Geographic Isolation Runs

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Geographic Isolation Runs

- Sets exchange ratios
  - States can choose to reduce more N and less P or vice versa in their WIPs
- Part of relative effectiveness
  - Geo Iso runs are (DO improvement) / (lb delivered)
  - Multiplied by (lb delivered) / (lb produced

Method

- Increase nitrogen by 1,000,000 lbs for a single basin
- Increase is implemented by multiplying each cell and day by the same factor
- Record the change in the 25th percentile of DO for each designated use
- Express result in terms of ug/l increase per million lbs TN
- Repeat for all basins
- Repeat using 100,000 lbs phosphorus

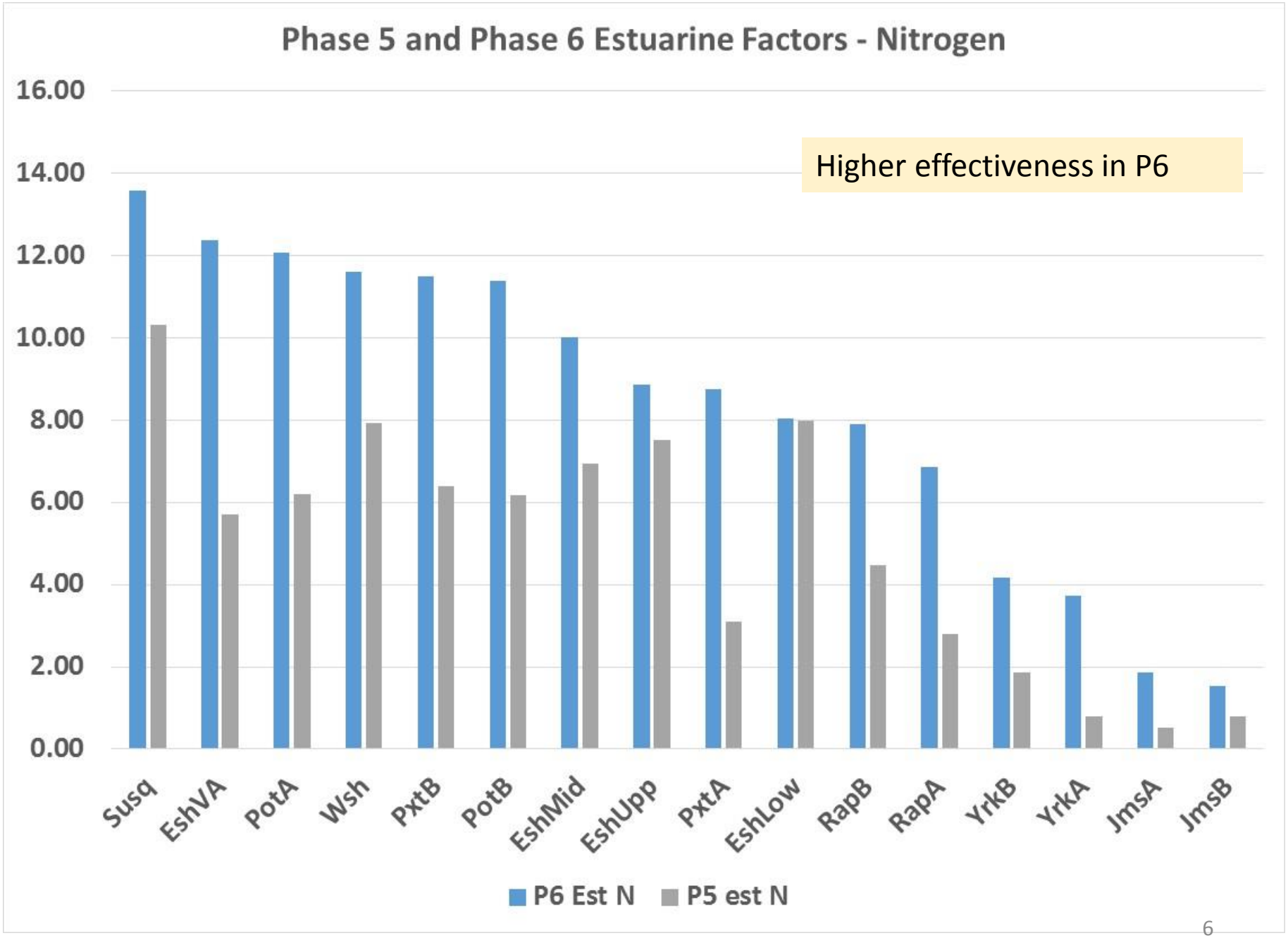
Nitrogen geo runs for Deep Water

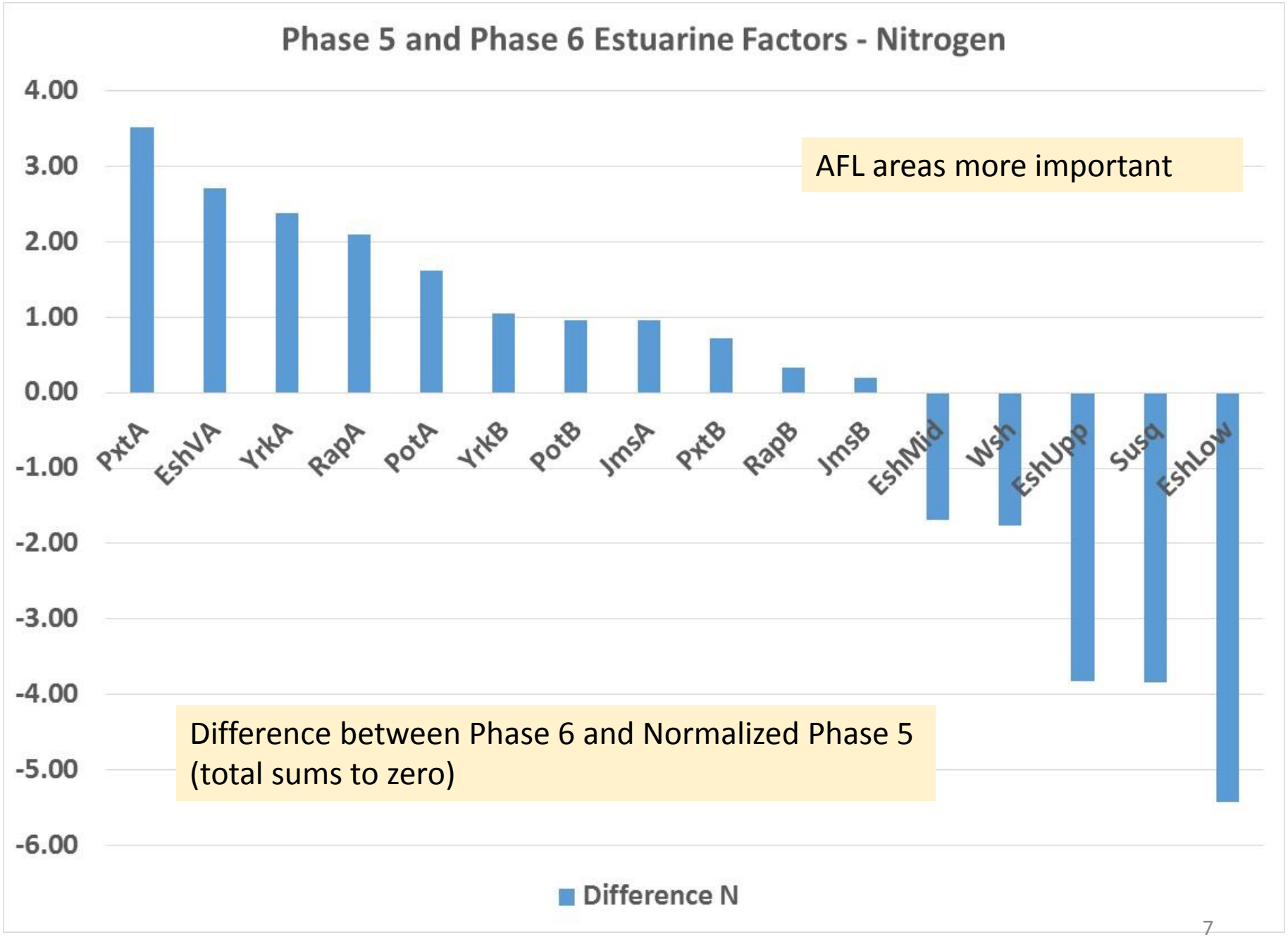
Numbers are the 25th percentile of DO in mg/l for deep water in the model

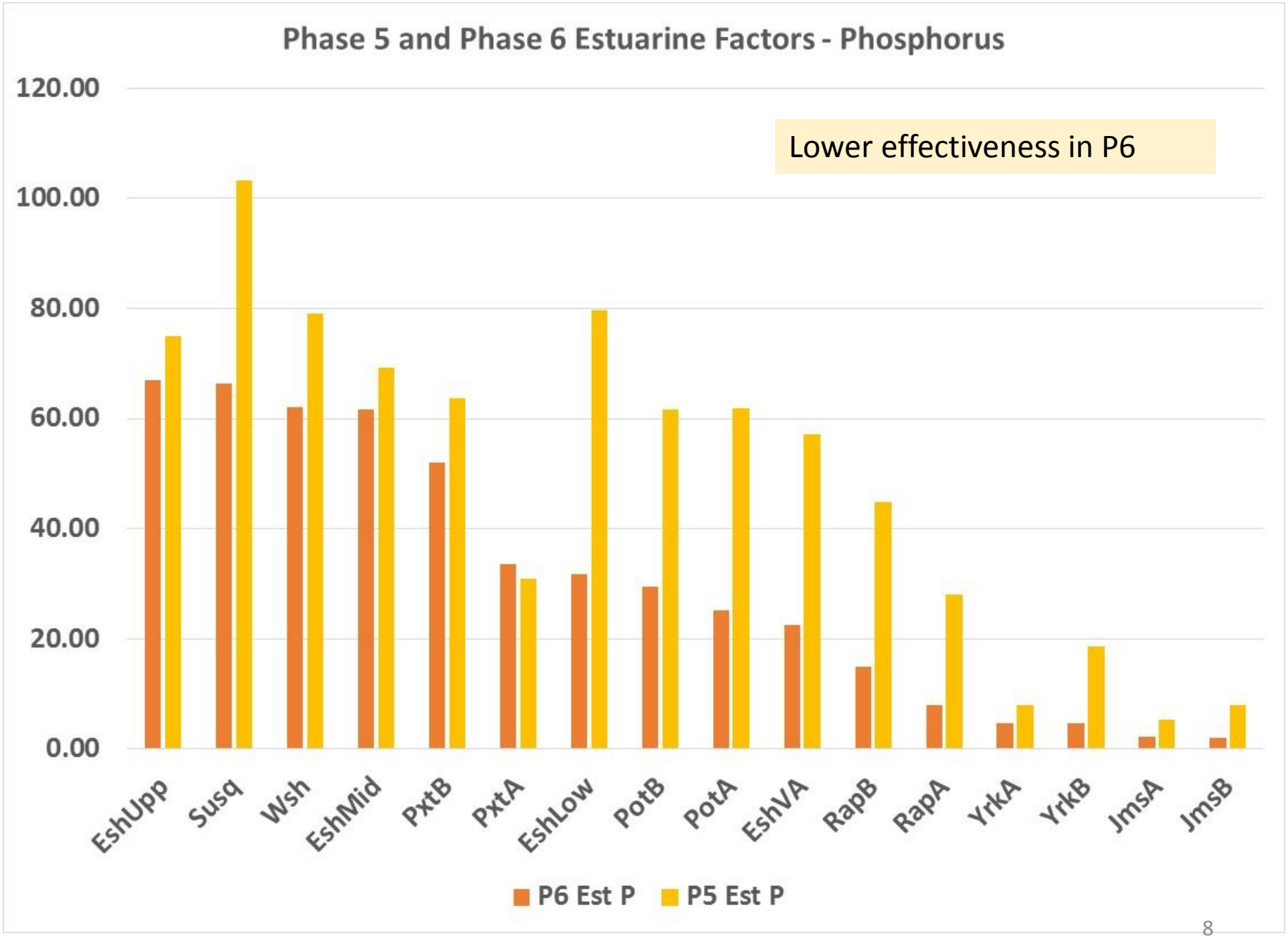
