

Moving Toward Achieving All DO and Chlorophyll Water Quality Standards

Water Quality Goal Implementation Team
Conference Call

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Overview:

- New scenarios and approach taken to examine loads needed to achieve all WQSs.
- Load and response plots.



WQSTM Scenarios We'll Examine Today:

- 1985 Scenario 342TN, 24.1TP, 9790TSS
- '91 -'00 Base Scenario 309TN, 19.5TP, 8950TSS
- 2009 Scenario - 248TN, 16.6TP, 8110TSS
- Target Load Option A - 200TN, 15TP (completed, to be replaced with scenario of corrected sediment loads in Susquehanna)
- Tributary Strategy 191TN, 14.4TP, 6460TSS
- 190 Loading Scenario - 190TN, 12.7TP, 6030TSS
- 179 Loading Scenario 179TN, 12.0TP, 5510TSS
- 170 Loading Scenario 170TN, 11.3TP, 5650TSS
- E3 2010 Scenario 141TN, 8.5TP, 5060TSS
- 1/3 Between E3 and All Forest
- 2/3 Between E3 and All Forest
- All Forest Scenario 58TN, 4.4TP, 3240TSS



Key points:

- There are many ways to estimate loads needed to achieve all water quality standards. We needed to find an approach that maximized flexibility and that could be done with a limited number of scenarios.
- Three new scenarios, with nutrient and sediment loads less than the Global Target Load Scenario, will be added to our library of model results.
- We'll assume the “1% Rule” in this analysis.



DUs That Need to Go Beyond the Global Target Load:

Chlorophyll Nonattainment at 180TN:

JMSTFL Spring Chlorophyll: (attained by 170 '93-'95, need E3 all years)

JMSOH Spring Chlorophyll (attained always '93-'95, need E3 all years)

JMSMH Spring Chlorophyll (attained always '93-'95, need E3 all years)

JMSTFL Summer Chlorophyll: (attained always '93-'95, need E3 all years)

JMSMH Summer Chlorophyll (attained always '93-'95, need E3 all years)

JMSPH Summer Chlorophyll (attained always '93-'95, need E3 all years)

DCPTF Summer Chlorophyll (need E3 all years)

DO Nonattainment at 180TN

CHSMH Deep Channel – need All Forest

CHSMH Deep Water – need 170TN

MAGMH Deep Water – need 170TN

WBEMH Open Water – need E3



Approach Taken - First Steps:

Ultimately we'll finalize the global target load and we'll do local/regional reductions with the target load to estimate loads on the major basin and local/regional scales.

For now we can do a dose and response analysis on the individual DUs that need reductions approaching or beyond E3.



Approach Taken – Next Steps:

We're suggesting we run the final global target loads as background for everything but the problem segments and their associated watershed regions that have the most influence. The first scenario addressing the problem segments would be the E3 P-based scenario, the next would be the 1/3rd from E3 to All Forest, followed by the 2/3rds from E3 to All Forest.

For example, we know that we need to attain the Deep Water standards in the CHSMH (1.6% nonattainment at 180TN) and MAGMH (3.4% nonattainment at 180TN) with additional, more local, reductions while using the global target loads as the background load reduction. Both of these segments respond to load reductions to the Upper Eastern Shore, the Susquehanna, and the Western Shore as the “top three” influences.



Approach Taken – Next :

We're also suggesting that we apply the principal of initially taking the reductions from the jurisdiction originating the WQ standard. So for CHSMH and MAGMH we apply the three scenarios of local reductions of E3 and beyond to the Upper Eastern Shore and the West Shore of Maryland. This will take care of the one Deep Channel problem we have of the CHSMH and should take care of other local attainment problems as well.

The other segment of Open Water to be concerned with is the West Branch Elizabeth and we'll be able to tackle this with an Elizabeth River only reduction to E3 or beyond.

For chlorophyll, the Tidal Fresh James has to go to at least E3. For the DC Potomac tidal fresh (DCPTF) we'll take the jurisdiction of DC, including CSOs and Blue Plains, to E3 and beyond to achieve the DC chlorophyll WQS.



