Planning Target Methodology

Base Year and Wastewater Curve Definition

Gary Shenk

11/14/16

Base Year, Land Use and Wastewater Flow Assumptions for the Chesapeake Bay TMDL

September 29th and 30th, 2009

Presentation D

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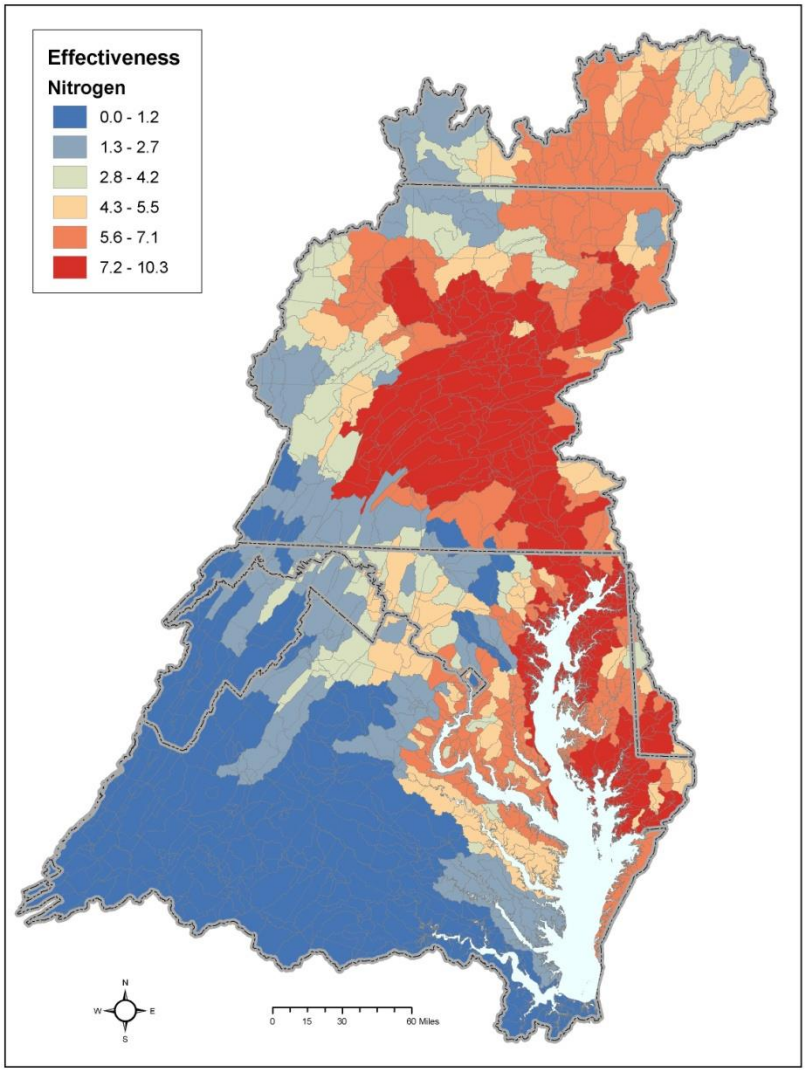
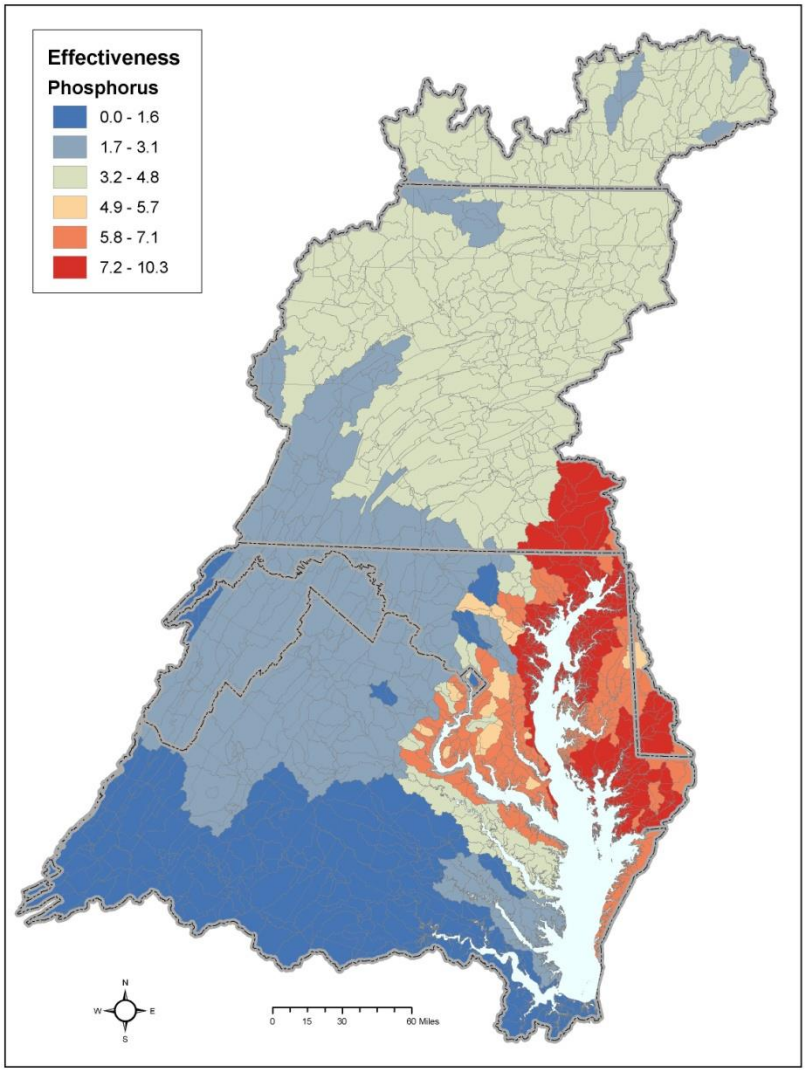
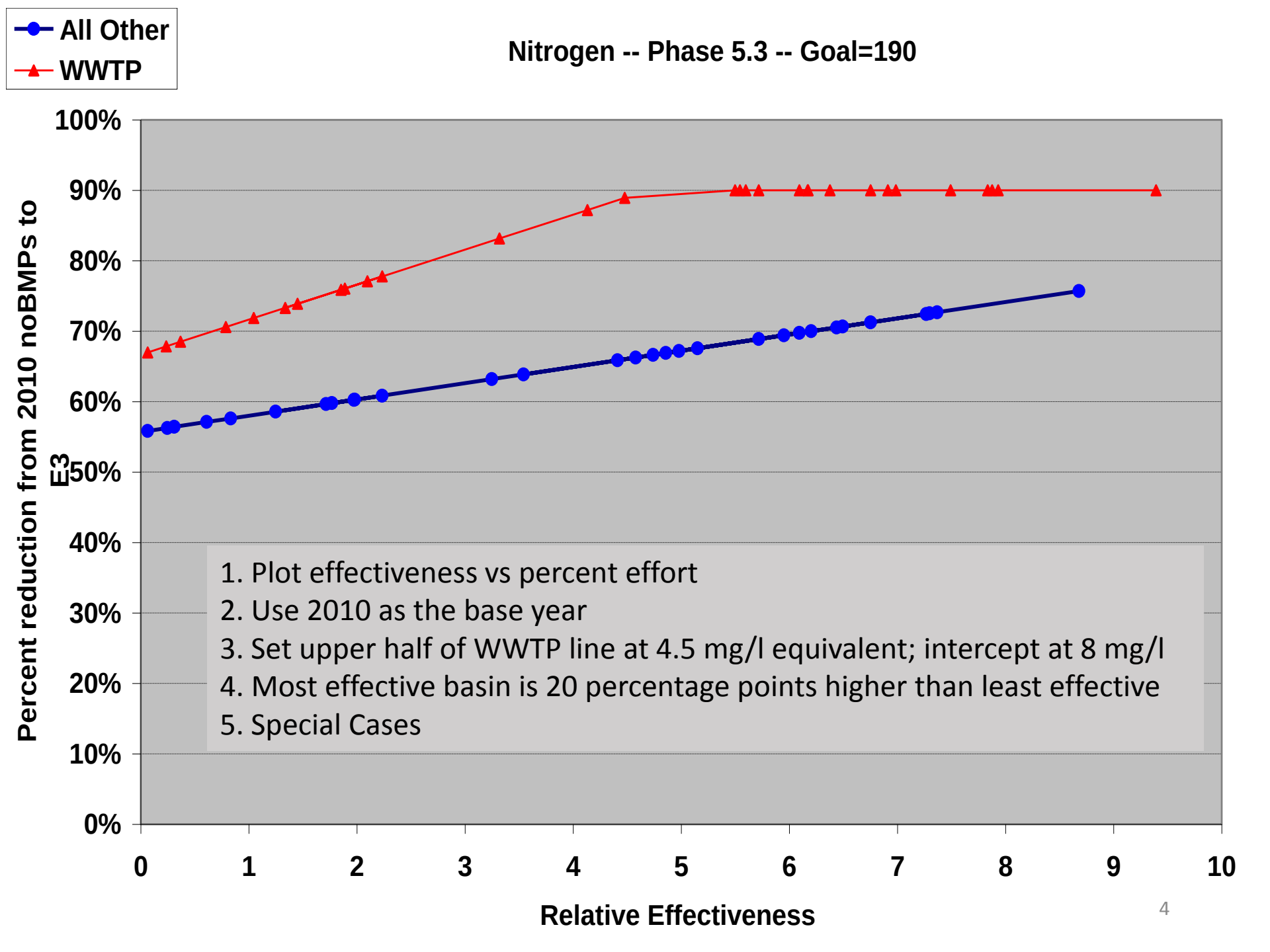
U.S. EPA Region III Water Protection Division and