run	2010WIP2	Susq_N_n	JmsA_N_r	PotA_N_n	PxtA_N_n
CB3MH	5.99309	5.98608	5.99238	5.98825	5.98892
CB4MH	4.44814	4.43477	4.44651	4.43781	4.43987
CB6PH	5.78068	5.77574	5.77977	5.77601	5.77744
CB7PH	5.95704	5.95297	5.95625	5.9535	5.95434
CHSMH	2.69905	2.68184	2.69757	2.68965	2.69124
EASMH	1.29263	1.27473	1.29107	1.28284	1.28429
MA1MH	7.12536	7.12413	7.12531	7.12464	7.12454
MAGMH	6.96071	6.96095	6.96066	6.96066	6.96089
MD5MH	5.29189	5.28185	5.2905	5.28227	5.2854
PA1MH	6.26554	6.26096	6.26507	6.26271	6.2631
PA2MH	3.69237	3.67391	3.69122	3.68429	3.60696
PATMH	3.97342	3.95976	3.97237	3.96716	3.96808
POMMH	5.86542	5.85789	5.86457	5.8554	5.86036
POVMH	6.6618	6.66356	6.66119	6.66616	6.6625
RPPMH	5.72118	5.71178	5.7202	5.71179	5.71476
SBEMH	4.94299	4.93747	4.8799	4.93771	4.93938
SEVMH	7.16546	7.16616	7.16533	7.16451	7.16495
SOUMH	7.68768	7.69251	7.68812	7.68924	7.6895
VA5MH	5.90626	5.89916	5.90517	5.89872	5.90179
YRKPH	5.10344	5.0962	5.10148	5.0963	5.09834

