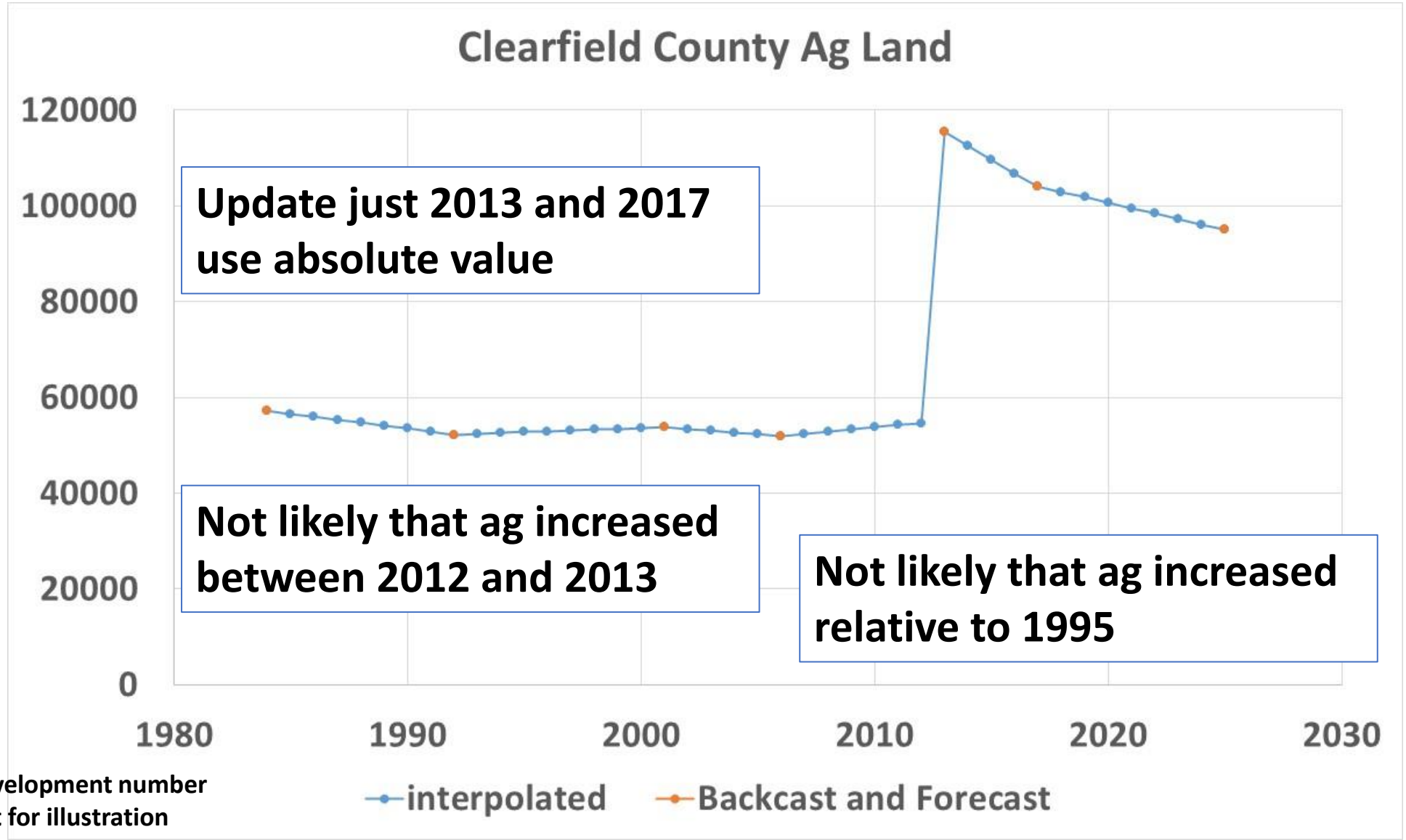