U.S. EPA Chesapeake Bay Program Office

Relative Effect of a Pound of Pollution on Bay Water Quality






All Other
WWTP
Nitrogen -- Phase 5.3 -- Goal=190
Percent reduction from 2010 noBMPs to E3
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
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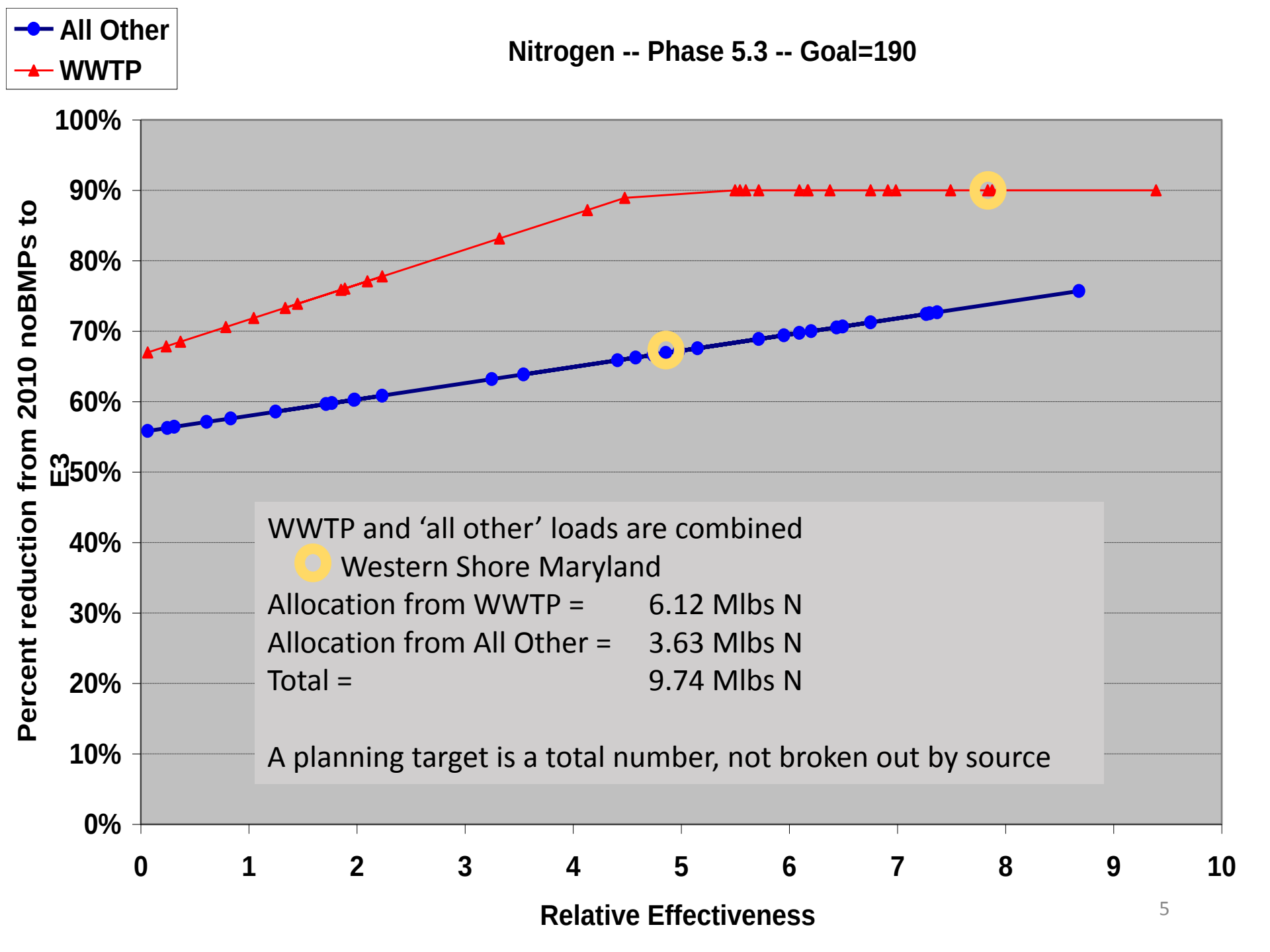
Relative Effectiveness
1. Plot effectiveness vs percent effort
2. Use 2010 as the base year
3. Set upper half of WWTP line at 4.5 mg/l equivalent; intercept at 8 mg/l
4. Most effective basin is 20 percentage points higher than least effective
5. Special Cases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Percent reduction from 2010 noBMPs to E3
0
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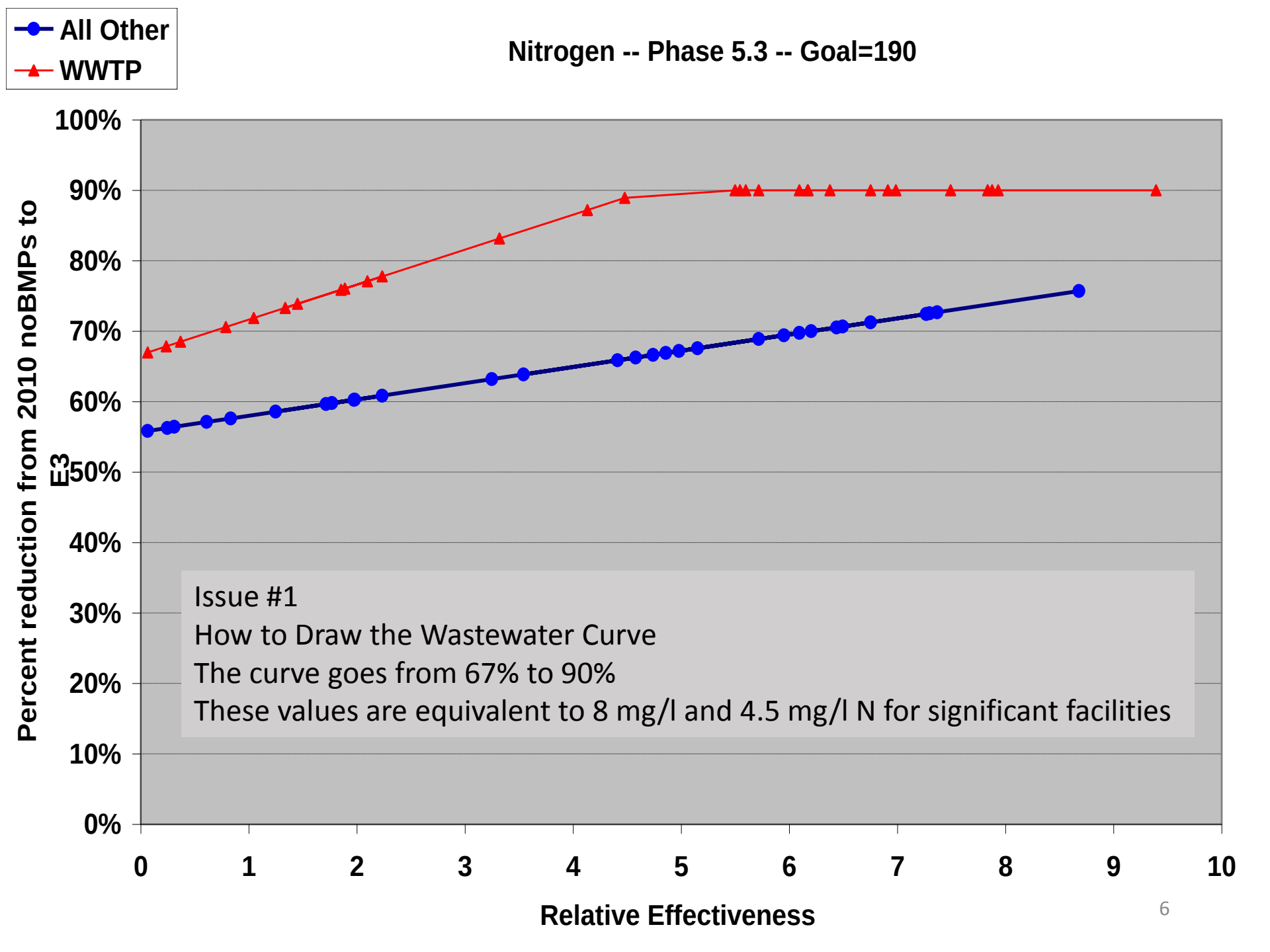
Relative Effectiveness
WWTP and 'all other' loads are combined
Western Shore Maryland
Allocation from WWTP = 6.12 Mlbs N
Allocation from All Other = 3.63 Mlbs N
Total = 9.74 Mlbs N
A planning target is a total number, not broken out by source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Relative Effectiveness
Issue #1
How to Draw the Wastewater Curve
The curve goes from 67% to 90%
These values are equivalent to 8 mg/l and 4.5 mg/l N for significant facilities