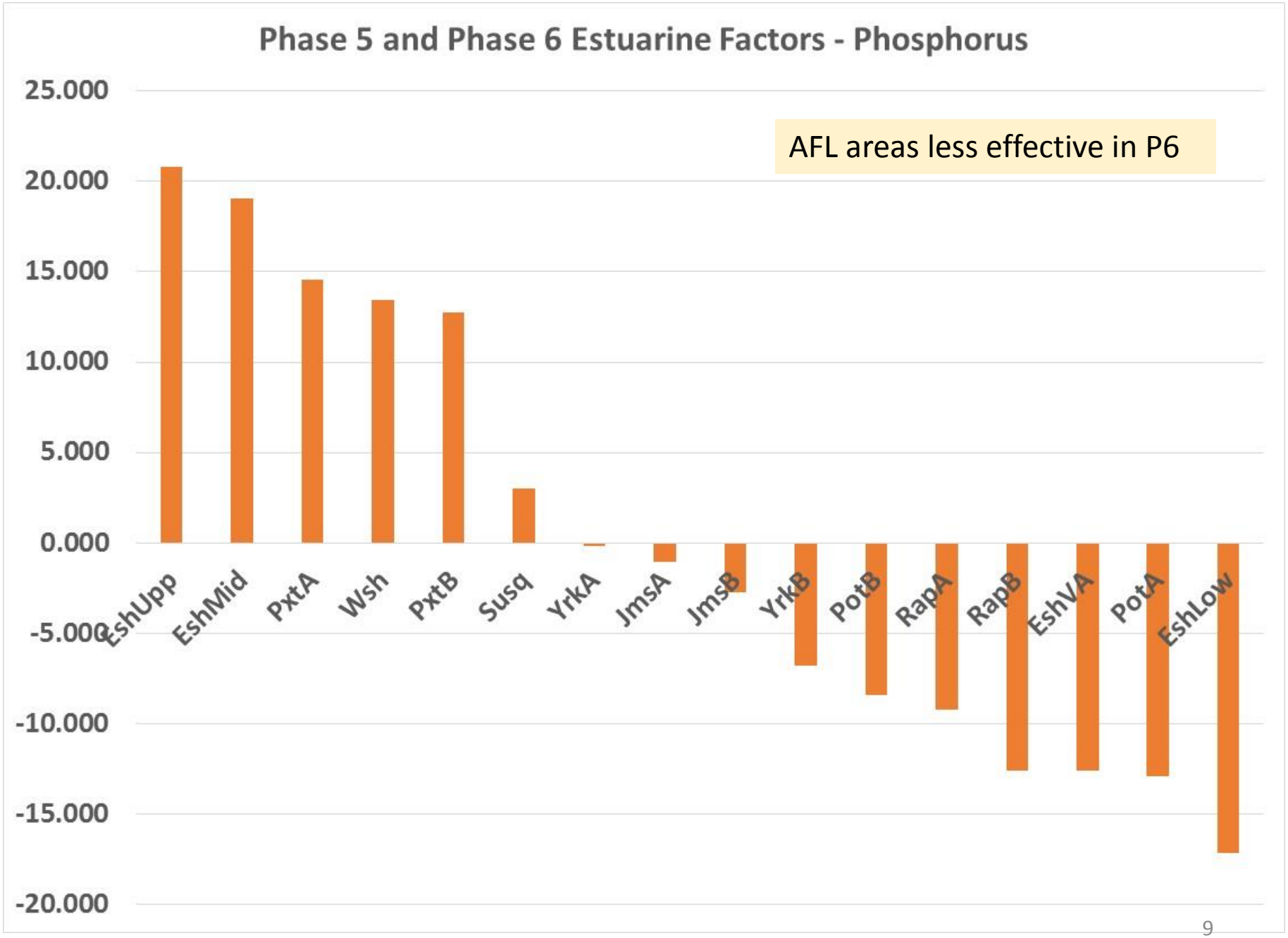
List of basins (MWG 8/9/2017)