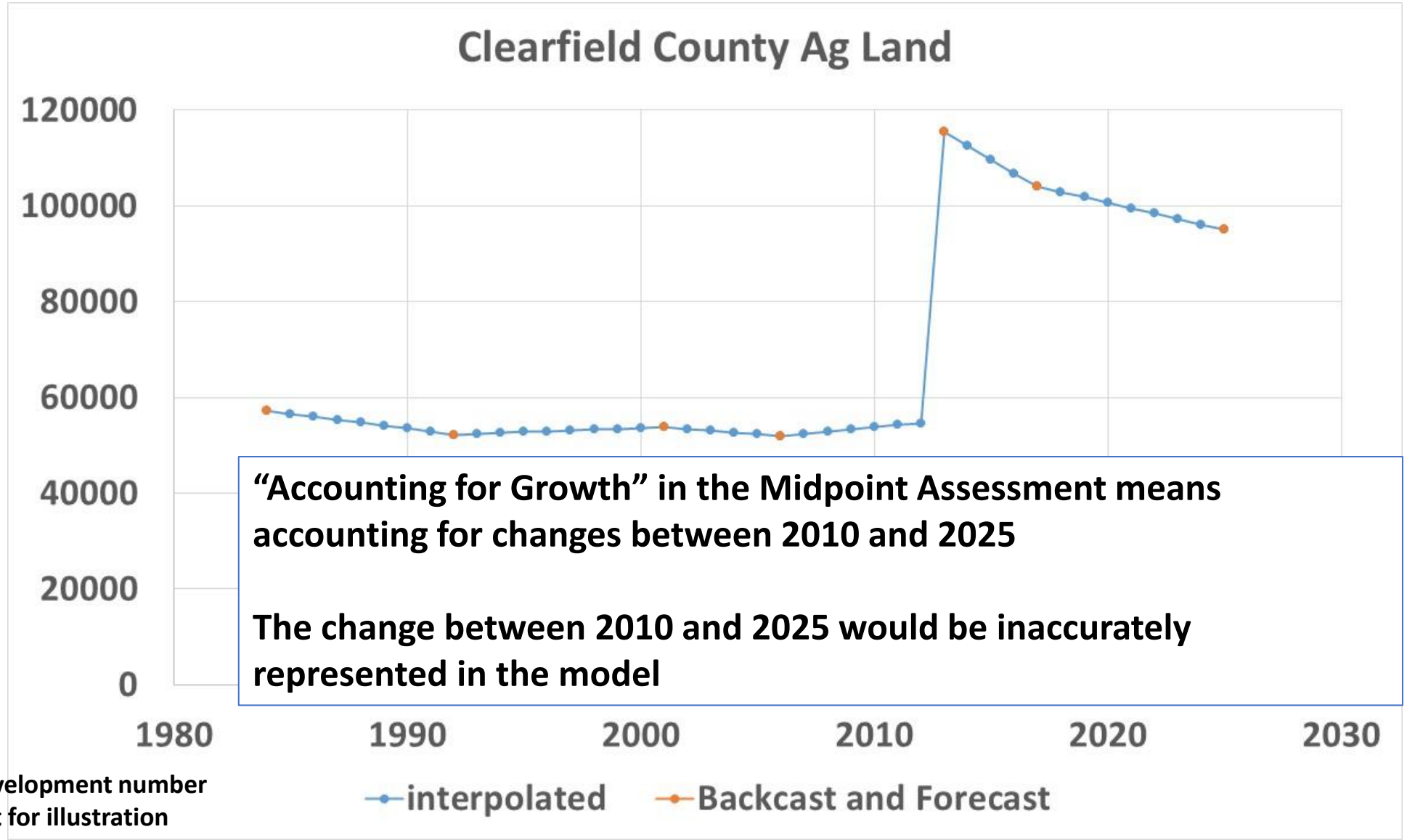