Key Scenario Loads By Basin

Total Nitrogen Loads by Basin (millions of pounds/year)

Basins	1985 Scenario 342TN, 24.1TP	Base Case Scenario 309TN, 19.5TP	2009 Scenario 251TN, 16.6TP	Target Load Scenario A 200TN, 15.0TP	Tributary Strategy 191TN 14.4TP	190 Loading Scenario 190TN 12.6TP	180 Loading Scenario 180TN 12.0TP	170 Loading Scenario 170TN 11.3TP	E3 Scenario 141TN, 8.5TP	1/3 Between E3 & Forest 113TN 7.1TP	2/3 Between E3 & Forest 85TN 5.7TP
Susquehanna	146.4	135.9	114.1	85.9	81.9	80.9	75.9	70.9	65.3	52.5	39.7
Western Shore	27.0	17.8	16.9	9.8	9.9	9.5	9.1	8.7	5.6	4.5	3.4
Patuxent	4.2	3.9	3.1	2.9	2.8	2.8	2.6	2.5	1.9	1.6	1.2
Potomac	81.3	75.5	54.1	46.9	43.8	44.8	42.8	40.7	33.4	26.5	19.7
Rappahannock	8.9	8.4	7.0	6.2	5.6	5.9	5.5	5.2	4.5	3.7	3.0
York	7.6	7.4	6.4	5.6	5.1	5.4	5.1	4.8	3.8	3.1	2.5
James	42.6	36.8	30.4	27.1	27.5	26.6	26.0	25.5	16.1	13.2	10.2
Eastern Shore	23.9	23.9	18.9	15.5	14.3	14.2	12.9	11.7	10.6	8.2	5.9
Total	341.8	309.4	250.9	200.0	190.9	190.0	180.0	170.0	141.2	113.4	85.5