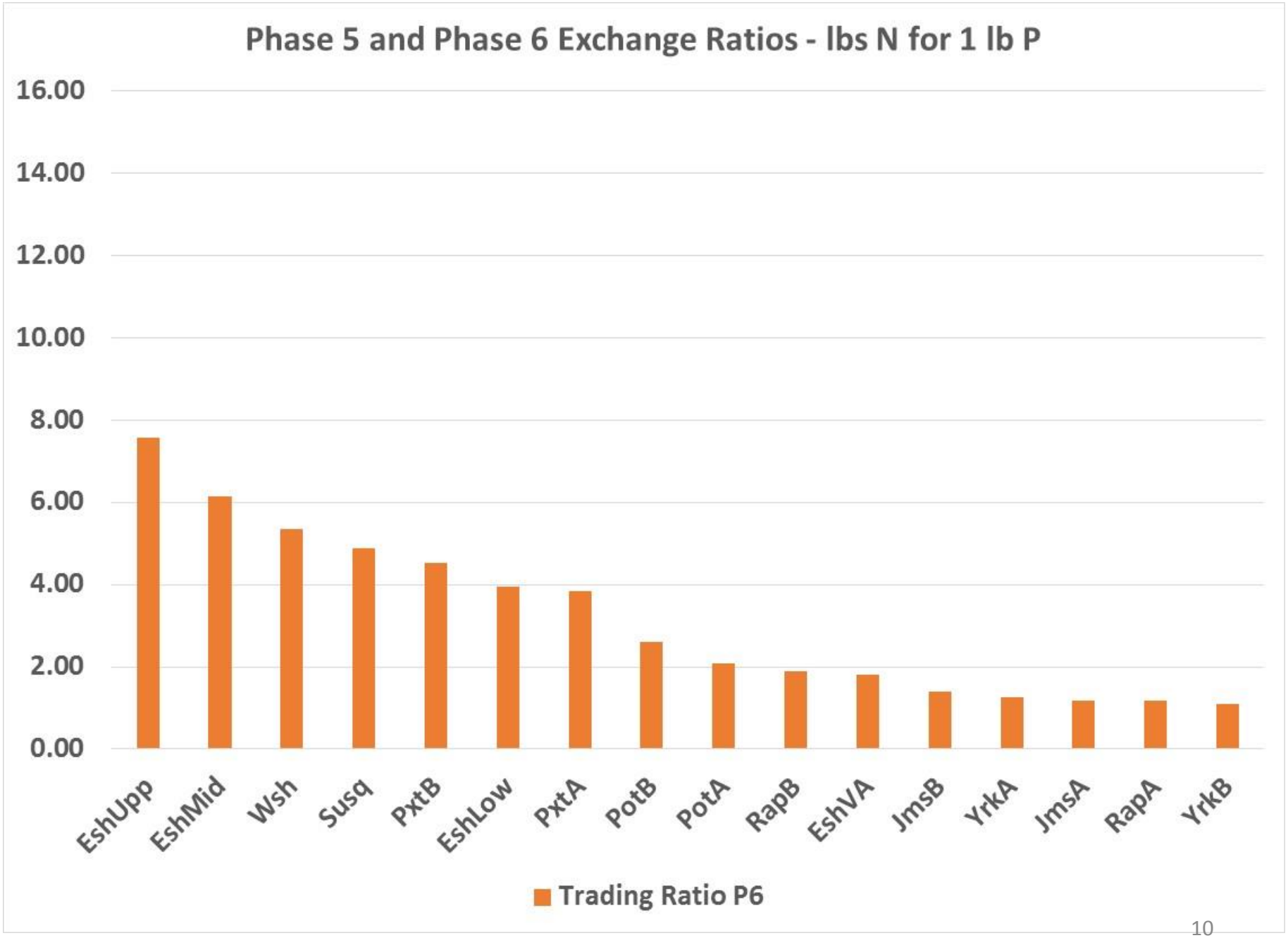
- Susquehanna
- Western Shore
- Patuxent AFL
- Patuxent BFL
- Potomac AFL
- Potomac BFL
- Rappahannock AFL
- Rappahannock BFL
- York AFL
- York BFL
- James AFL
- James BFL
- Upper Eastern Shore
- Middle Eastern Shore
- Lower Eastern Shore
- Eastern Shore Virginia

