Target Load Methodology Options Analysis

September 29th and 30th, 2009

Presentation G

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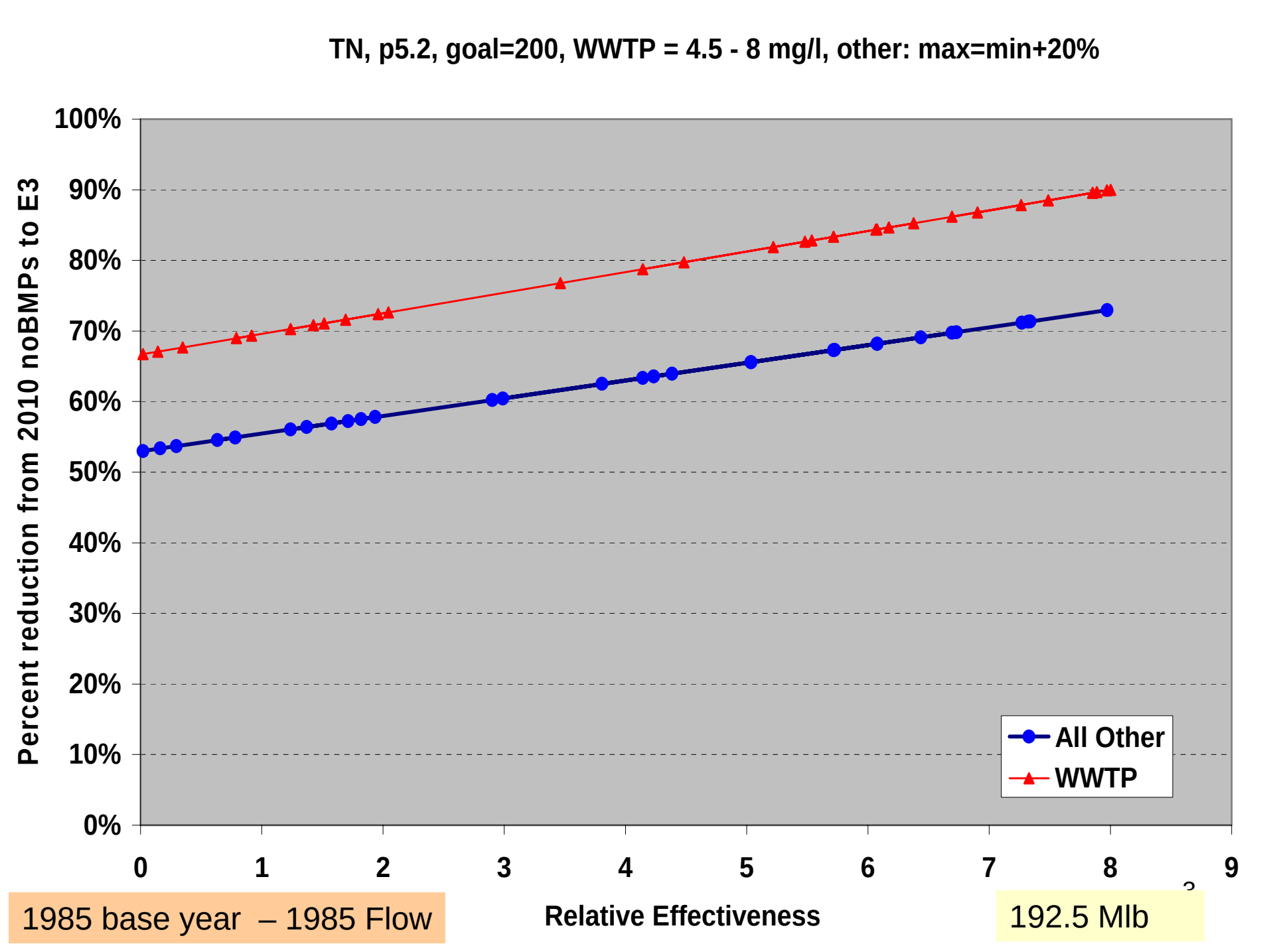
U.S. EPA Region III Water Protection Division and

U.S. EPA Chesapeake Bay Program Office

Guidelines

- The Basinwide cap should protect living resources
- Tributary basins by jurisdiction that contribute the most to the problem must do the most to resolve the problem
- All reductions in nutrient loads are credited toward achieving final assigned loads.


TN, p5.2, goal=200, WWTP = 4.5 - 8 mg/l, other: max=min+20%
Percent reduction from 2010 noBMPs to E3
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0
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2
3
4
5
6
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8
9
All Other
WWTP
Relative Effectiveness
1985 base year – 1985 Flow
192.5 Mlb

Decisions and Preferences from WQGIT 9/21 Call

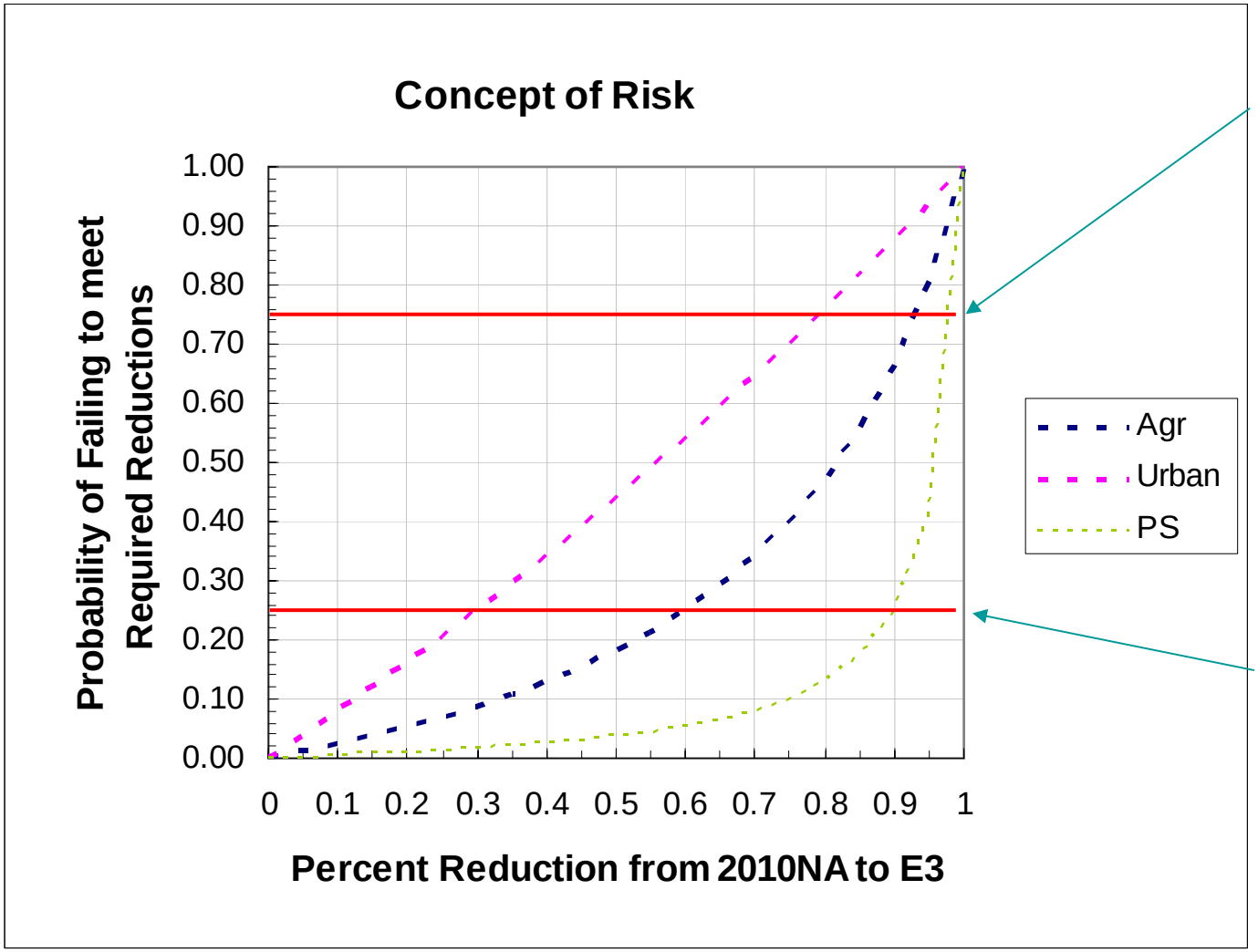
Number: WQGIT approved considering only the **2 line** approach to target load methodology for the September face-to-face meeting.

Shape: WQGIT members agreed to an emphasis towards using a target load methodology with a **straight line or z curve** at the September face-to-face meeting.

WWTP: WQGIT overall preferred a line with a maximum of **90% e3 for N** and **96% e3 for P**

Slope: WQGIT overall preferred a slope of **10-20%**

Help from Lee Currey



With 75% Risk level we can set the following reduction from 2010NA to E3
Agr = 0.92
Urban =0.8
PS = 0.96

Assume that 25% is Max feasible, (allows curve to be defined)
Agr = 0.3
Urban =0.6
PS = 0.9

An option is that all source levels for percent reduction from 2010NA to E3 can be defined by selecting a risk level

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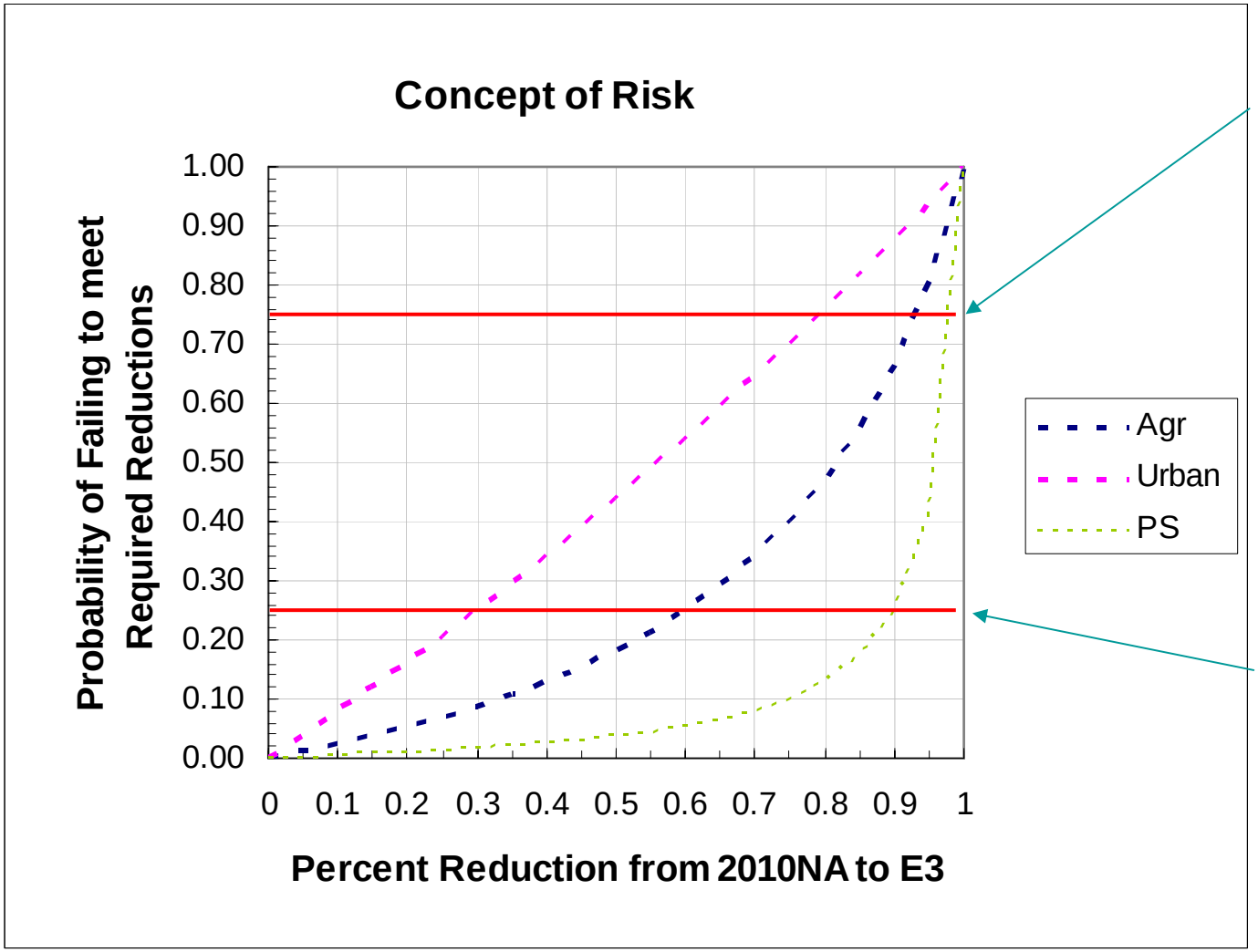

There is a significant difference between WWTP risk and other source risk.