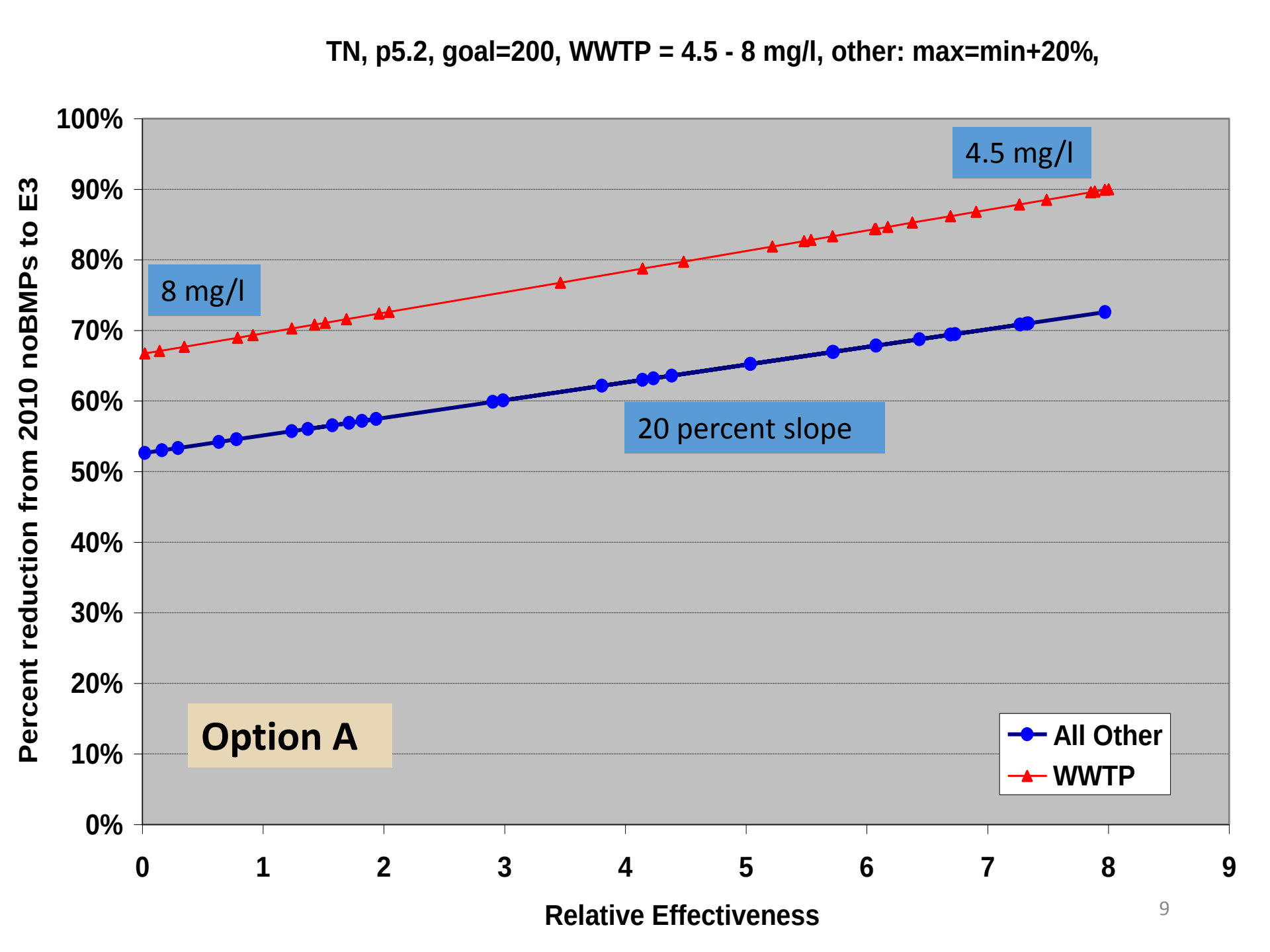
TMDL documentation

- For nitrogen
  - The maximum percent controllable load was **90 percent**, corresponding to an effluent concentration of **4.5 mg/L.**
  - The minimum percent controllable load was **67 percent**, corresponding to an effluent concentration of **8 mg/L**.
- For phosphorus
  - The maximum percent controllable load was **96 percent**, corresponding to an effluent concentration of **0.22 mg/L**.
  - The minimum percent controllable load was **85 percent**, corresponding to an effluent concentration of **0.54 mg/L**.

WQGIT 2009

- **9/21 decision**
  - **WWTP**: WQGIT overall preferred a line with a maximum of **90% for N** and **96% for P**