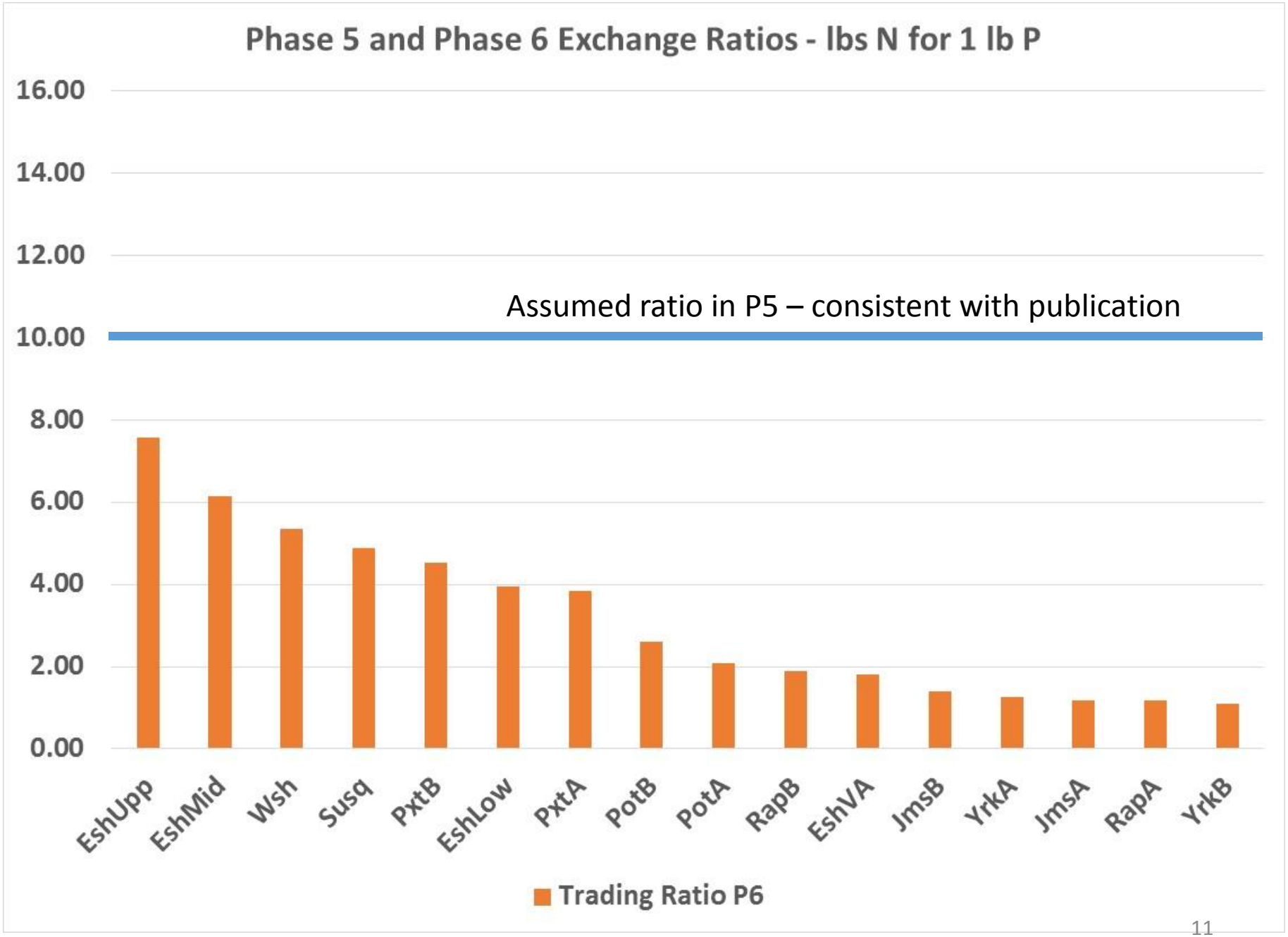

Phase 5 and Phase 6 Estuarine Factors - Nitrogen
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Higher effectiveness in P6
Susq
EshVA
PotA
Wsh
PxtB
PotB
EshMid
EshUpp
PxtA
EshLow
RapB
RapA
YrkB
YrkA
JmsA
JmsB
P6 Est N
P5 est N

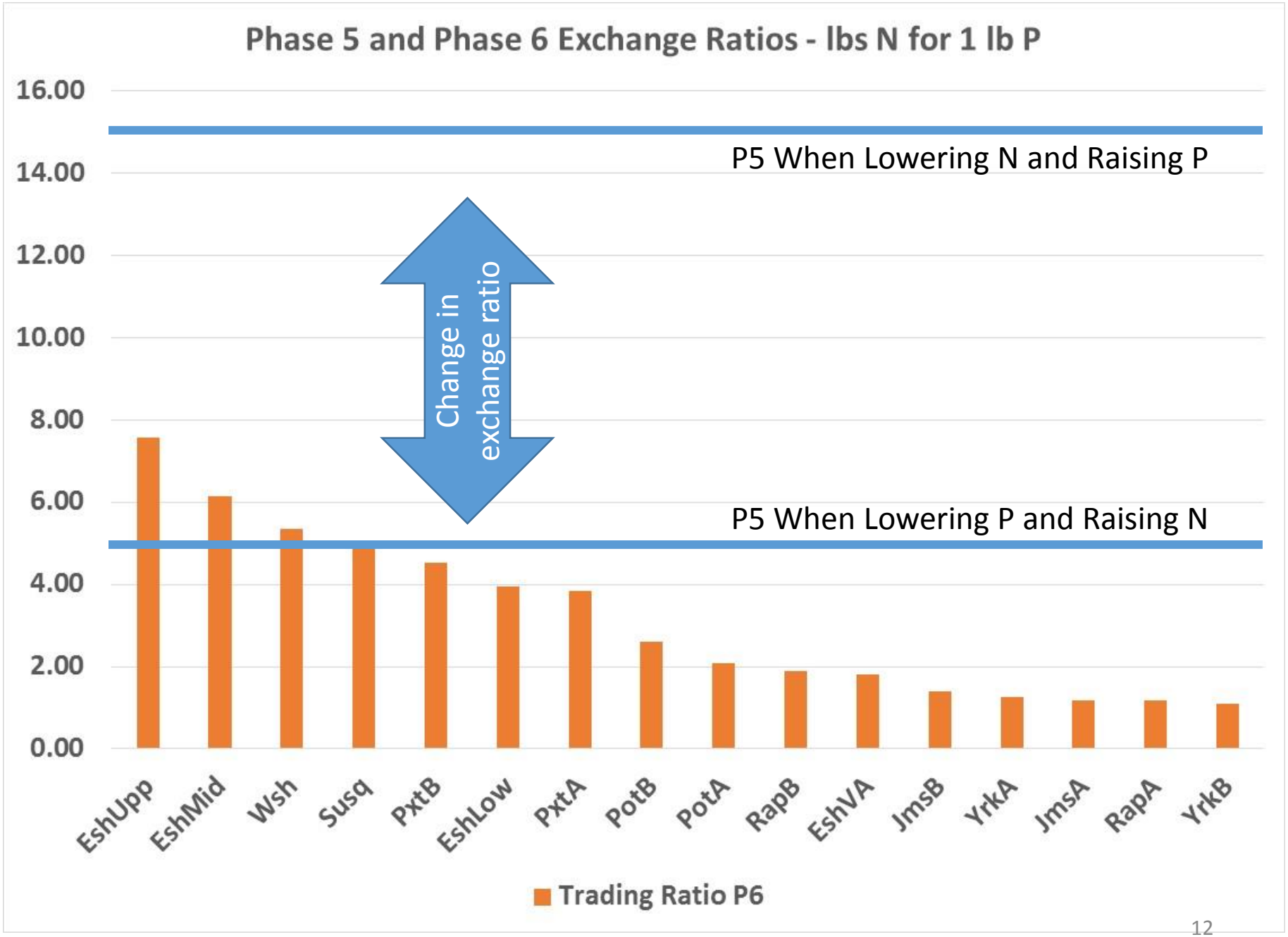

Phase 5 and Phase 6 Estuarine Factors - Nitrogen
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
PxtA
EshVA
YrkA
RapA
PotA
YrkB
PotB
JmsA
PxtB
RapB
JmsB
EshMid
Wsh
EshUpp
Susq
EshLow
AFL areas more important
Difference between Phase 6 and Normalized Phase 5 (total sums to zero)
Difference N