The difference between WWTP and other sources is dependent on how much reduction you need

Max out the WWTP at a reasonably high level and see where that gets you with other sources

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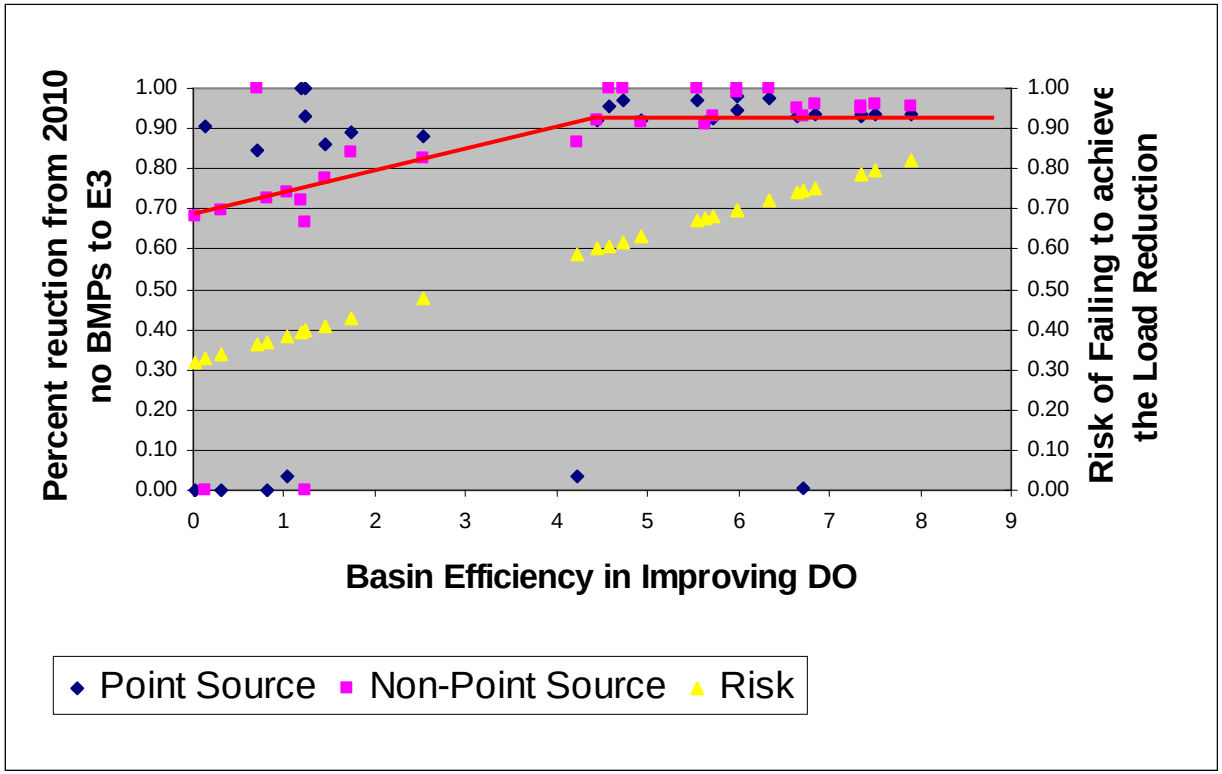
Minimize total EOS load reduced and assume proportional risk



- Set upper and lower bounds on the maximum difference in basin-jurisdiction risk as 50% and assume linear proportional risk.
- Concentrates efforts on most efficient basins
- Shape is more of a hockey stick and endpoint set themselves based on risk
- Points on bottom of graph represent basin-jurisdictions with very low proportion of ps and/or nps load that can be reduced. Reducing them does not significantly improve the objective

Higher levels of risk are warranted for more efficient basins

Sloped Line = ~ 20%

Maximum (hockey stick) if we approach E3, otherwise stick to a straight line

The risk increases beyond the expected reward as you approach E3, so set a ceiling below E3

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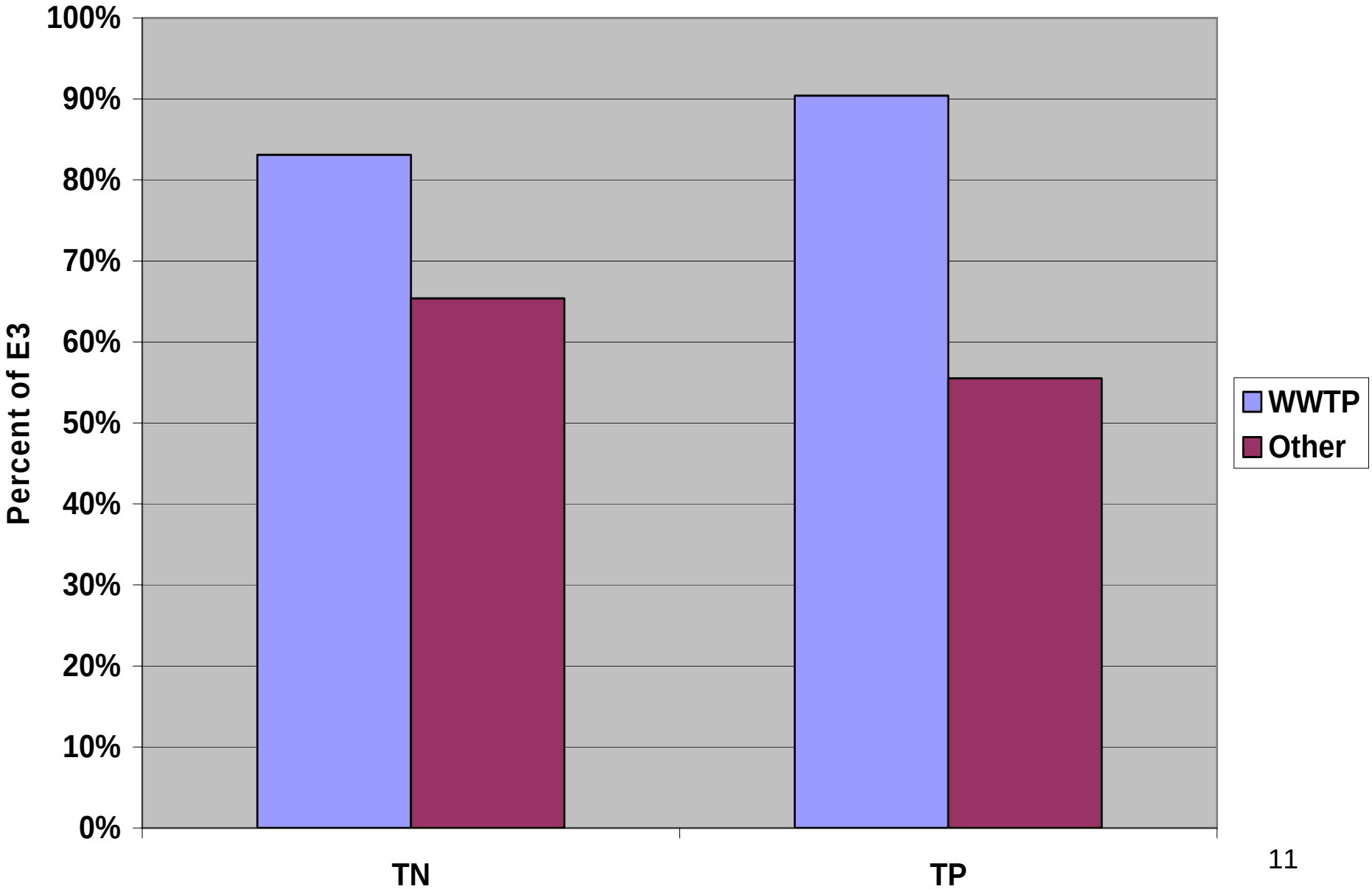
Slope: **WQGIT overall preferred a slope of 10-20%**

Investigate Options

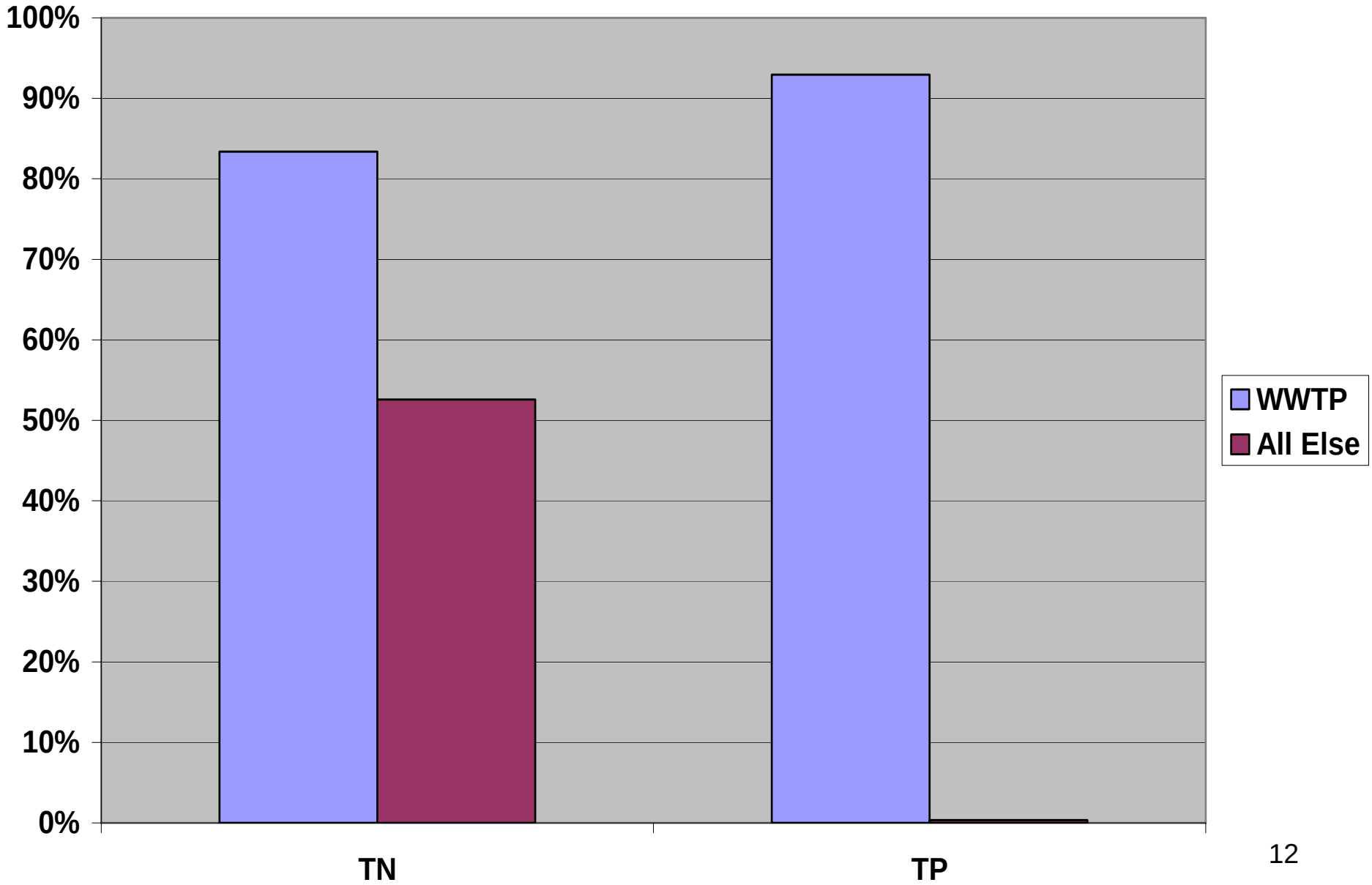
- 2 lines with max WWTP set
- Slope of lines = 10% or 20%
- Shape of the lines = straight or with limits
- Look at Target Loads vs Tributary Strategy Loads