- **9/29 decision:** WQGIT approval to present options 1 and 3 to the PSC.
  - Option 1
    - TN WWTP 4.5-8 & other straight w/ 20% slope
    - TP WWTP .22-.53 & other straight w/ 20% slope
  - Option 3
    - TN: WWTP 4.5-8 hockey stick, other straight 20% slope
    - TP: WWTP .22-.53 hockey stick, other straight 20% slope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Percent reduction from 2010 noBMPs to E3
100%
90%
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50%
40%
30%
20%
10%
0%
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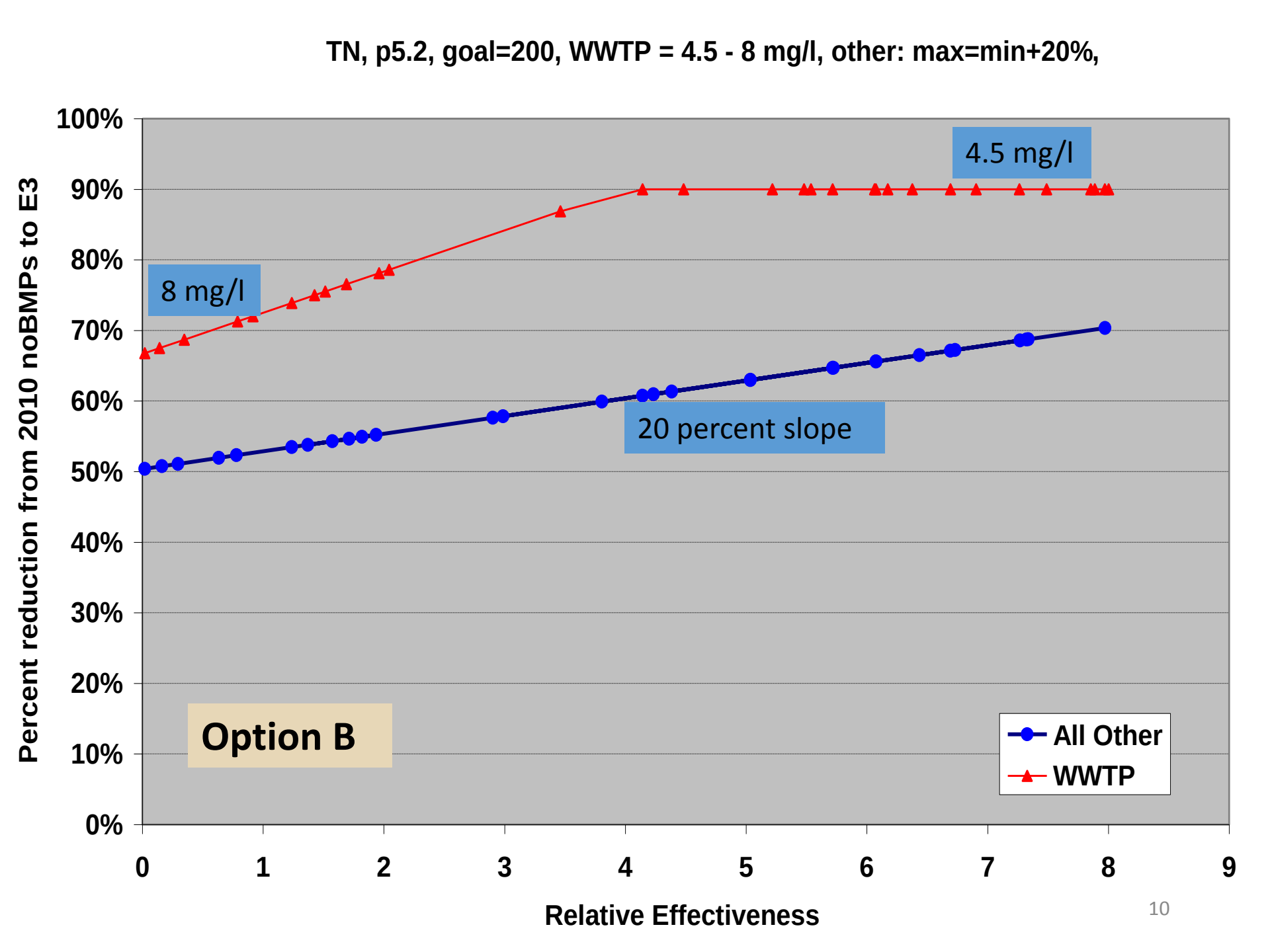
Relative Effectiveness
4.5 mg/l
8 mg/l
20 percent slope
Option A
All Other
WWTP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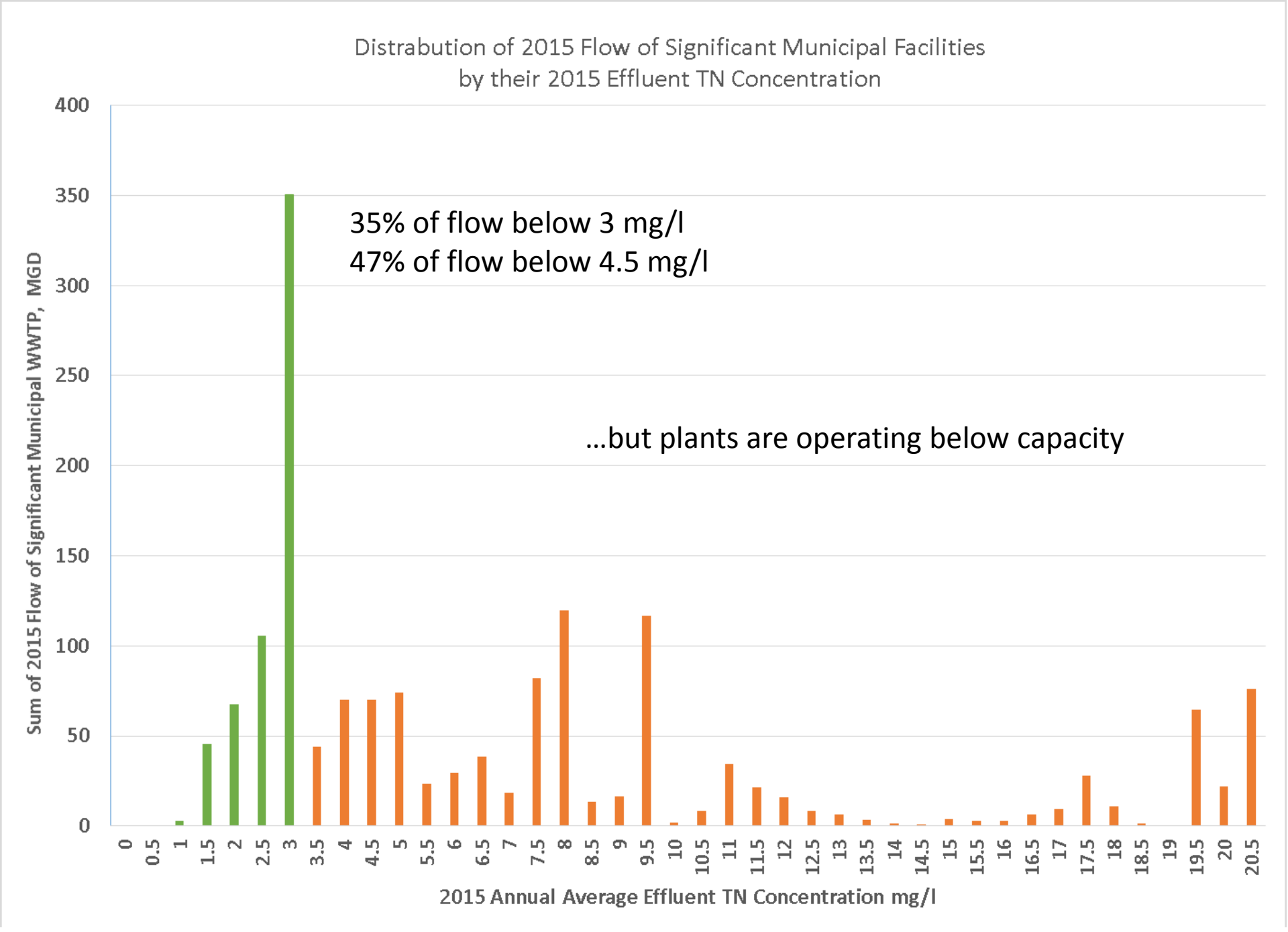
Relative Effectiveness
4.5 mg/l
8 mg/l
20 percent slope
Option B
All Other
WWTP