Phase 5 and Phase 6 Estuarine Factors - Phosphorus
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Lower effectiveness in P6
EshUpp
Susq
Wsh
EshMid
PxtB
PxtA
EshLow
PotB
PotA
EshVA
RapB
RapA
YrkA
YrkB
JmsA
JmsB
P6 Est P
P5 Est P


Phase 5 and Phase 6 Estuarine Factors - Phosphorus
AFL areas less effective in P6
25.000
20.000
15.000
10.000
5.000
0.000
-5.000
-10.000
-15.000
-20.000
EshUpp
EshMid
PxtA
Wsh
PxtB
Susq
YrkA
JmsA
JmsB
YrkB
PotB
RapA
RapB
EshVA
PotA
EshLow


Phase 5 and Phase 6 Exchange Ratios - lbs N for 1 lb P
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
EshUpp
EshMid
Wsh
Susq
PxtB
EshLow
PxtA
PotB
PotA
RapB
EshVA
JmsB
YrkA
JmsA
RapA
YrkB
Trading Ratio P6


Phase 5 and Phase 6 Exchange Ratios - lbs N for 1 lb P
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Assumed ratio in P5 – consistent with publication
EshUpp
EshMid
Wsh
Susq
PxtB
EshLow
PxtA
PotB
PotA
RapB
EshVA
JmsB
YrkA
JmsA
RapA
YrkB
Trading Ratio P6


Phase 5 and Phase 6 Exchange Ratios - lbs N for 1 lb P
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
P5 When Lowering N and Raising P
Change in exchange ratio
P5 When Lowering P and Raising N
EshUpp
EshMid
Wsh
Susq
PxtB
EshLow
PxtA
PotB
PotA
RapB
EshVA
JmsB
YrkA
JmsA
RapA
YrkB
Trading Ratio P6

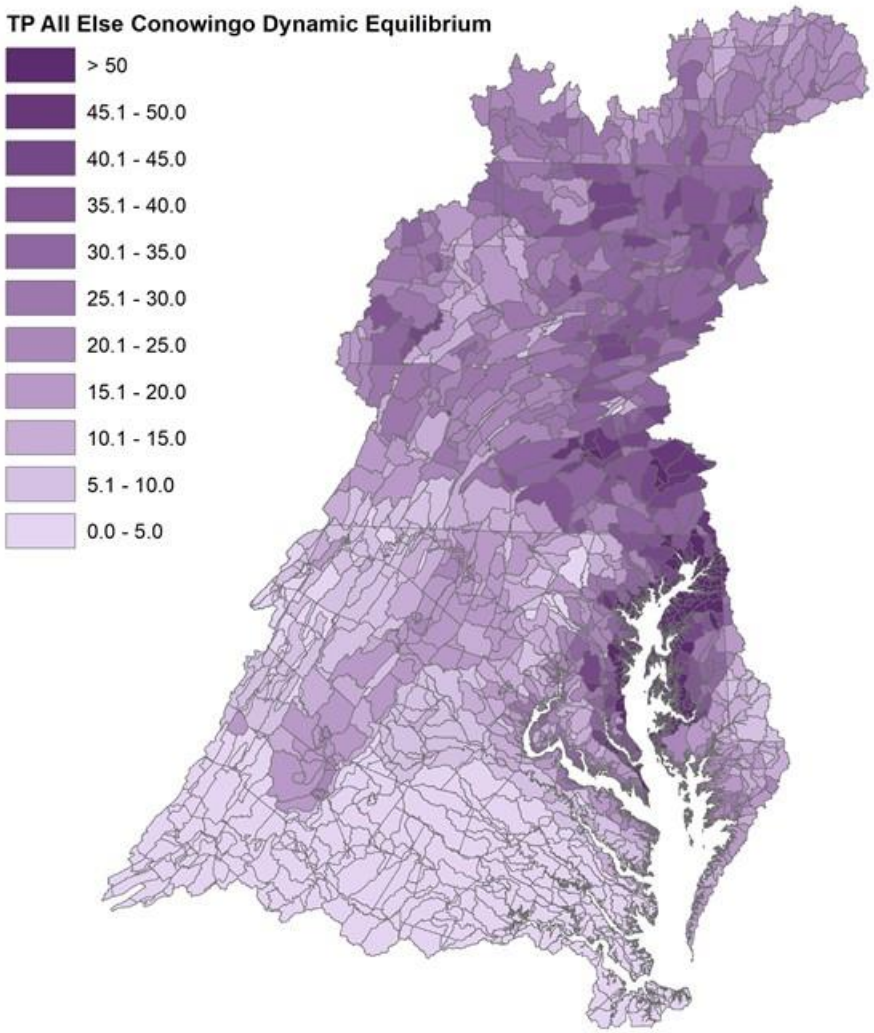
Relative Effectiveness

Key factors:

Watershed Transport
- Watershed Characteristics
- Travel time
- Existence of impoundments