- Use 200 Mlbs TN and 15 Mlbs TP

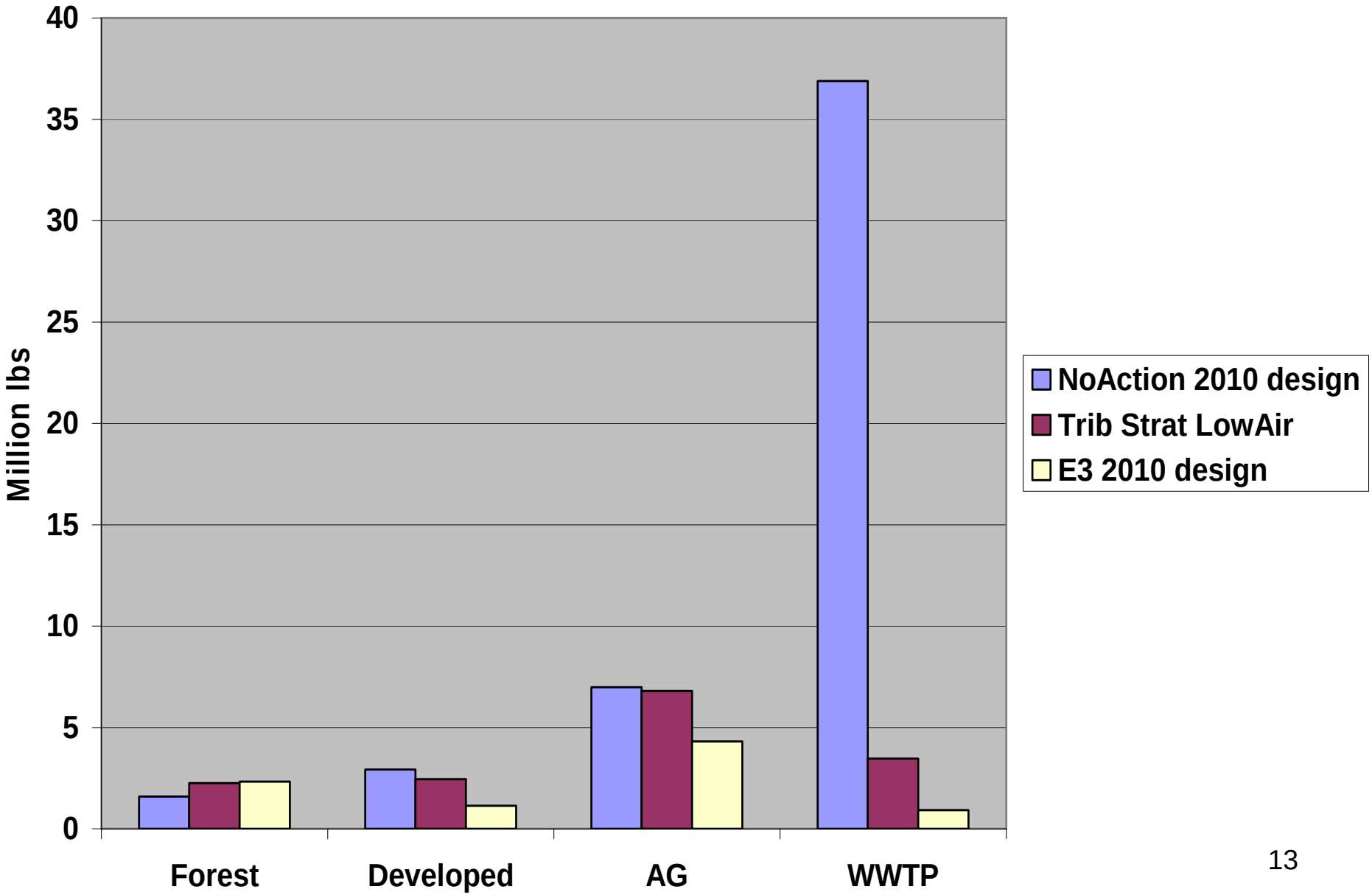
Trib Strategy Reductions in Edge-of-Stream Loads



Trib Strategy Reductions in Delivered Loads

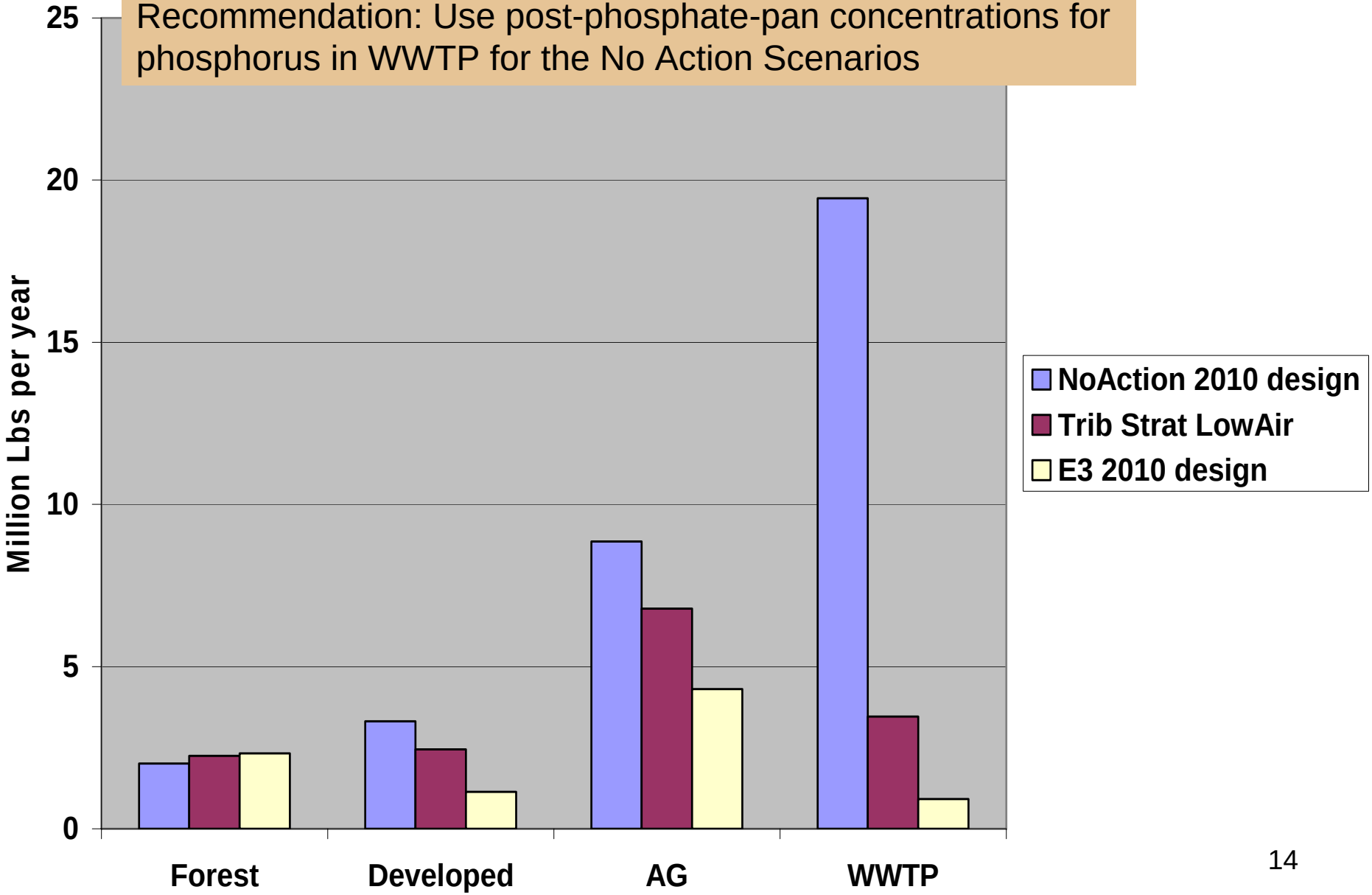


TP loads by Sector and Scenario Pre P-Ban

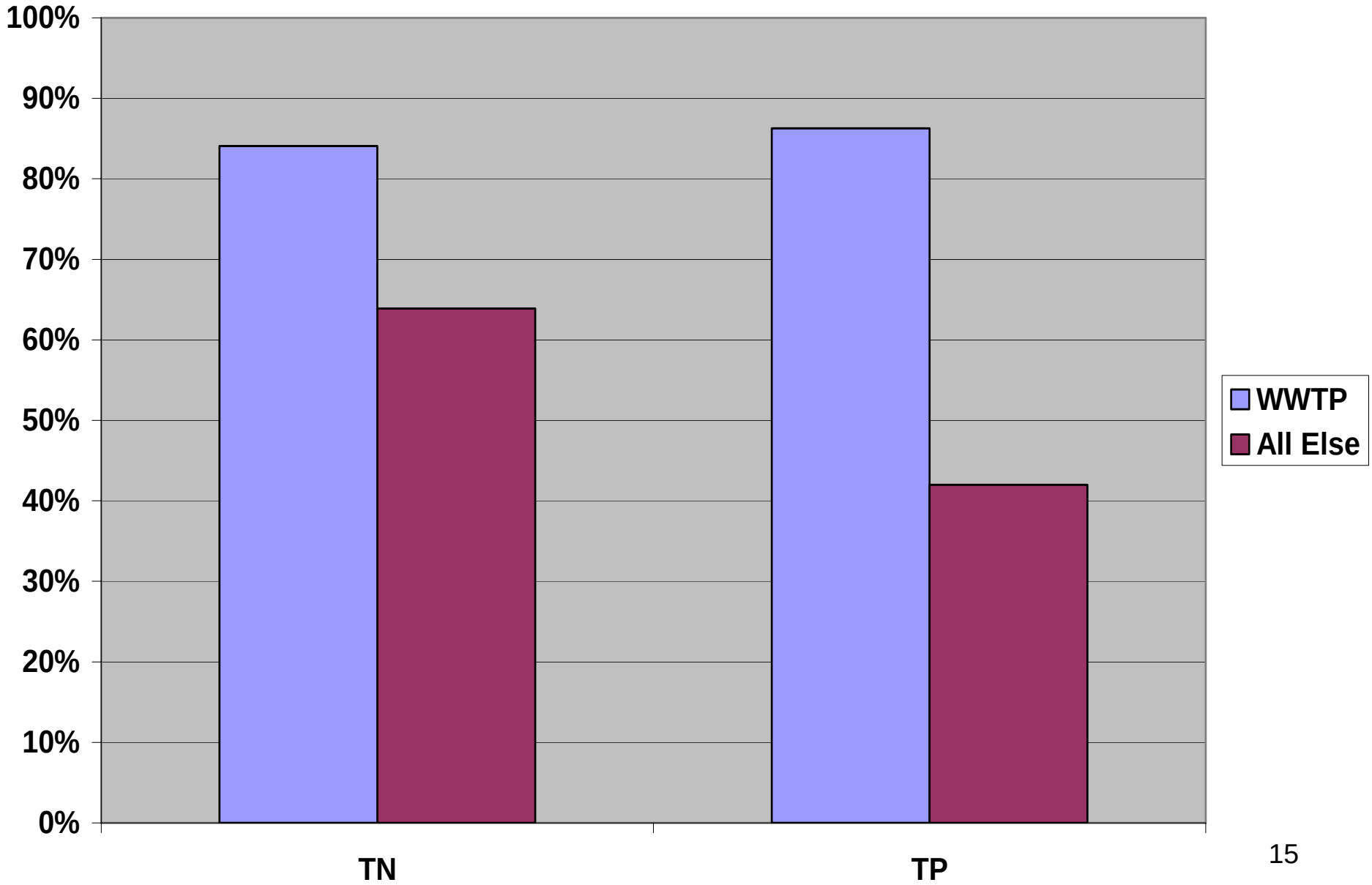


TP loads by Sector and Scenario - Post P-Ban

Recommendation: Use post-phosphate-pan concentrations for phosphorus in WWTP for the No Action Scenarios