PSC decision 10/23/2009

- The PSC acknowledges the good work of the Water Quality Goal Implementation Team to develop options for allocating target loads for the Chesapeake Bay to the seven jurisdictions. **The PSC agrees to adopt Option B** and its associated, non-binding, working target loads for nitrogen and phosphorus. Adoption of Option B today allows for the separate jurisdictions to move forward and engage local partners in development of their Watershed Implementation Plans.
- …


Distrabution of 2015 Flow of Significant Municipal Facilities
by their 2015 Effluent TN Concentration
35% of flow below 3 mg/l
47% of flow below 4.5 mg/l
…but plants are operating below capacity
Sum of 2015 Flow of Significant Municipal WWTP, MGD
400
350
300
250
200
150
100
50
0
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8 8.5 9 9.5 10 10.5 11 11.5 12 12.5 13 13.5 14 14.5 15 15.5 16 16.5 17 17.5 18 18.5 19 19.5 20 20.5
2015 Annual Average Effluent TN Concentration mg/l

E3 Has Different Definitions for Significant and NS facilities

- 90% of E3 is 4.5 mg/l for significant facilities
- 90% of E3 is 9 mg/l for non-significant facilities

Table 6-4. Pollutant sources as defined for the No Action and E3 model scenarios

Model source	Scenario	
	No Action	**E3 = Everyone Everything Everywhere**
Land uses	No BMPs applied to the land	All possible BMPs applied to land given current human and animal population and land use
Wastewater Dischargers	Significant municipal WWTPs Flow = design flows TN = 18 mg/L TP = 3 mg/L BOD = 30 mg/L DO = 4.5 mg/L TSS = 15 mg/L	Significant municipal WWTPs Flow = design flows TN = 3 mg/L TP = 0.1 mg/L BOD = 3 mg/L DO = 6 mg/L TSS = 5 mg/L
	Non-significant municipal WWTPs Flow = existing flows TN = 18 mg/L TP = 3 mg/L BOD = 30 mg/L DO = 4.5 mg/L TSS = 15 mg/L	Non-significant municipal WWTPs Flow = existing flows TN = 8 mg/L TP = 2 mg TP/l BOD = 5 mg/L DO = 5 mg/L TSS = 8 mg/L

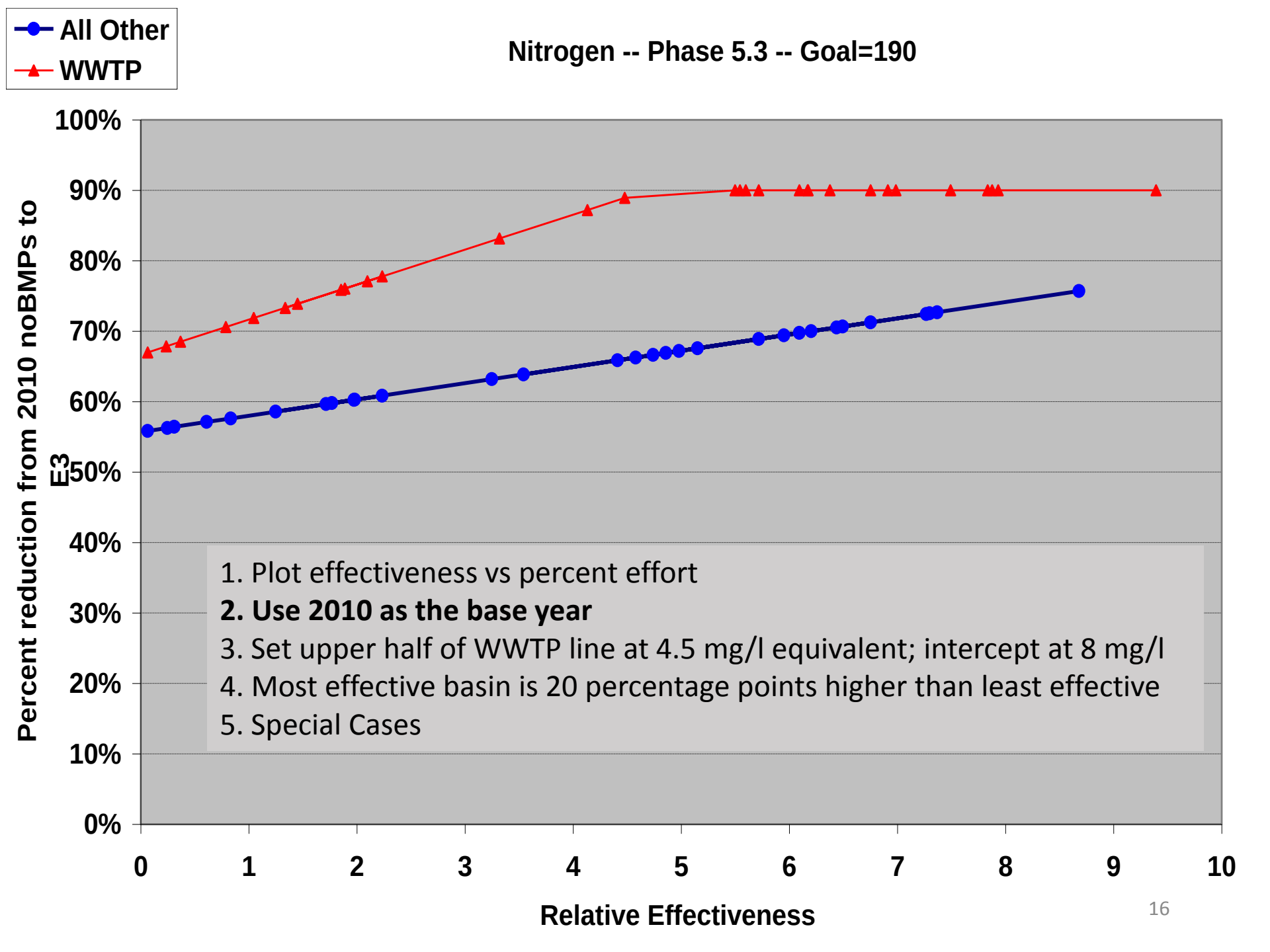
Summary of Issues

- WWTP must be specified as a percent of E3
- … but, clearly the decision was based on the concentration of the significant facilities