Position along mainstem bay
- Estuarine circulation

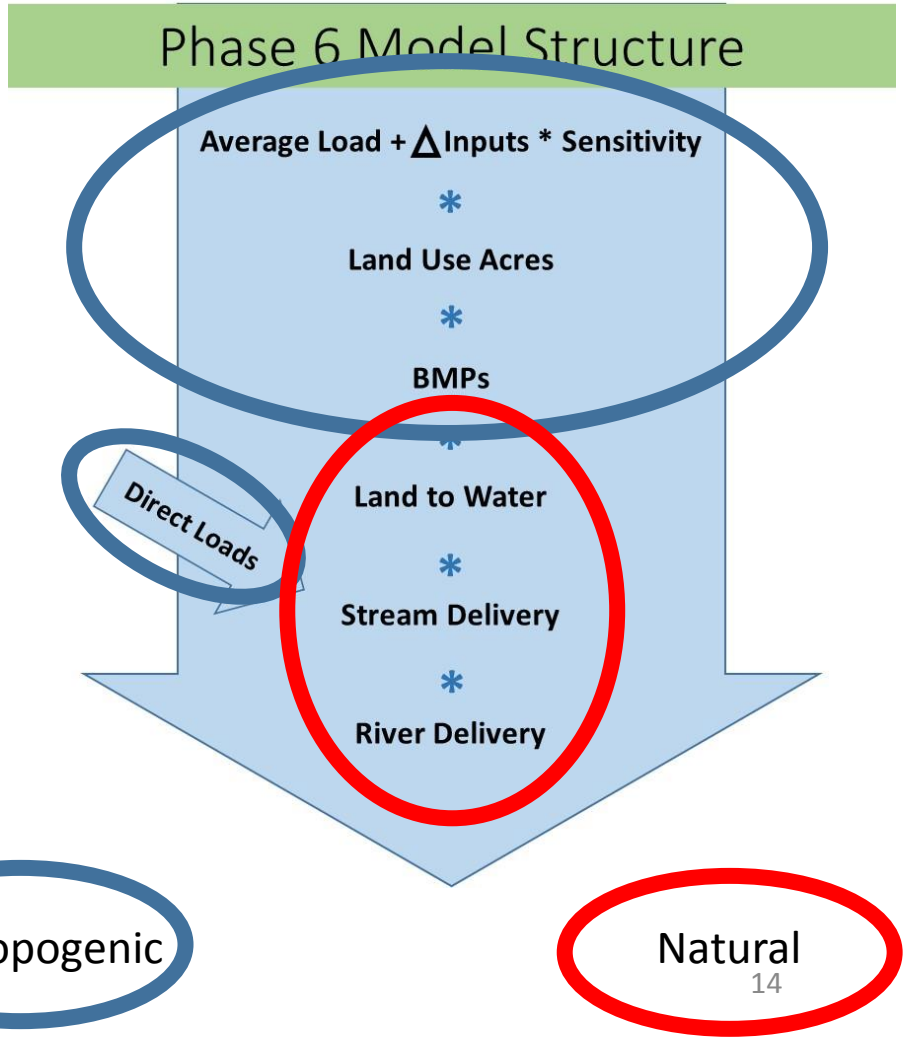
Existence of riverine estuary



Watershed delivery:
Pound delivered per pound produced
Estuarine delivery
Oxygen reduced per pound delivered
Overall Effectiveness
Oxygen reduced per pound produced

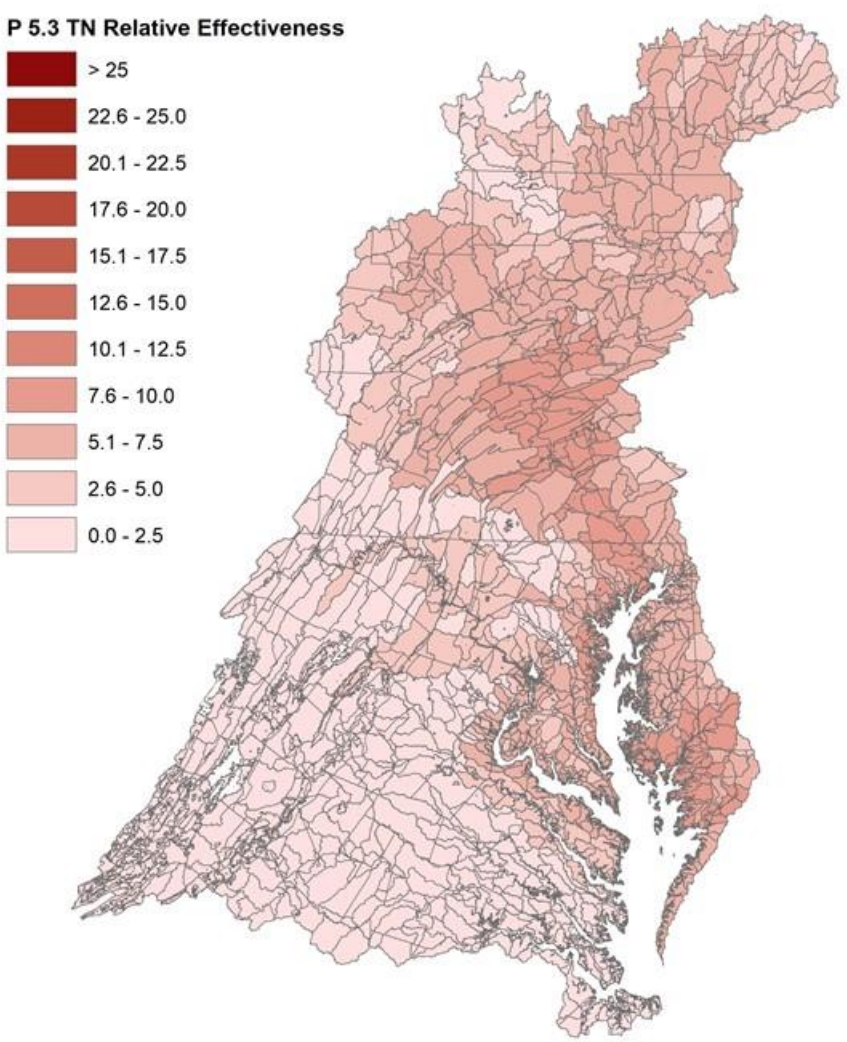
Watershed Delivery

- Pound delivered per pound produced
- Factor out anthropogenic effects and just include watershed delivery
- WWTP have higher delivery because they tend to be on large rivers in the lower sections of basins