Trib Strategy Percent of E3 For Analysis After P Ban



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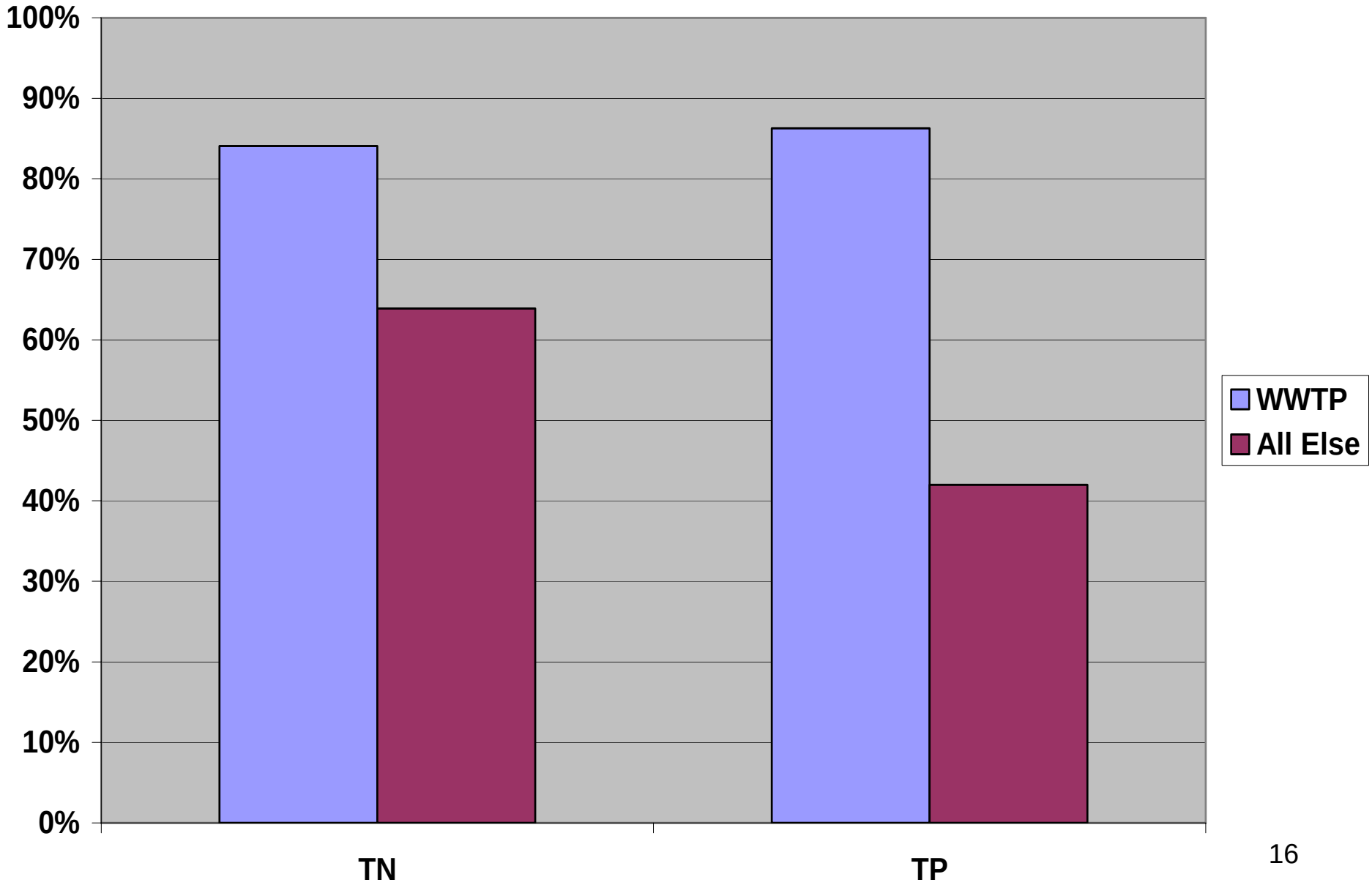