- 35% of the sector is below E3 in 2015
- … but, loads may climb as capacity is reached

Options – WWTP Line

- 1. Keep the intent of the definitions. Draw the lines from 4.5 to 8 mg/l. Potential changes in E3 would have no effect.
  - 1a. Modify those concentrations in some way
- 2. Keep the 90% definition. Reductions in E3 would mean reductions in allocations for areas with WWTPs
  - 2a Modify the definition in some way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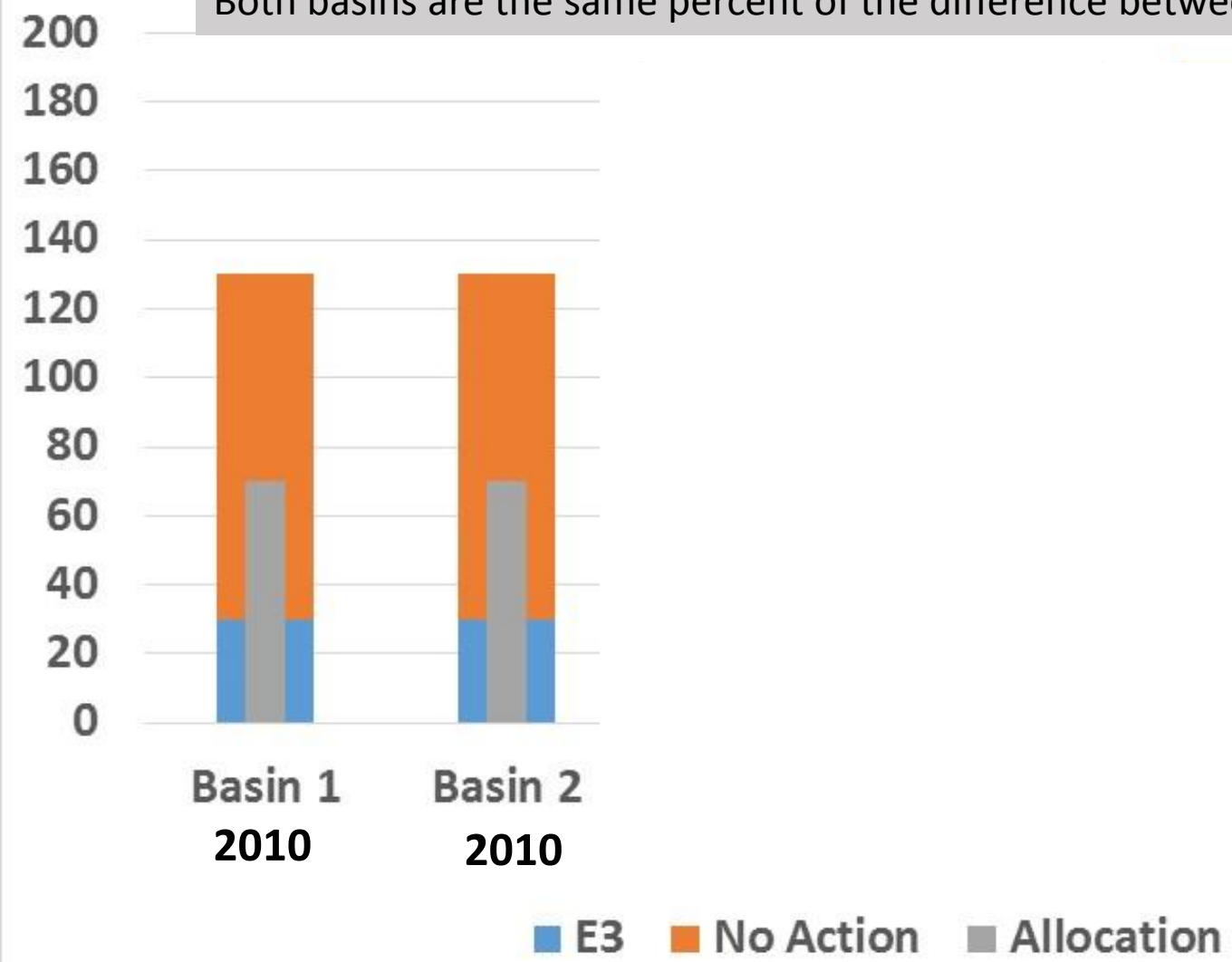
Changing Base Year - Theoretical

Allocation = 140
Both basins are the same percent of the difference between NA and E3