2013 is current development number
2017 and 2025 just for illustration

Example 3: Land Use – Clearfield, PA example

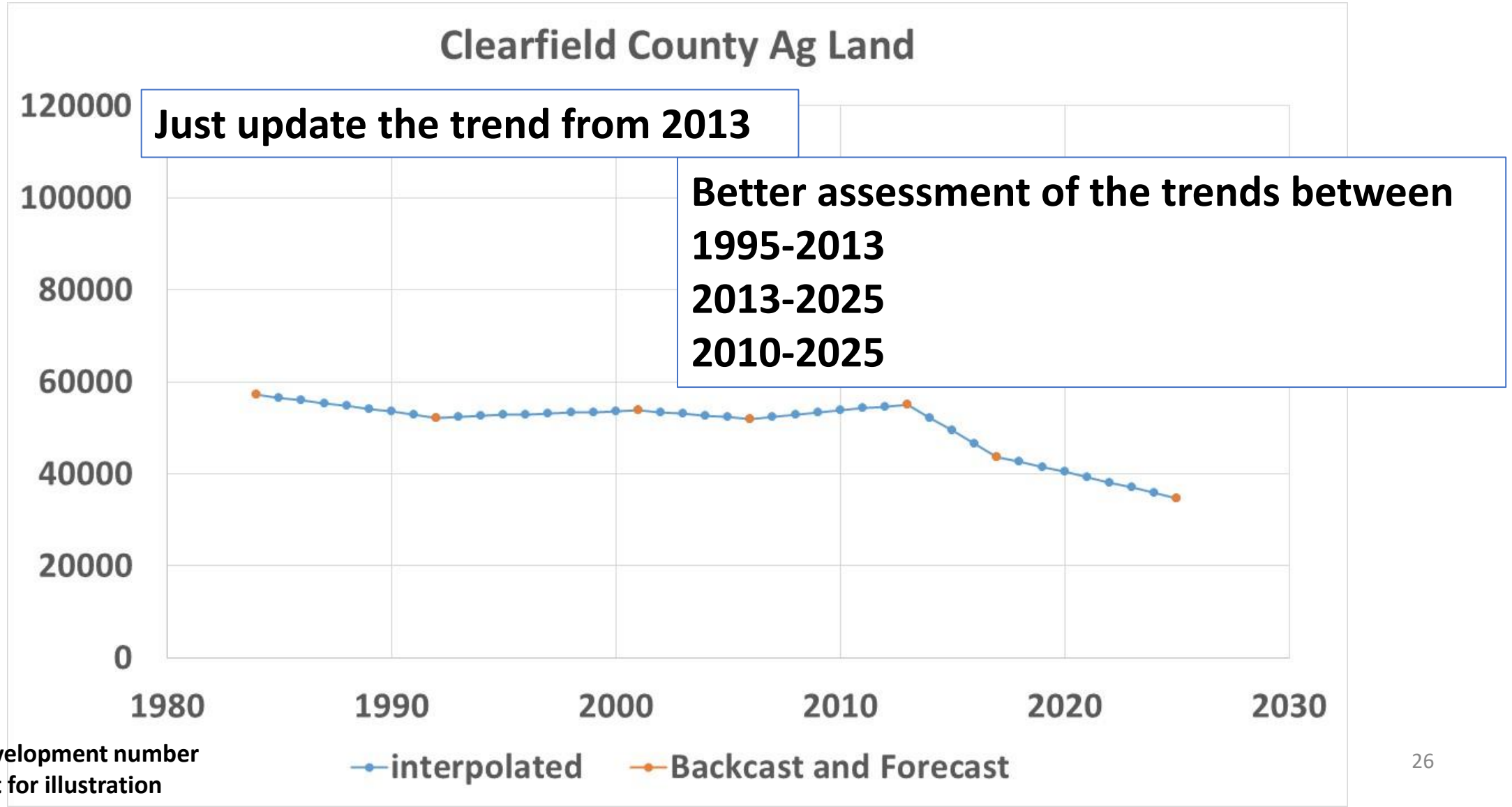


"Accounting for Growth" in the Midpoint Assessment means accounting for changes between 2010 and 2025

The change between 2010 and 2025 would be inaccurately represented in the model

2013 is current development number
2017 and 2025 just for illustration

Example 3: Land Use – Clearfield, PA example



Just update the trend from 2013

Better assessment of the trends between
1995-2013
2013-2025
2010-2025

2013 is current development number
2017 and 2025 just for illustration

So, are we stuck with old data?

- We update comprehensively when we change the planning targets
  - 2003
  - 2010
  - 2011
  - 2017
  - 2025?
- The principle of modeling change is the reason that we have planning targets rather than sticking with the 2010 TMDL allocations