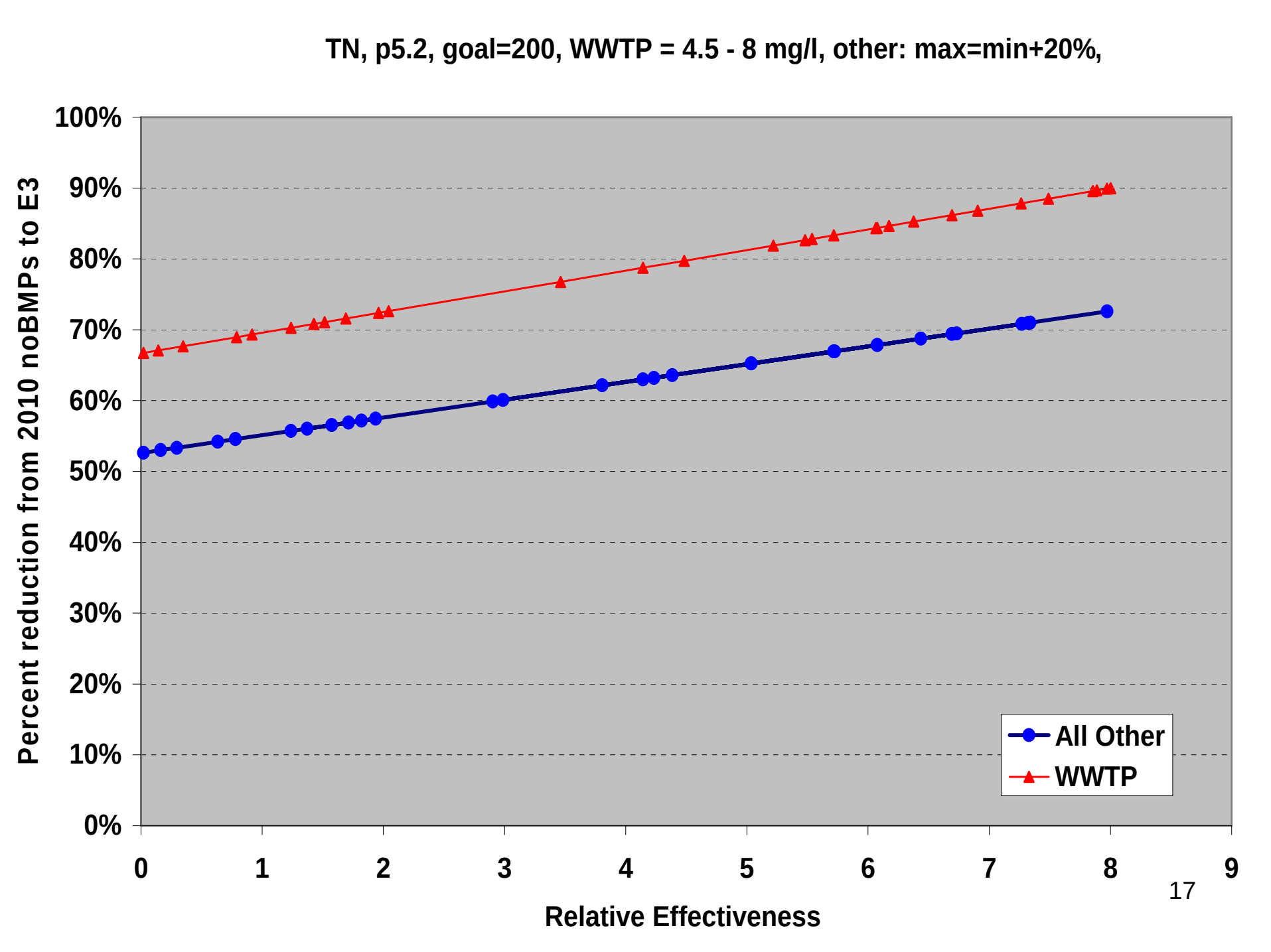
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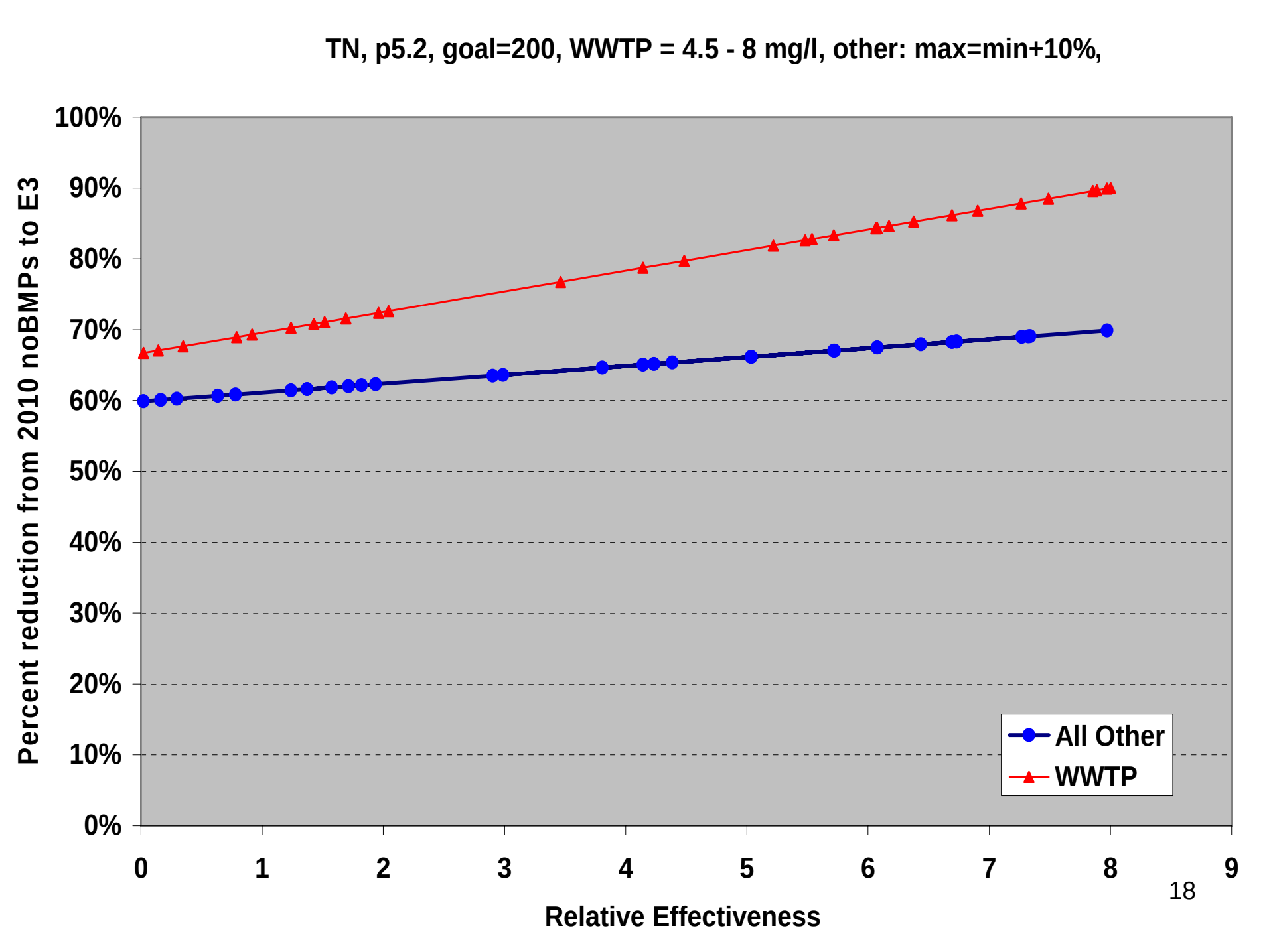
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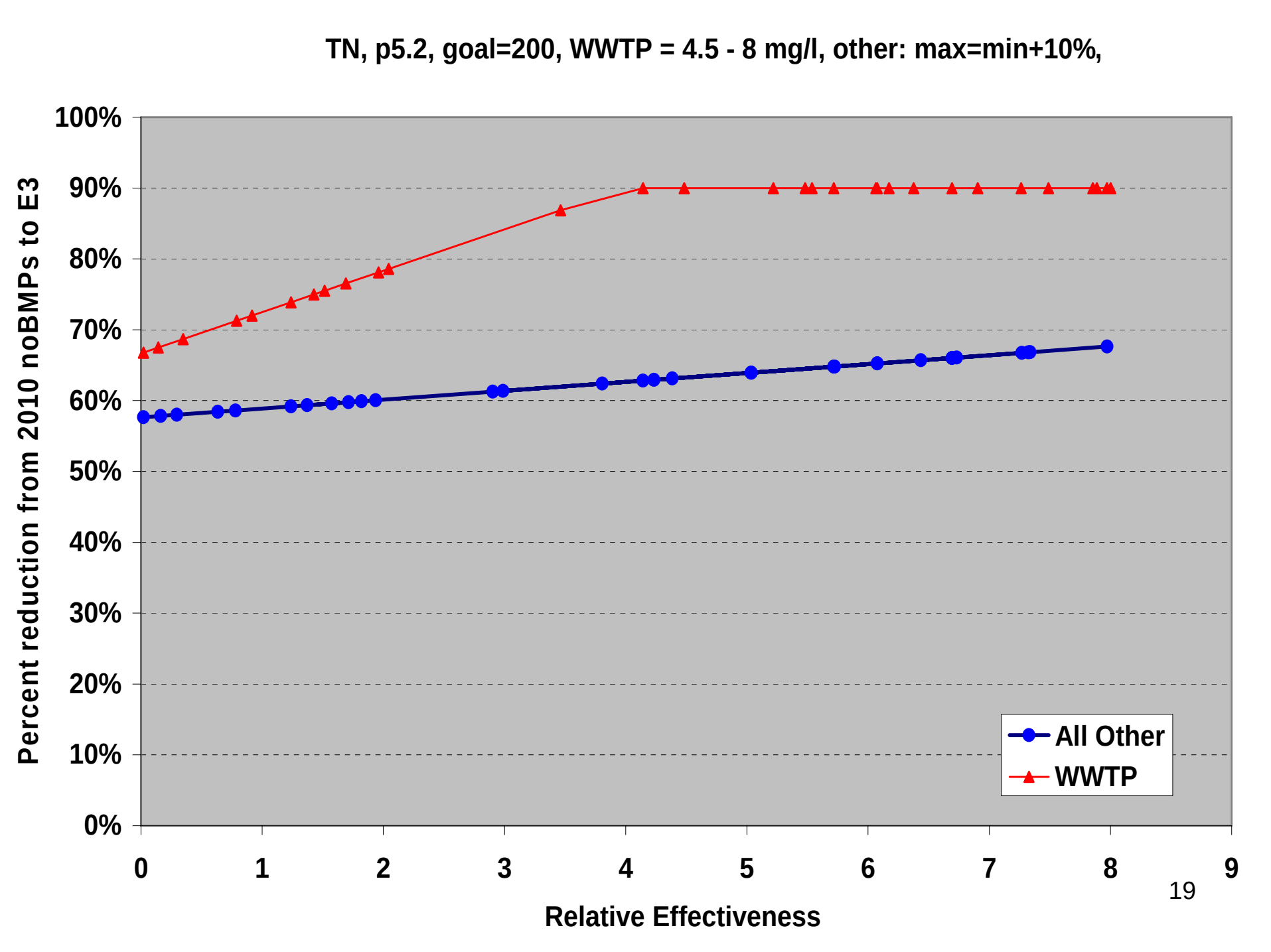
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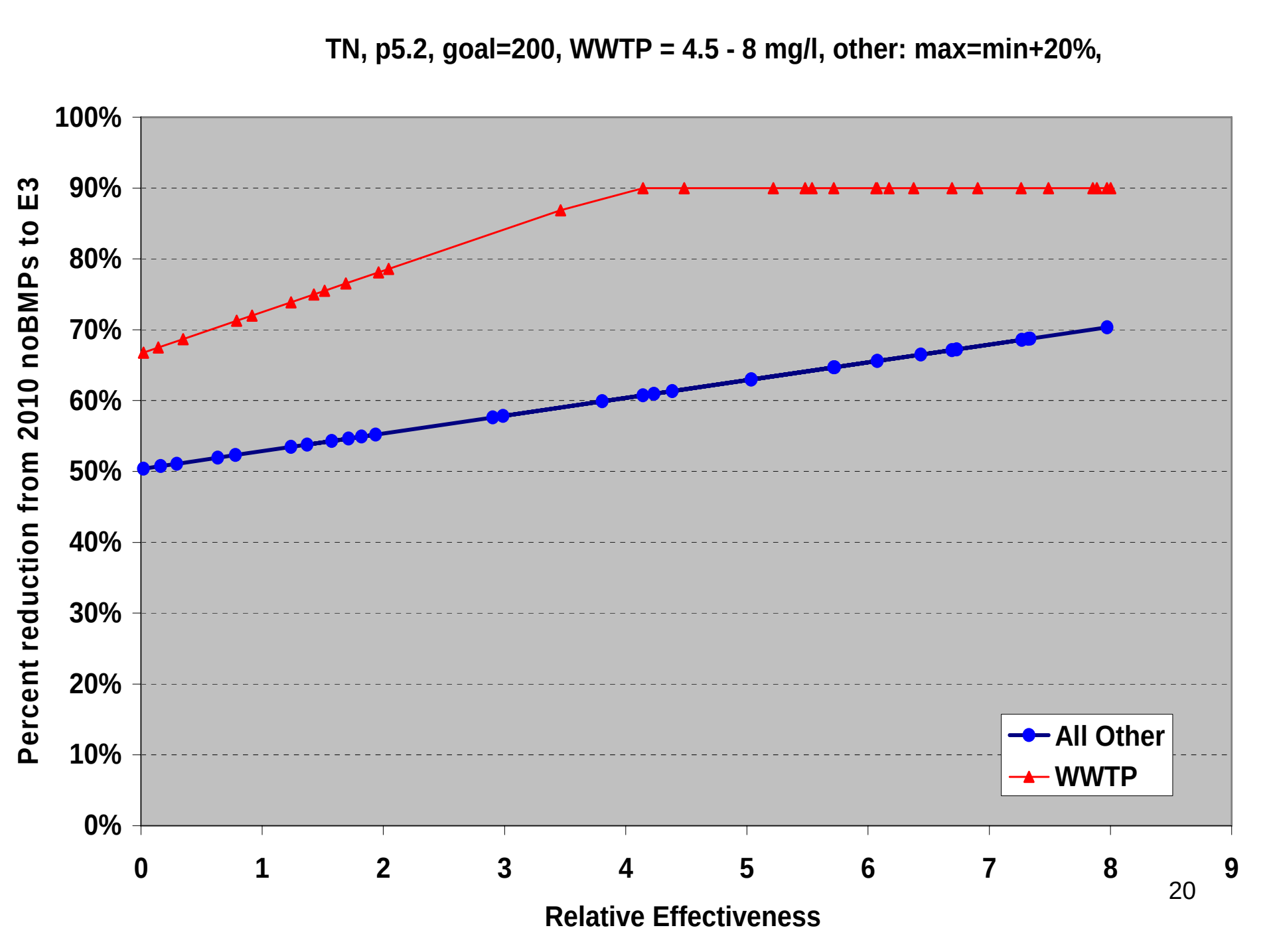
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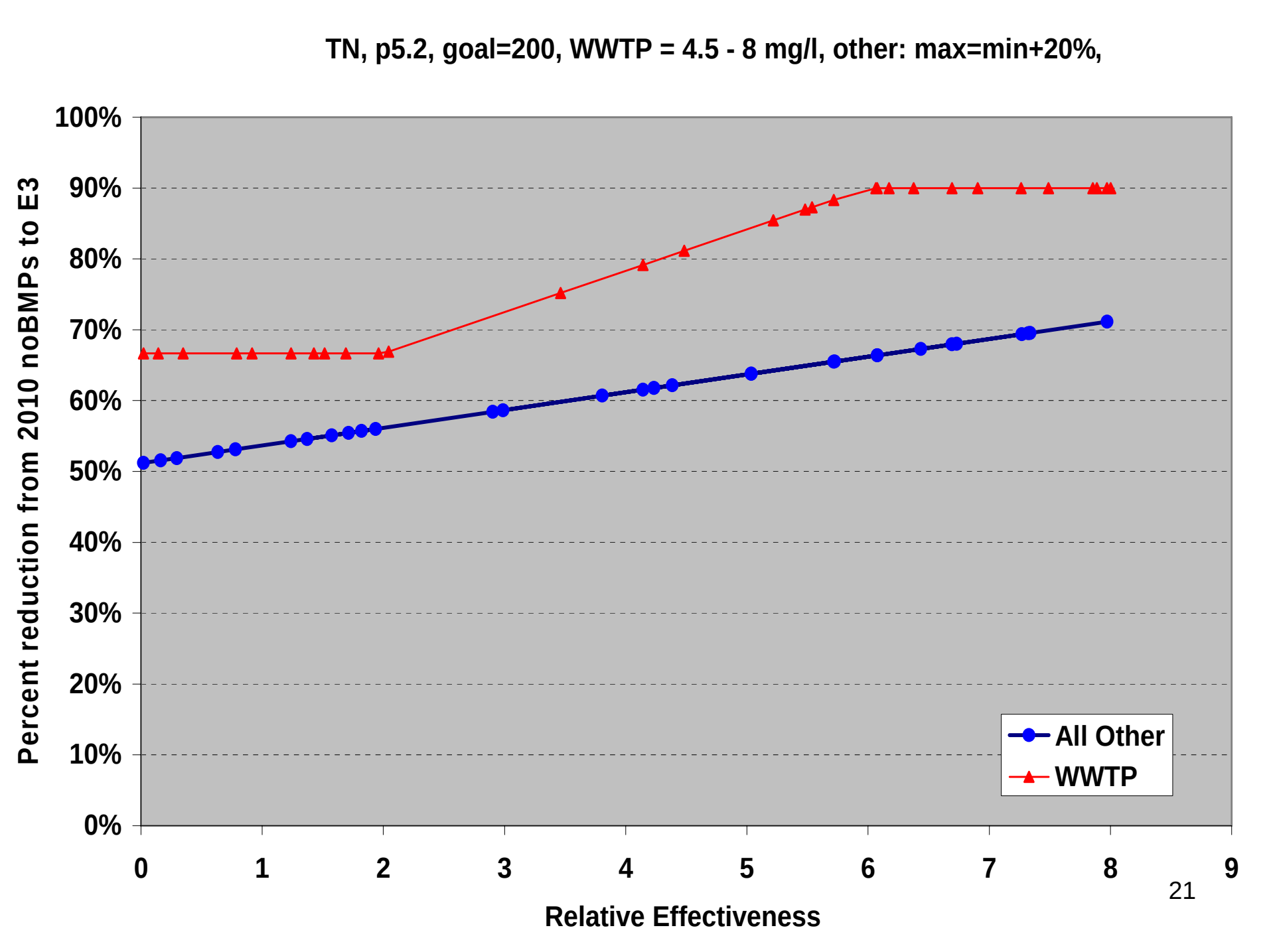
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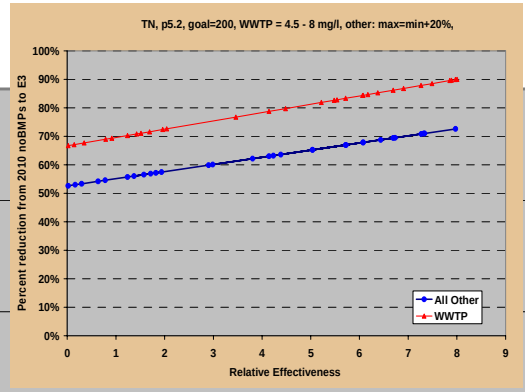
TN Target Loads as a percent of Trib Strategy Loads