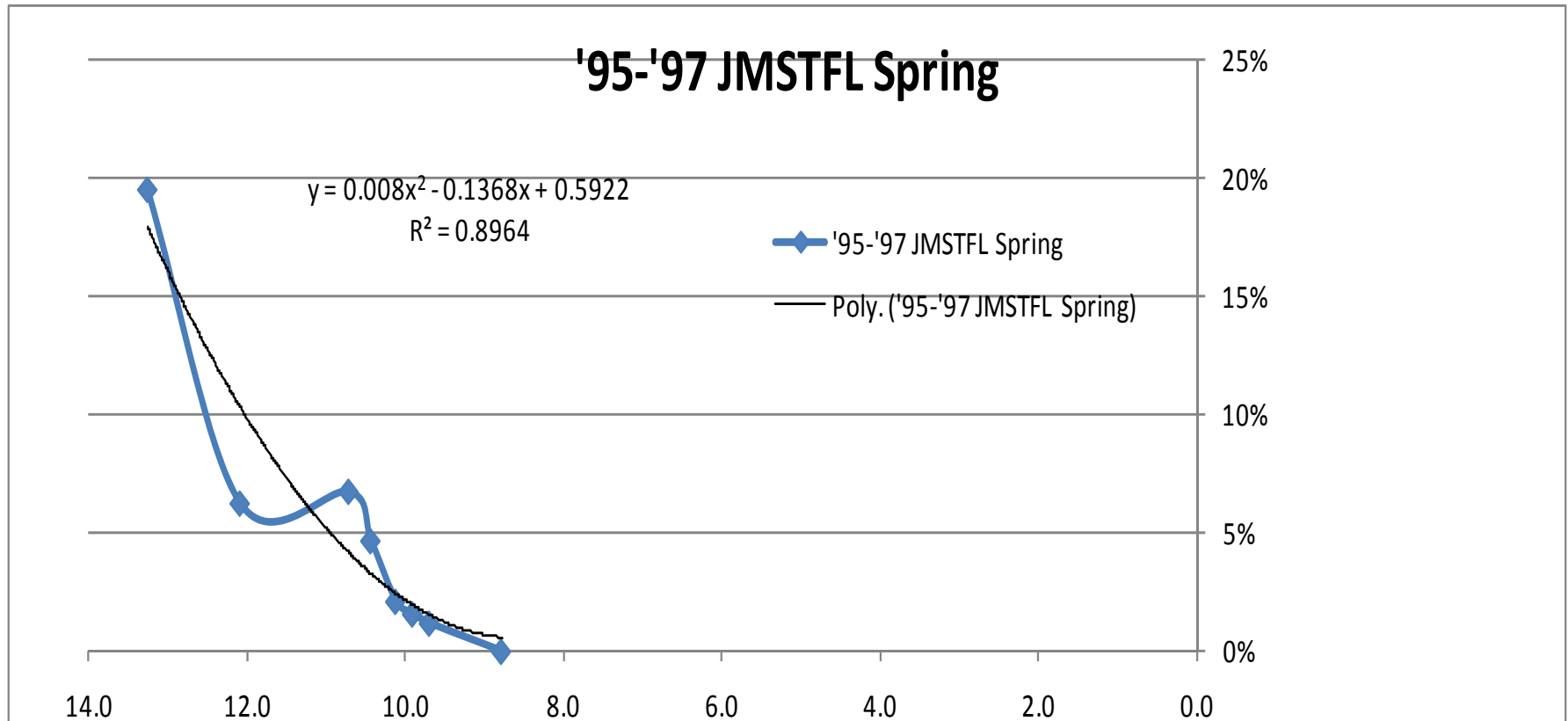
Key Scenario Loads By Basin

Total Phosphorus Loads by Basin (millions of pounds/year)

Basins	1985 Scenario 342TN, 24.1TP	Base Case Scenario 309TN, 19.5TP	2009 Scenario 248TN, 16.6TP	Target Load Scenario A 200TN, 14.4TP	Tributary Strategy 191TN 14.4TP	190 Loading Scenario 190TN 12.6TP	180 Loading Scenario 180TN 12.0TP	170 Loading Scenario 170TN 11.3TP	E3 - CBPO Scenario 141TN, 8.5TP	1/3 Between E3 & Forest 113TN 7.1TP	2/3 Between E3 & Forest 85TN 5.7TP
Susquehanna	5.64	4.84	4.27	3.36	3.36	2.89	2.75	2.61	2.22	1.94	1.65
Western Shore	1.62	0.87	0.83	0.54	0.68	0.45	0.42	0.40	0.23	0.20	0.18
Patuxent	0.48	0.36	0.29	0.25	0.29	0.21	0.20	0.18	0.12	0.10	0.09
Potomac	5.21	4.90	4.50	4.10	3.76	3.46	3.27	3.09	2.33	1.90	1.48
Rappahannock	1.30	1.24	1.09	1.13	0.94	0.91	0.85	0.78	0.61	0.51	0.40
York	1.03	0.76	0.63	0.64	0.59	0.54	0.51	0.48	0.34	0.30	0.26
James	6.51	4.34	3.32	3.05	3.29	2.68	2.58	2.47	1.50	1.30	1.11
Eastern Shore	2.36	2.23	1.70	1.92	1.45	1.53	1.42	1.31	1.14	0.86	0.58
Total	24.14	19.54	16.62	15.00	14.36	12.67	12.00	11.33	8.49	7.12	5.74



Load and Response Plots:

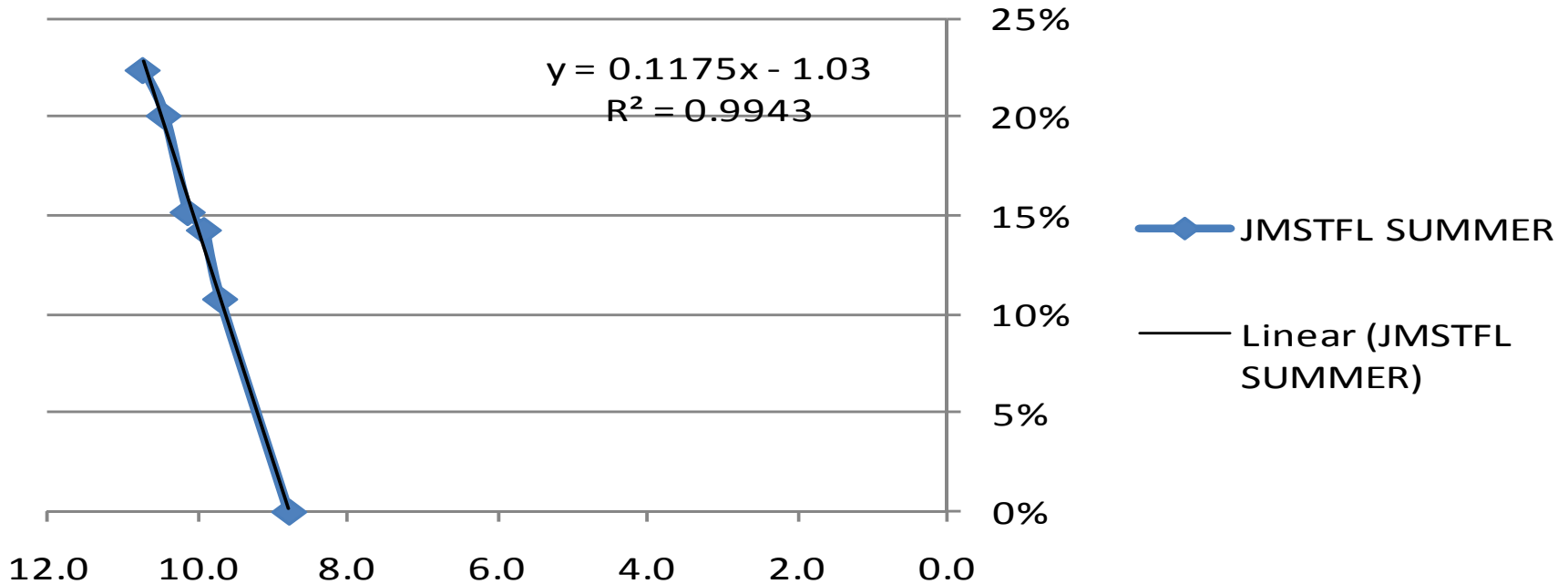


	1985 Scenario 342TN, 24.1TP, 9790TSS	'91-'00 Base Scenario 309TN, 19.5TP, 8950TSS	2009 Scenario 248TN, 16.6TP, 8110TSS	Target Load Option A 200TN, 15TP, 6390TSS	Tributary Strategy 191TN 14.4TP, 6462 TSS	190 Loading Scenario 190TN 12.6TP, 6030TSS	179 Loading Scenario 179TN 12.0TP, 5510TSS	170 Loading Scenario 170TN 11.3TP, 5650TSS	E3 2010 Scenario 141TN 8.5TP, 5060TSS	1/3 Between E3 & Forest 113TN 7.1TP 4450TSS	2/3 Between E3 & Forest 85TN 5.7TP 3840TSS	All Forest Scenario
	0%	19%	6%	7%	5%	2%	2%	1%	0%	0%	0%	0%
TN Load	14.0	13.2	12.1	10.7	10.4	10.1	9.9	9.7	8.8	7.2	5.6	5.8
TP Load	2.26	2.23	1.82	1.64	1.62	1.32	1.27	1.22	1.07	0.93	0.79	0.75



Load and Response Plots:

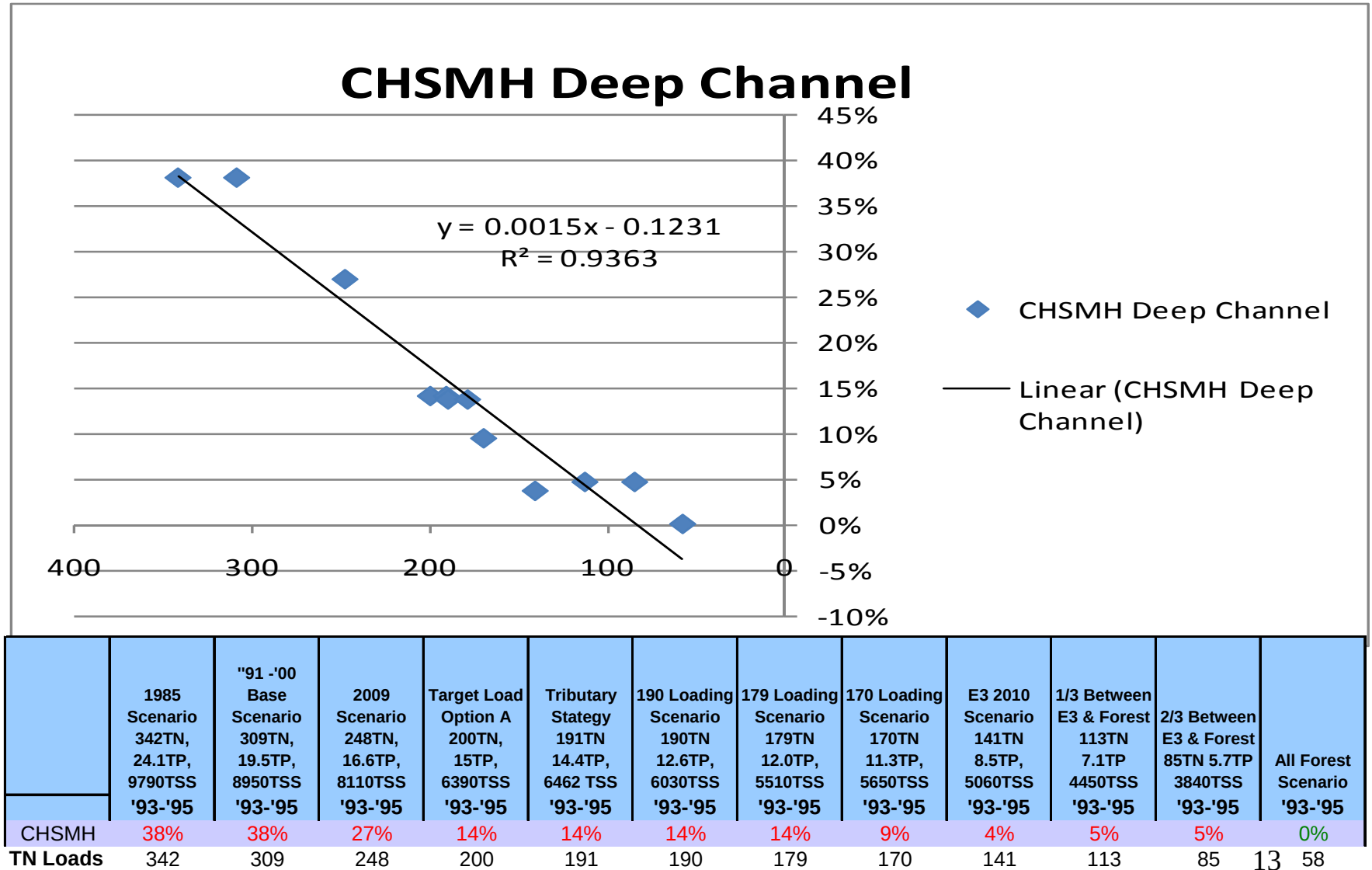
JMSTFL SUMMER



	1985 Scenario 342TN, 24.1TP, 9790TSS	"91-'00 Base Scenario 309TN, 19.5TP, 8950TSS	2009 Scenario 248TN, 16.6TP, 8110TSS	Target Load Option A 200TN, 15TP, 6390TSS	Tributary Strategy 191TN, 14.4TP, 6462 TSS	190 Loading Scenario 190TN, 12.6TP, 6030TSS	179 Loading Scenario 179TN, 12.0TP, 5510TSS	170 Loading Scenario 170TN, 11.3TP, 5650TSS	E3 2010 Scenario 141TN, 8.5TP, 5060TSS	1/3 Between E3 & Forest 113TN, 7.1TP, 4450TSS	2/3 Between E3 & Forest 85TN 5.7TP 3840TSS	All Forest Scenario
TN Load	14.0	13.2	12.1	10.7	10.4	10.1	9.9	9.7	8.8	7.2	5.6	5.8
TP Load	2.26	2.23	1.82	1.64	1.62	1.32	1.27	1.22	1.07	0.93	0.79	0.75