June/July 2011

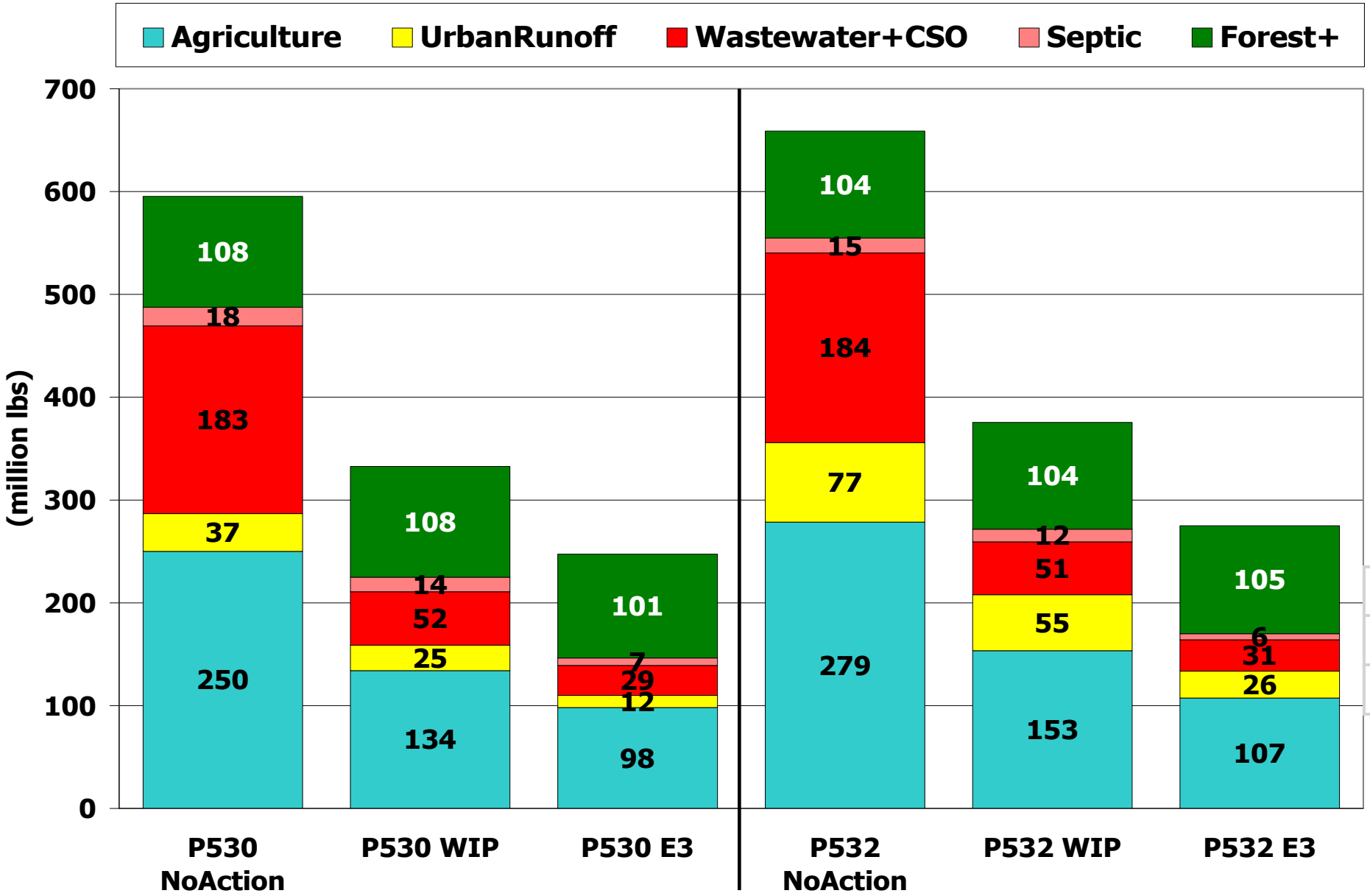
P5.3.0 to P5.3.2 Changes

- Updated land use with more complete urban coverage
  - STAC reviewed and modifications incorporated
- Modified agricultural nutrient handling
  - Increased non-NM application rates
  - Stop automatic transfer of manure
  - Adjust rates and timing
  - Additional nursery categories
  - Keep mass balance of manure
  - Adjust animal projections with state data
  - Manure excess disposal
- Recalibration

Nitrogen Source Evaluation

Phase 530 →Phase 532 (Edge-of-Stream) Loads

June/July 2011



	TN	TP
2010 TMDL	201.6	12.5
2011 PT	203.3	14.0

Summary

- 1995 loads must not change until planning targets change
- We ***can*** incorporate changes that more accurately represent changes between 1995 and any future scenario
- Extra care taken when dealing with changes prior to 2010
- “Best available data” means the best available data on the **changes** in land use, BMPs, point sources, etc
- We can update comprehensively when we change the planning targets