WWTP 4.5 – 8 mg/l Straight Line

All Else: Straight Line -- Min + 20% = Max



Target Loads Lower == Trib Strategy Lower

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140%
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DC Potm
DE Esh
MD Esh
MD Patux
MD Potm
MD Susq
MD Wsh
NY Susq
PA Potm
PA Susq
VA Esh
VA James
VA Potm
VA Rap
VA York
WV Potm

TN Target Loads as a percent of Trib Strategy Loads

WWTP 4.5 – 8 mg/l Straight Line

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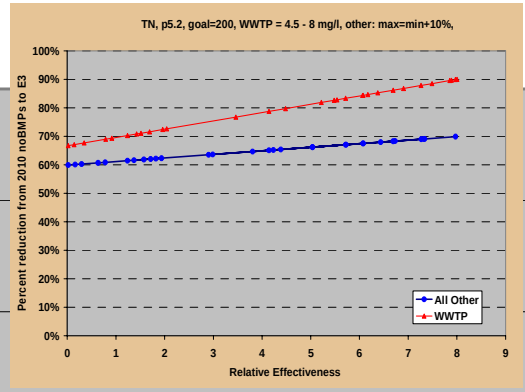

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WWTP 4.5 – 8 mg/l Hockey Stick

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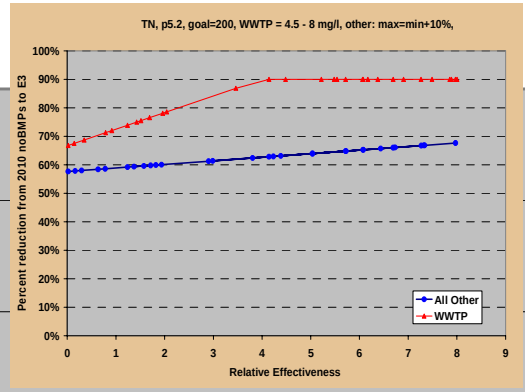

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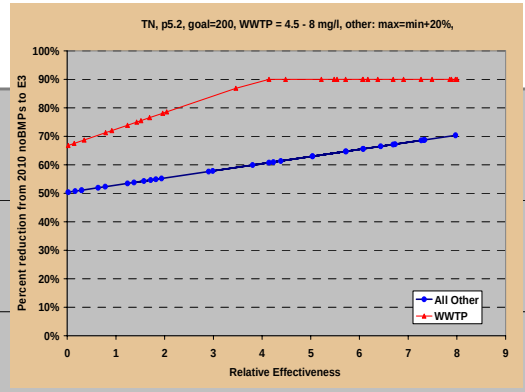

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TN Target Loads as a percent of Trib Strategy Loads

WWTP 4.5 – 8 mg/l Z-curve

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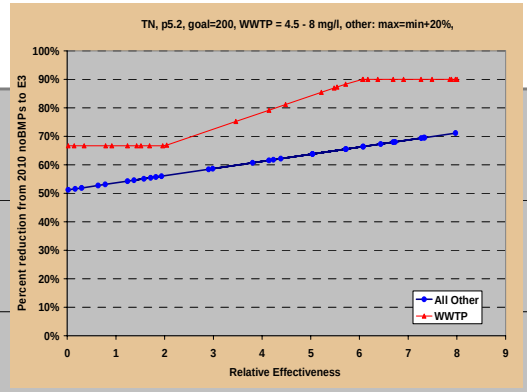

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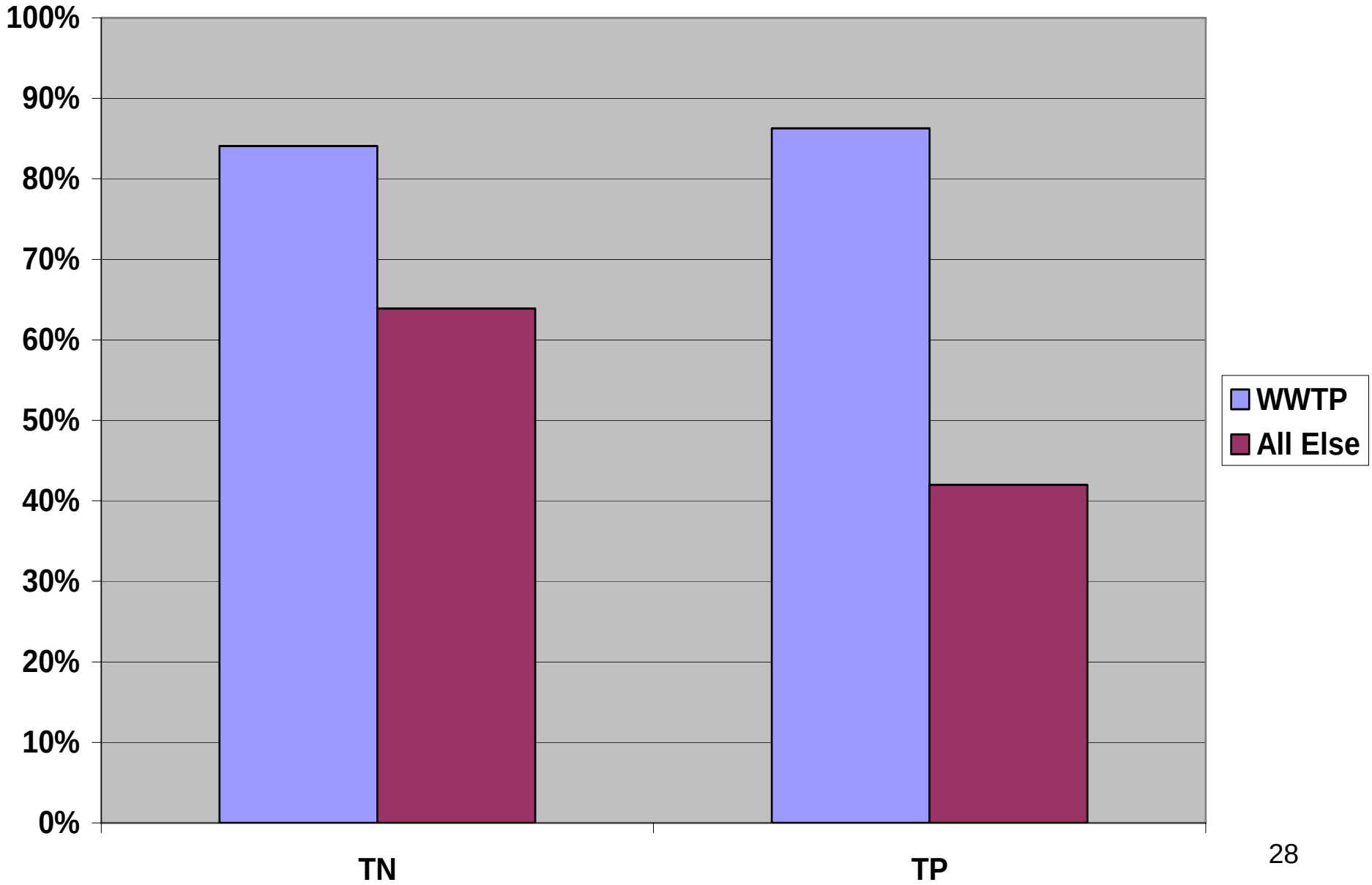
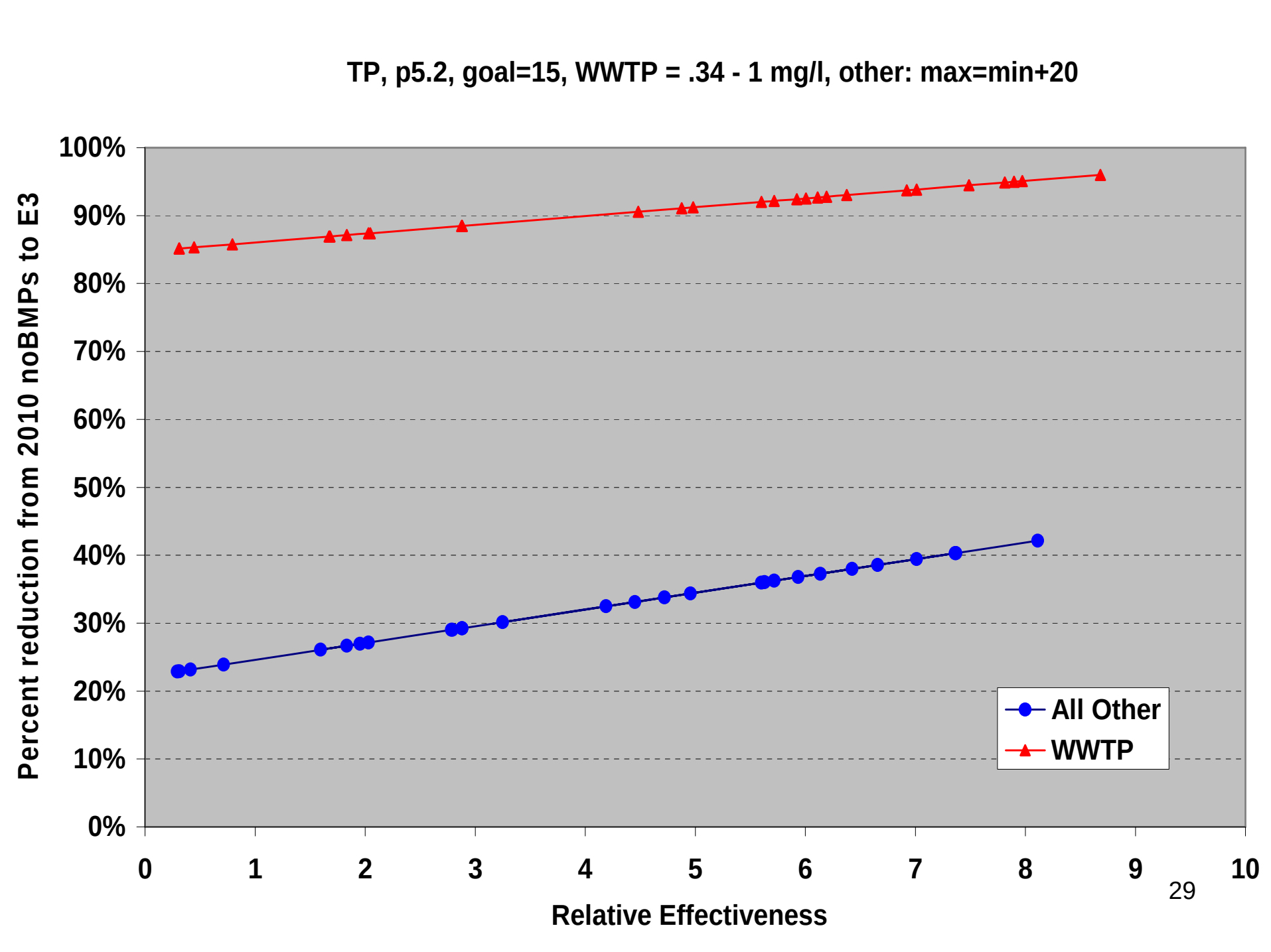
Target Load Approaches