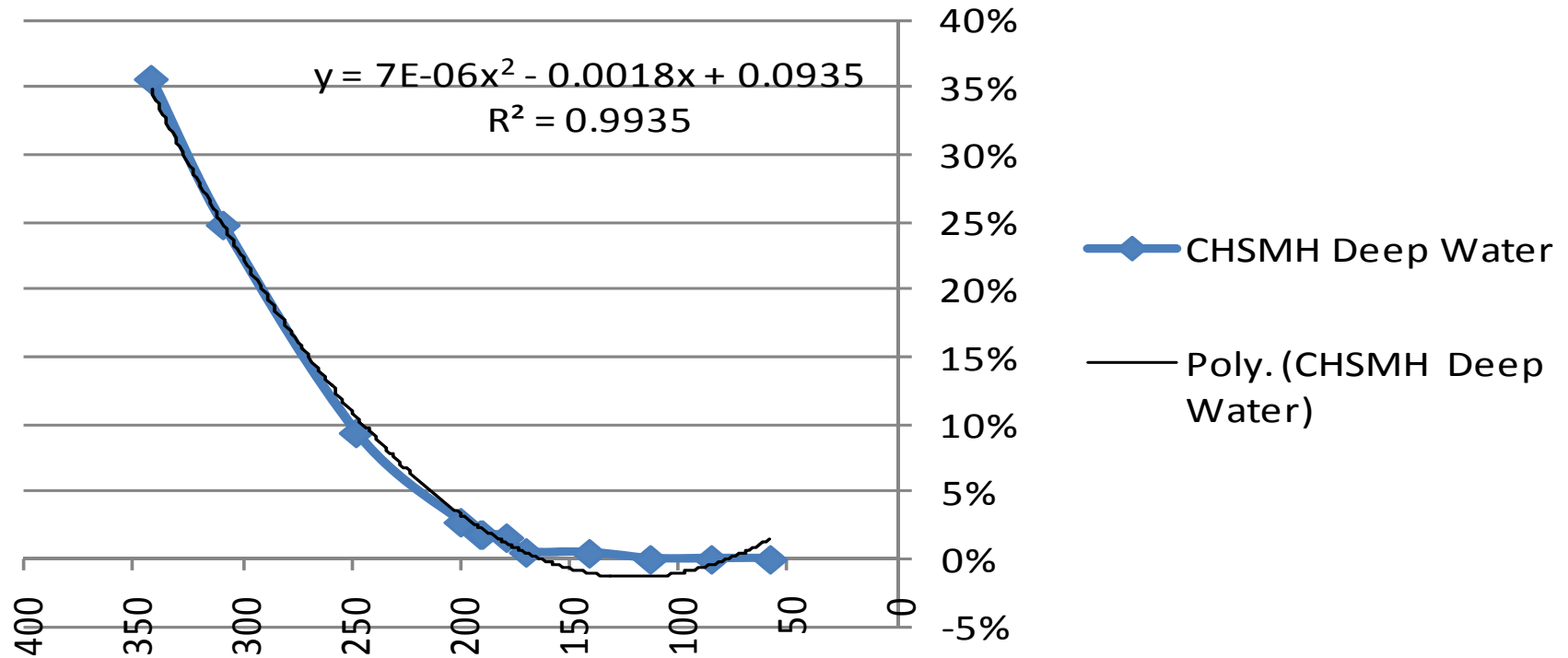
Load and Response Plots:





Load and Response Plots:

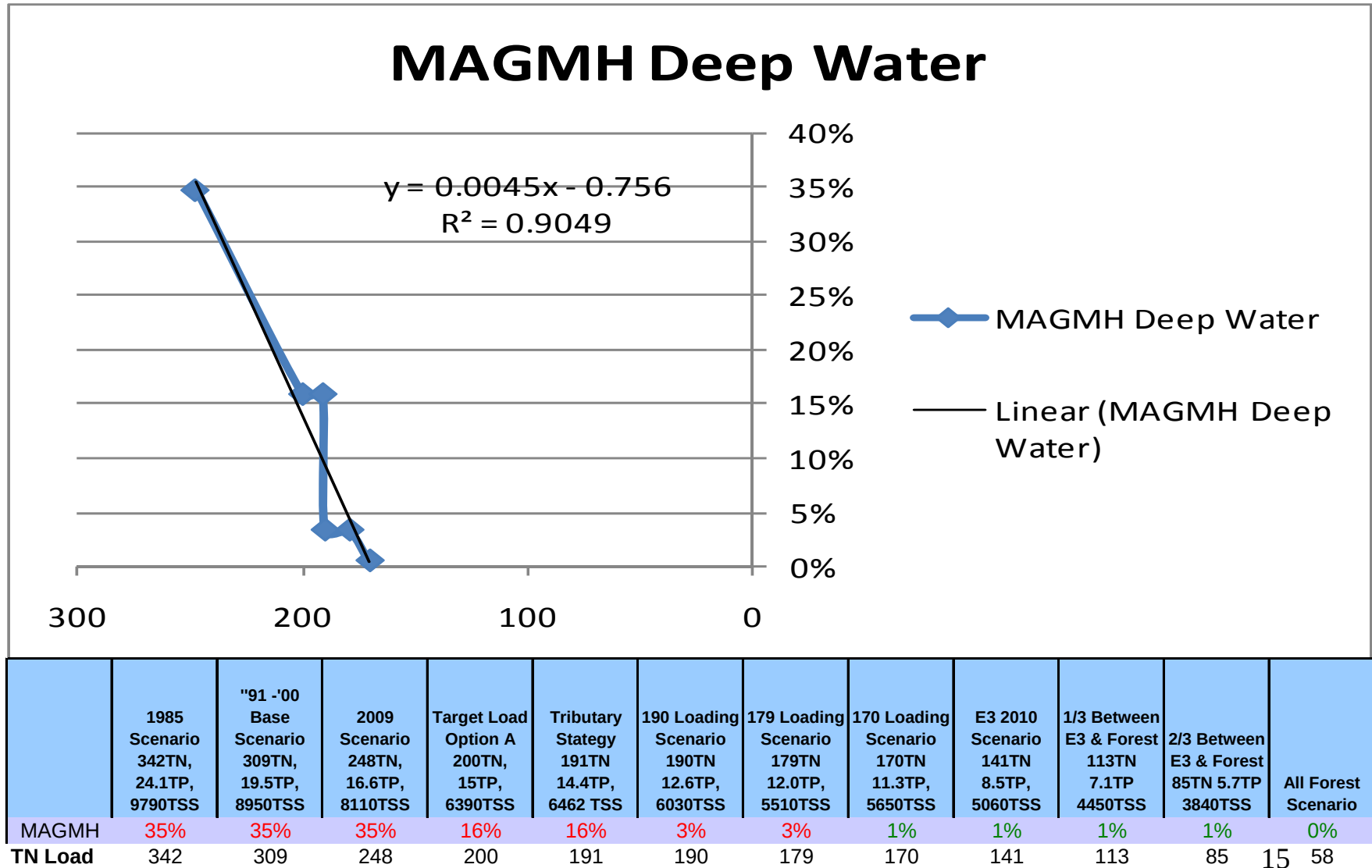
CHSMH Deep Water



	1985 Scenario 342TN, 24.1TP, 9790TSS '93-'95	'91-'00 Base Scenario 309TN, 19.5TP, 8950TSS '93-'95	2009 Scenario 248TN, 16.6TP, 8110TSS '93-'95	Target Load Option A 200TN, 15TP, 6390TSS '93-'95	Tributary Strategy 191TN, 14.4TP, 6462 TSS '93-'95	190 Loading Scenario 190TN, 12.6TP, 6030TSS '93-'95	179 Loading Scenario 179TN, 12.0TP, 5510TSS '93-'95	170 Loading Scenario 170TN, 11.3TP, 5650TSS '93-'95	E3 2010 Scenario 141TN, 8.5TP, 5060TSS '93-'95	1/3 Between E3 & Forest 113TN, 7.1TP, 4450TSS '93-'95	2/3 Between E3 & Forest 85TN 5.7TP 3840TSS '93-'95	All Forest Scenario '93-'95
CHSMH TN Load	36% 342	25% 309	9% 248	3% 200	2% 191	2% 190	2% 179	1% 170	0% 141	0% 113	0% 85	0% 58