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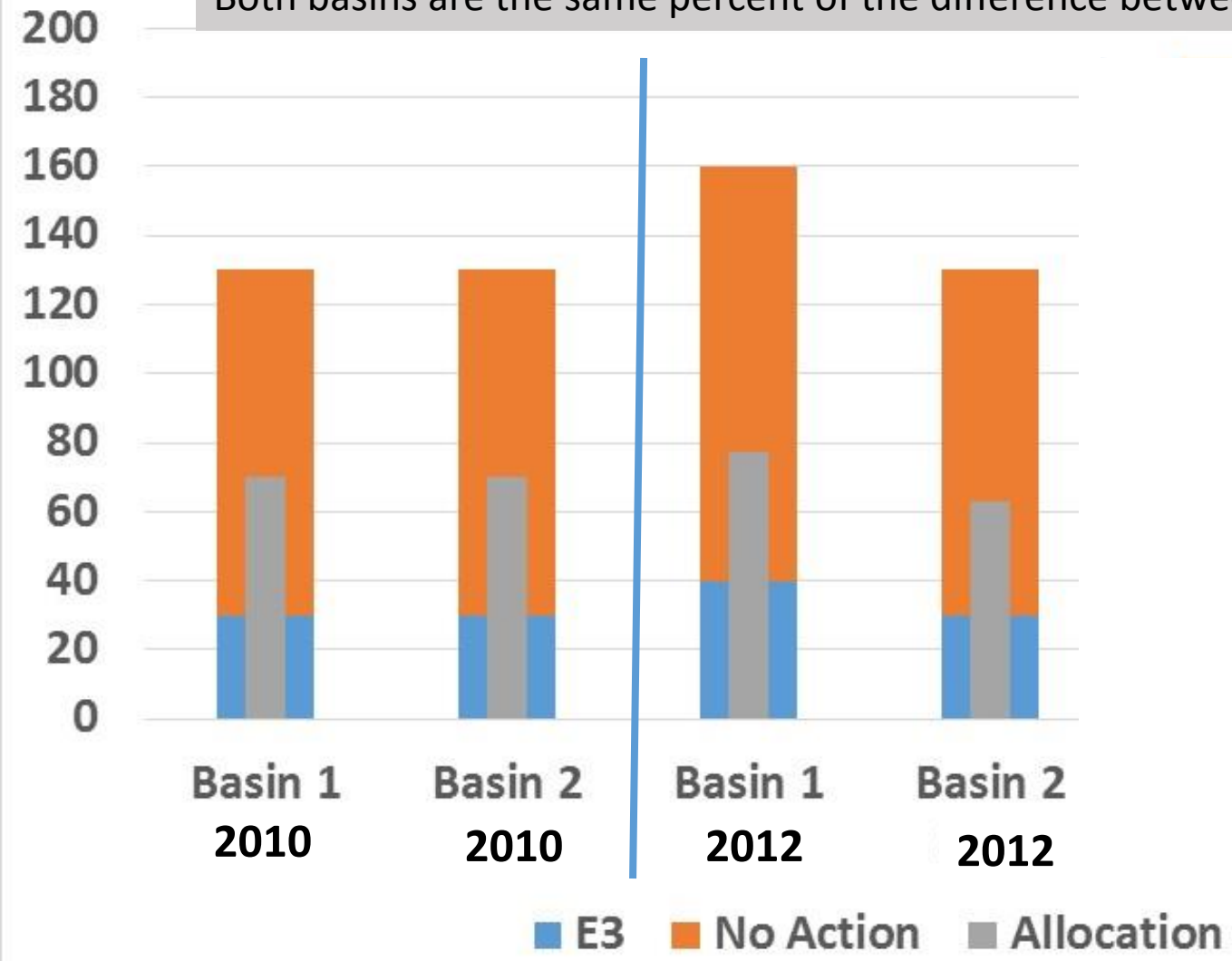

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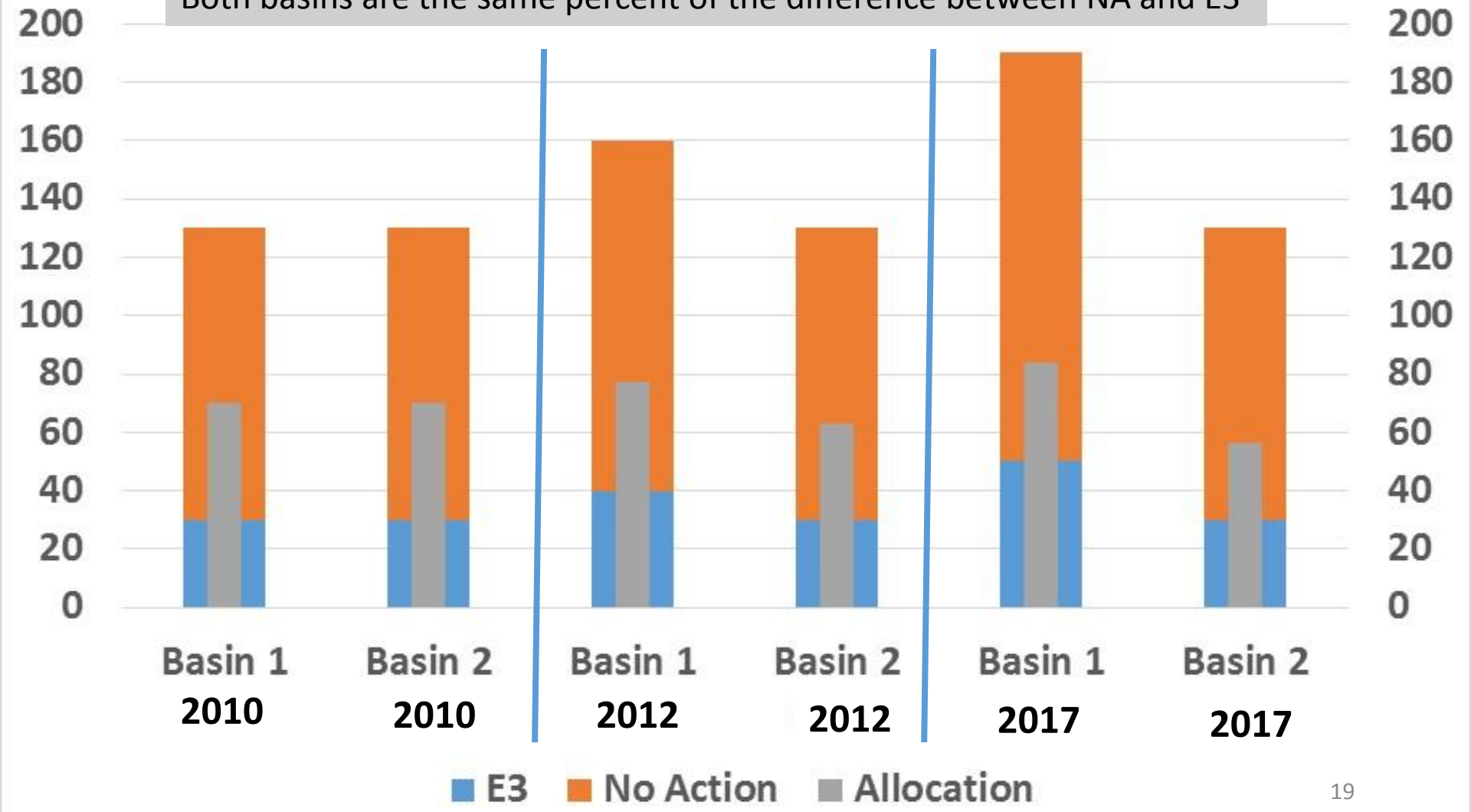

Options

- 2010
  - Consistent with TMDL
  - Does not grandfather additional growth past the TMDL date
- 2012
  - Best land use data set
  - Grandfathers growth from 2010-2012
- 2017
  - Close to current year
  - Grandfathers growth from 2010-2017