Lines	2	2	2	2	2				
WWTP rule	3-8 mg/l	3-8 mg/l	3-8 mg/l HS	3-8 mg/l HS	3-8 mg/l Z				
Other Load Rule	20%	10%	20%	10%	20%	**Largest**			
DO goal	200	200	200	200	200	**Difference**	2010 Noact	E3 load	TS load
DC Potm	2.82	2.82	2.37	2.37	2.37	16%	9.68	1.53	2.12
DE Esh	5.12	5.21	5.25	5.34	5.21	4%	9.28	3.45	6.43
MD Esh	12.54	12.76	12.81	13.03	12.70	4%	23.94	8.25	13.84
MD Patux	3.26	3.25	3.15	3.13	3.27	4%	6.57	2.15	3.17
MD Potm	14.73	14.52	14.10	13.89	14.29	6%	30.31	9.65	14.66
MD Susq	0.81	0.83	0.83	0.85	0.82	4%	1.35	0.61	0.97
MD Wsh	10.18	10.15	10.15	10.11	10.12	1%	36.50	6.15	9.49
NY Susq	10.54	10.41	10.54	10.41	10.55	1%	16.36	7.78	8.68
PA Potm	4.76	4.58	4.83	4.65	4.83	5%	7.08	3.12	4.31
PA Susq	67.96	68.59	68.81	69.44	68.37	2%	121.19	49.23	68.86
VA Esh	1.60	1.59	1.61	1.61	1.60	1%	3.25	0.88	1.67
VA James	28.84	28.14	28.49	27.78	29.58	6%	52.63	15.80	28.85
VA Potm	16.85	16.47	16.09	15.72	16.50	7%	33.05	10.72	15.81
VA Rap	6.54	6.37	6.49	6.32	6.60	4%	10.61	4.33	6.49
VA York	6.55	6.32	6.53	6.30	6.72	6%	10.54	4.05	6.48
WV Potm	5.65	5.44	5.71	5.50	5.73	5%	8.32	3.76	5.69
Total	**198.77**	**197.46**	**197.76**	**196.45**	**199.27**	1%	**380.66**	**131.45**	**197.53**

Trib Strategy Percent of E3 For Analysis After P Ban

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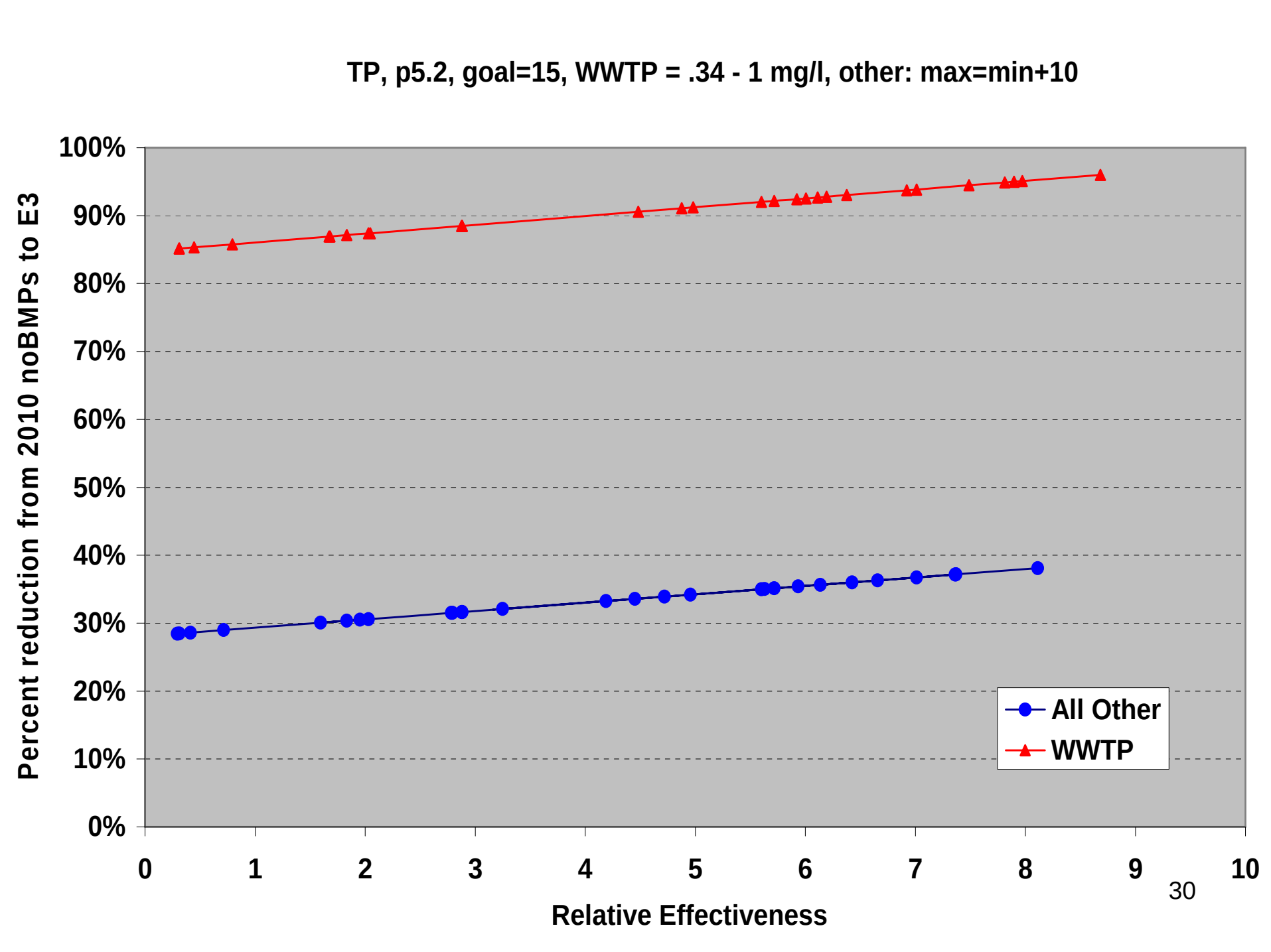
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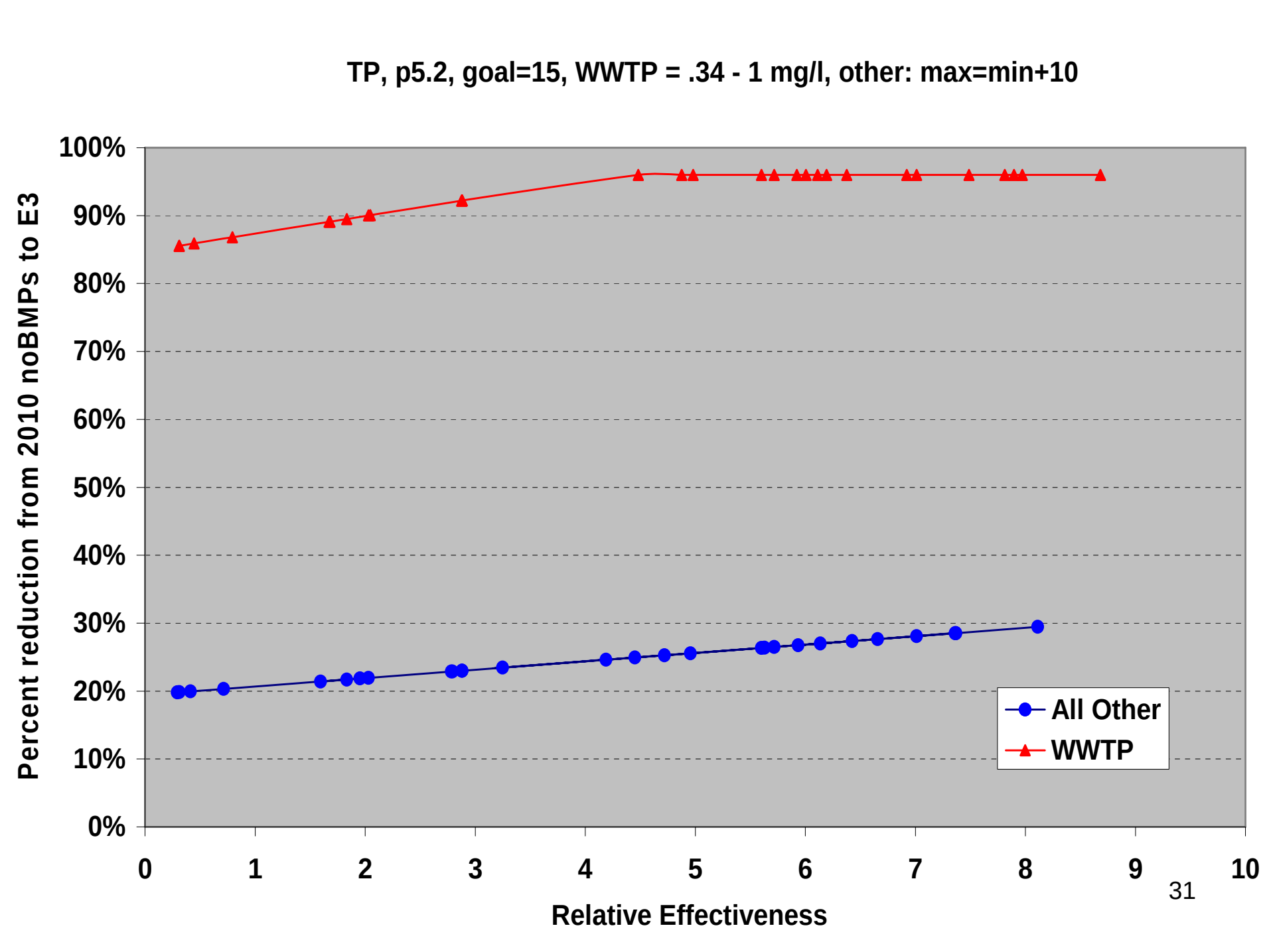
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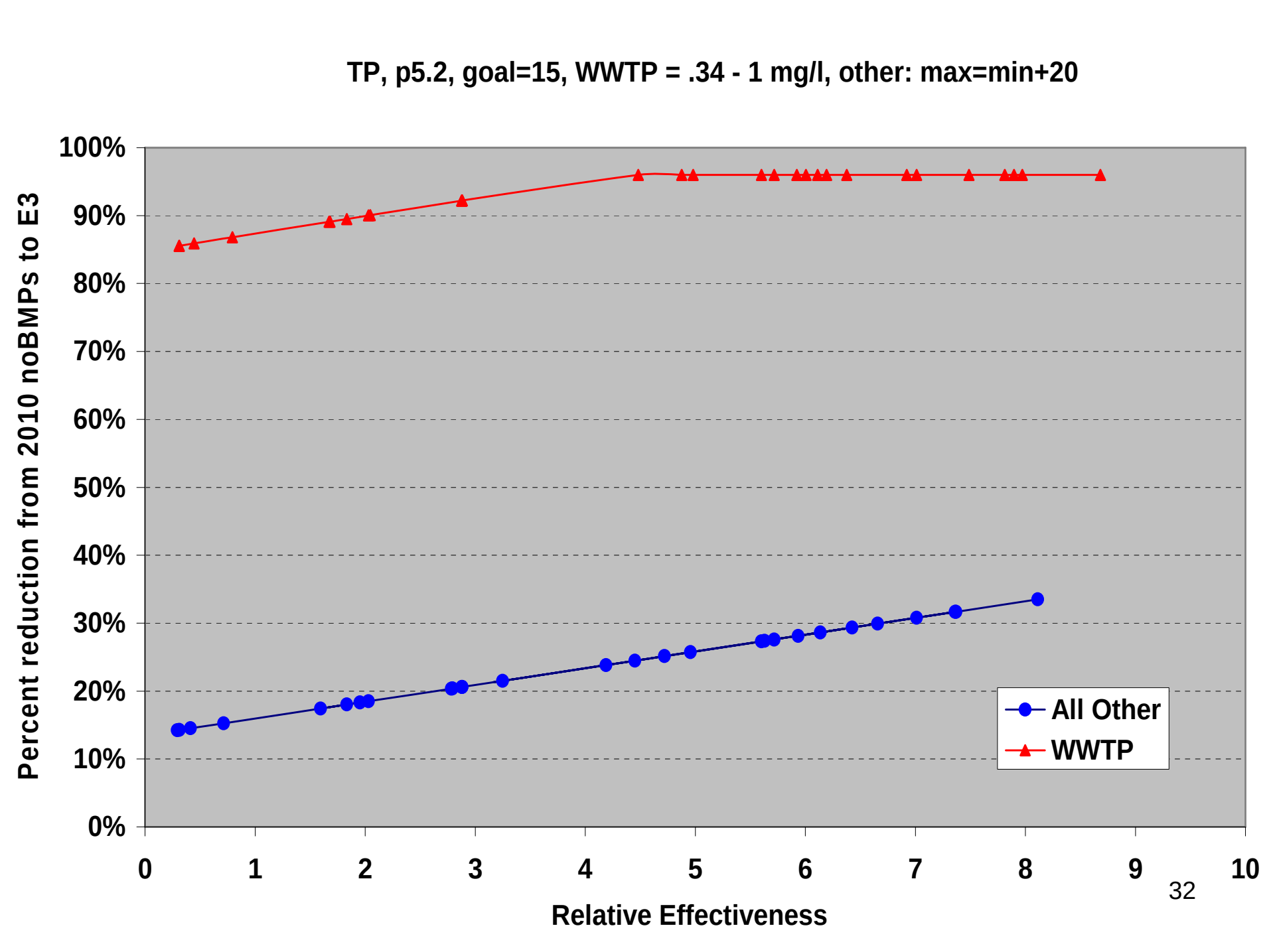
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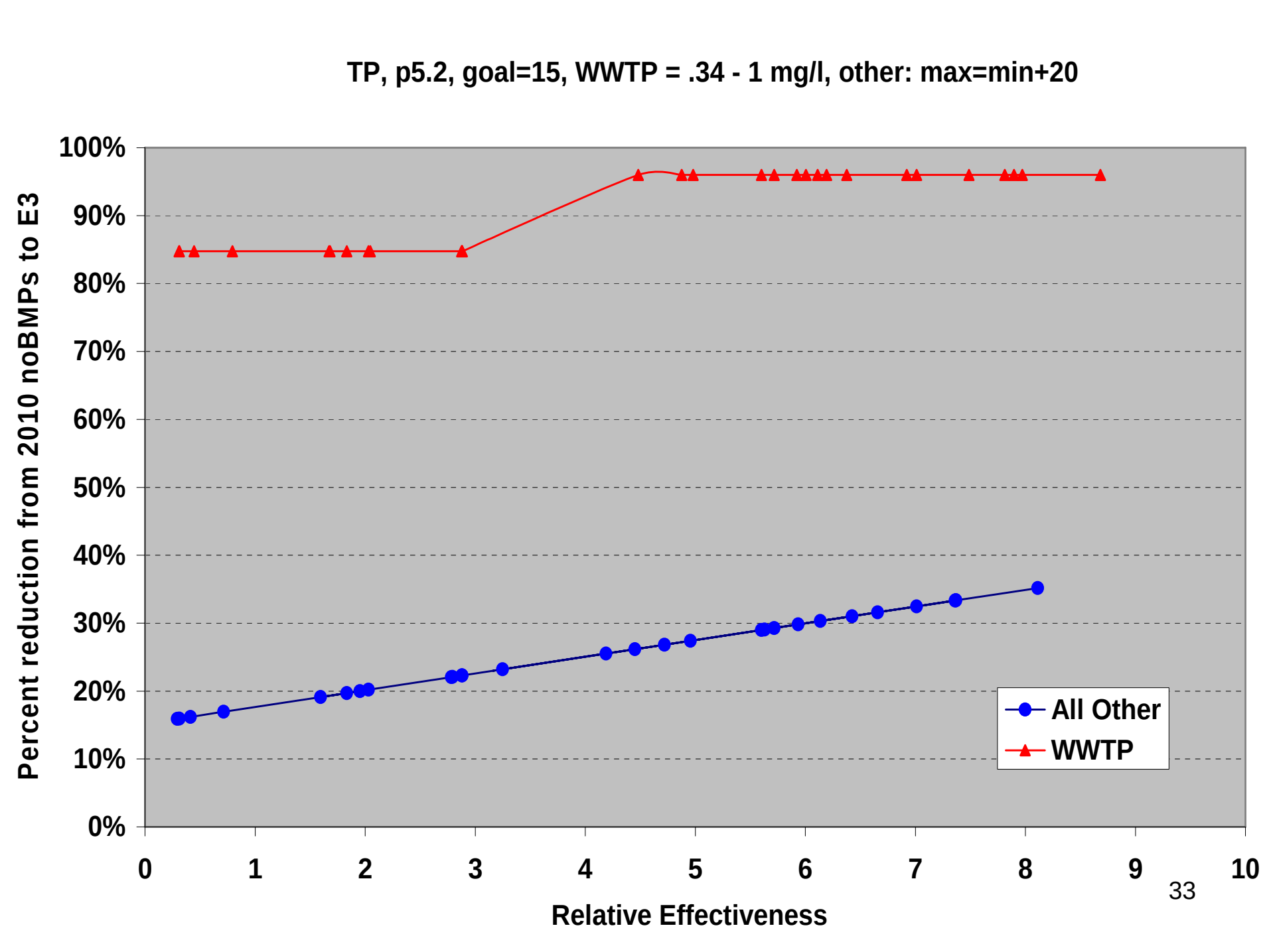
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TP Target Loads and Tributary Strategy Loads