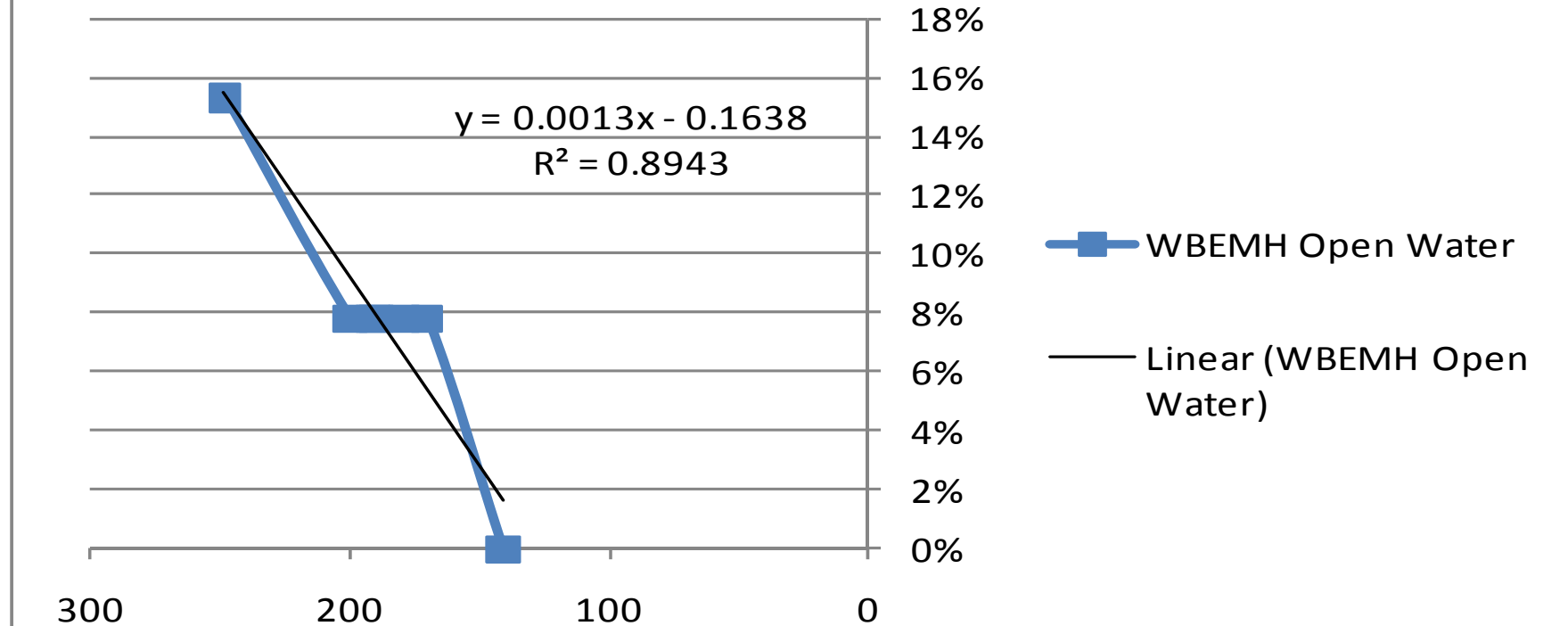
Load and Response Plots:





Load and Response Plots:

WBEMH Open Water



	1985 Scenario 342TN, 24.1TP, 9790TSS	'91 -'00 Base Scenario 309TN, 19.5TP, 8950TSS	2009 Scenario 248TN, 16.6TP, 8110TSS	Target Load Option A 200TN, 15TP, 6390TSS	Tributary Strategy 191TN 14.4TP, 6462 TSS	190 Loading Scenario 190TN 12.6TP, 6030TSS	179 Loading Scenario 179TN 12.0TP, 5510TSS	170 Loading Scenario 170TN 11.3TP, 5650TSS	E3 2010 Scenario 141TN 8.5TP, 5060TSS	1/3 Between E3 & Forest 113TN 7.1TP 4450TSS	2/3 Between E3 & Forest 85TN 5.7TP 3840TSS	All Forest Scenario
WBEMH TN Load	15%	11%	15%	8%	8%	8%	8%	8%	0%	0%	0%	0%
	342	309	248	200	191	190	179	170	141	113	85	58