WWTP .34 - 1 mg/l Straight Line

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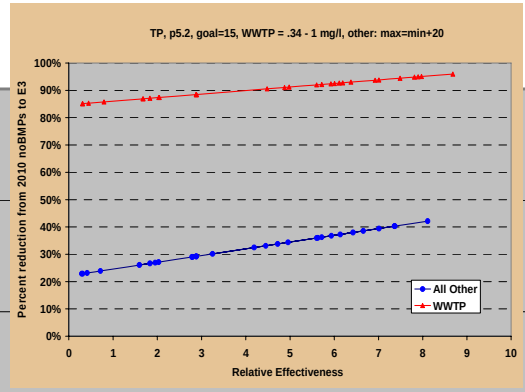

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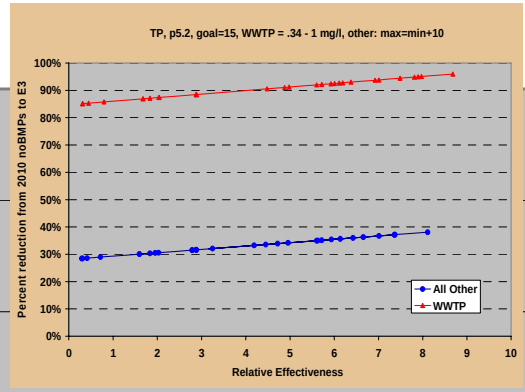

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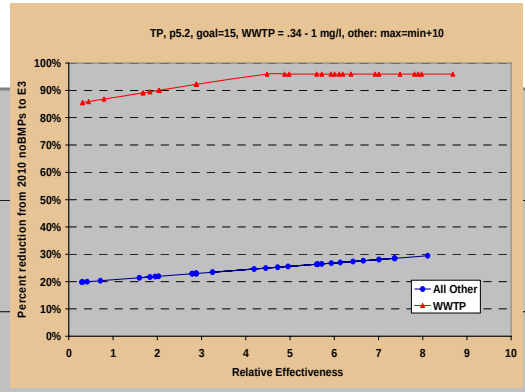
TP Target Loads and Tributary Strategy Loads

WWTP .34 - 1 mg/l Hockey Stick

All Else: Straight Line -- Min + 10% = Max



Target Loads Lower == Trib Strategy Lower

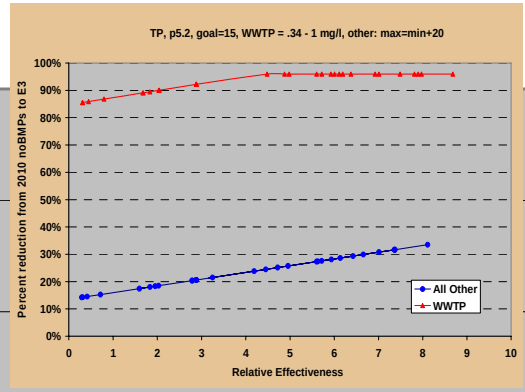
150%
140%
130%
120%
110%
100%
90%
80%
70%
60%
50%

DC Potm
DE Esh
MD Esh
MD Patux
MD Potm
MD Susq
MD Wsh
NY Susq
PA Potm
PA Susq
VA Esh
VA James
VA Potm
VA Rap
VA York
WV Potm

TP Target Loads and Tributary Strategy Loads

WWTP .34 - 1 mg/l Hockey Stick

All Else: Straight Line -- Min + 20% = Max



Target Loads Lower == Trib Strategy Lower

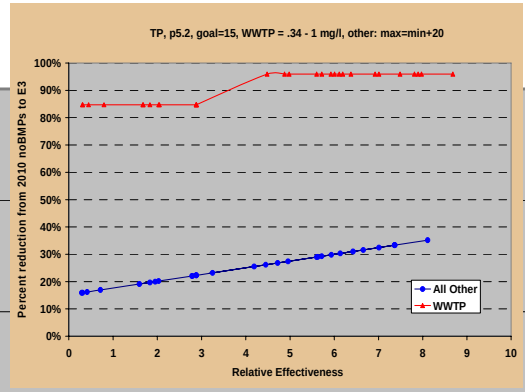
150%
140%
130%
120%
110%
100%
90%
80%
70%
60%
50%

DC Potm | DE Esh | MD Esh | MD Patux | MD Potm | MD Susq | MD Wsh | NY Susq | PA Potm | PA Susq | VA Esh | VA James | VA Potm | VA Rap | VA York | WV Potm

TP Target Loads and Tributary Strategy Loads

WWTP .34 - 1 mg/l Z-curve

All Else: Straight Line -- Min + 20% = Max



Target Loads Lower == Trib Strategy Lower

150%
140%
130%
120%
110%
100%
90%
80%
70%
60%
50%

DC Potm | DE Esh | MD Esh | MD Patux | MD Potm | MD Susq | MD Wsh | NY Susq | PA Potm | PA Susq | VA Esh | VA James | VA Potm | VA Rap | VA York | WV Potm

Target Load Methods

Lines	2	2	2	2	2				
WWTP rule	.34-1 mg/l	.34-1 mg/l	.34-1 HS	3-8 mg/l HS	3-8 mg/l Z				
Other Load Rule	20%	10%	20%	10%	20%				
DO goal	15	15	15	15	15	**Largest Difference**	2010 Noact	E3 load	TS load
DC Potm	0.18	0.17	0.13	0.13	0.13	28%	1.49	0.06	0.10
DE Esh	0.26	0.27	0.28	0.29	0.28	8%	0.38	0.14	0.25
MD Esh	1.18	1.20	1.24	1.27	1.23	7%	1.87	0.65	0.83
MD Patux	0.25	0.25	0.24	0.24	0.25	3%	0.80	0.12	0.23
MD Potm	0.93	0.93	0.89	0.88	0.90	5%	3.20	0.51	0.83
MD Susq	0.04	0.05	0.05	0.05	0.05	6%	0.06	0.03	0.04
MD Wsh	0.63	0.63	0.62	0.62	0.61	3%	3.54	0.30	0.63
NY Susq	0.56	0.56	0.56	0.56	0.56	1%	0.97	0.39	0.56
PA Potm	0.46	0.46	0.47	0.47	0.48	4%	0.58	0.32	0.40
PA Susq	2.70	2.71	2.69	2.69	2.67	1%	5.05	1.85	2.70
VA Esh	0.15	0.15	0.15	0.15	0.15	5%	0.22	0.08	0.17
VA James	3.44	3.38	3.50	3.44	3.57	5%	7.44	1.90	3.81
VA Potm	1.99	1.97	1.97	1.95	1.99	2%	4.89	1.06	2.38
VA Rap	0.81	0.80	0.82	0.81	0.82	2%	1.25	0.52	0.87
VA York	0.59	0.58	0.61	0.60	0.62	6%	1.03	0.35	0.69
WV Potm	0.60	0.59	0.62	0.61	0.62	5%	0.84	0.38	0.45
Total	**14.77**	**14.69**	**14.84**	**14.76**	**14.93**	2%	**33.60**	**8.68**	**14.93**

Recommendation

- Make a decision on WWTP, then set all other sources to meet the water quality goals
  - Allocation methodology is relatively robust. Changes in shape and slope do not make much of a difference for most basins.
  - Hockey Stick for WWTP – Re-Consider Level
  - 20% straight line for All Other