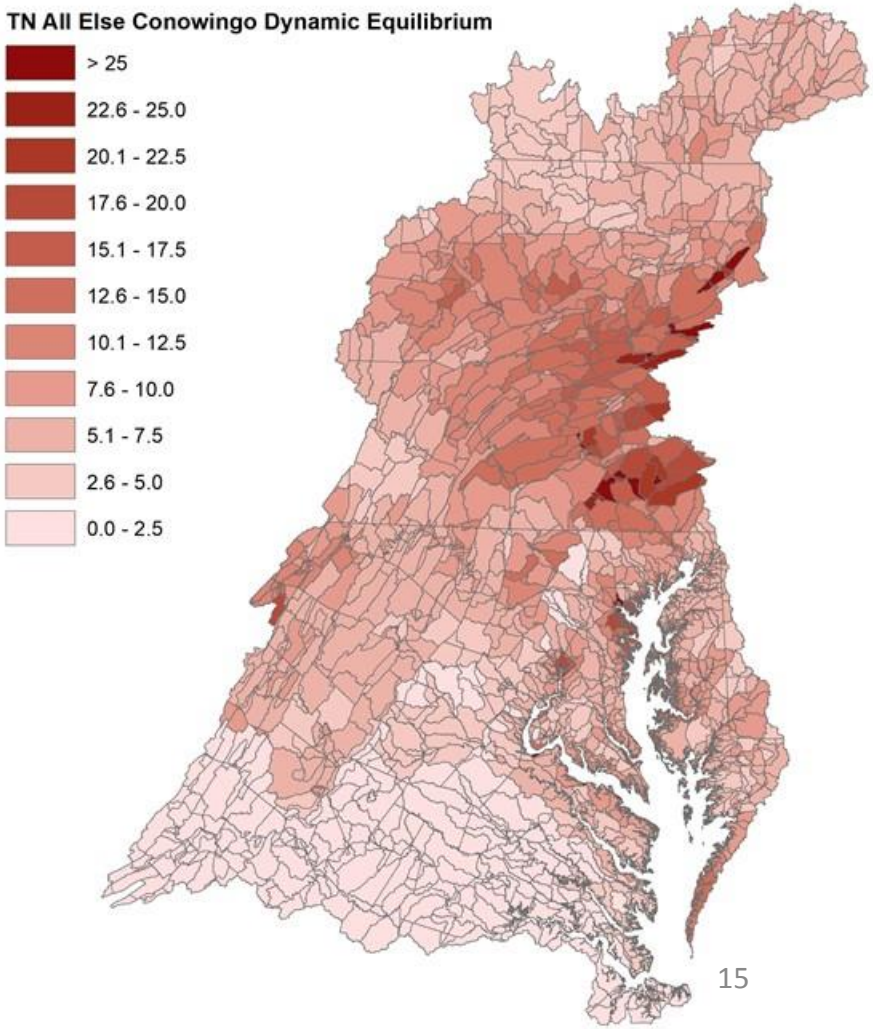


Nitrogen Relative Effectiveness

P5

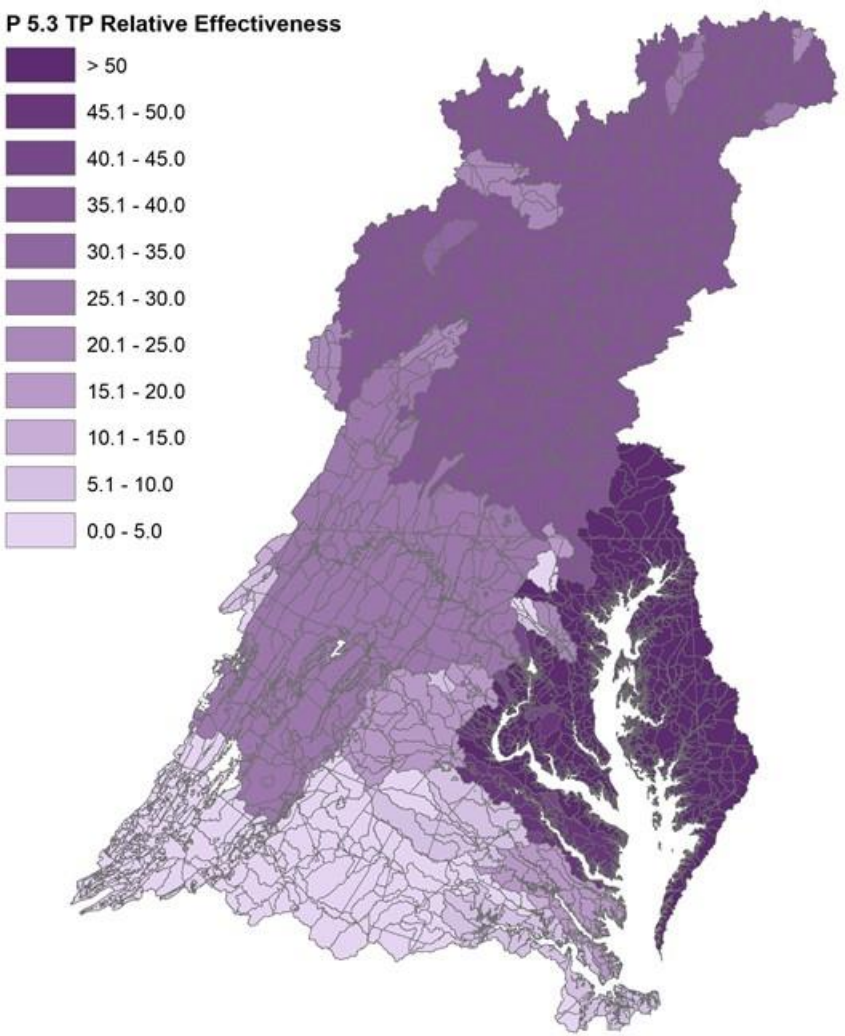


P6

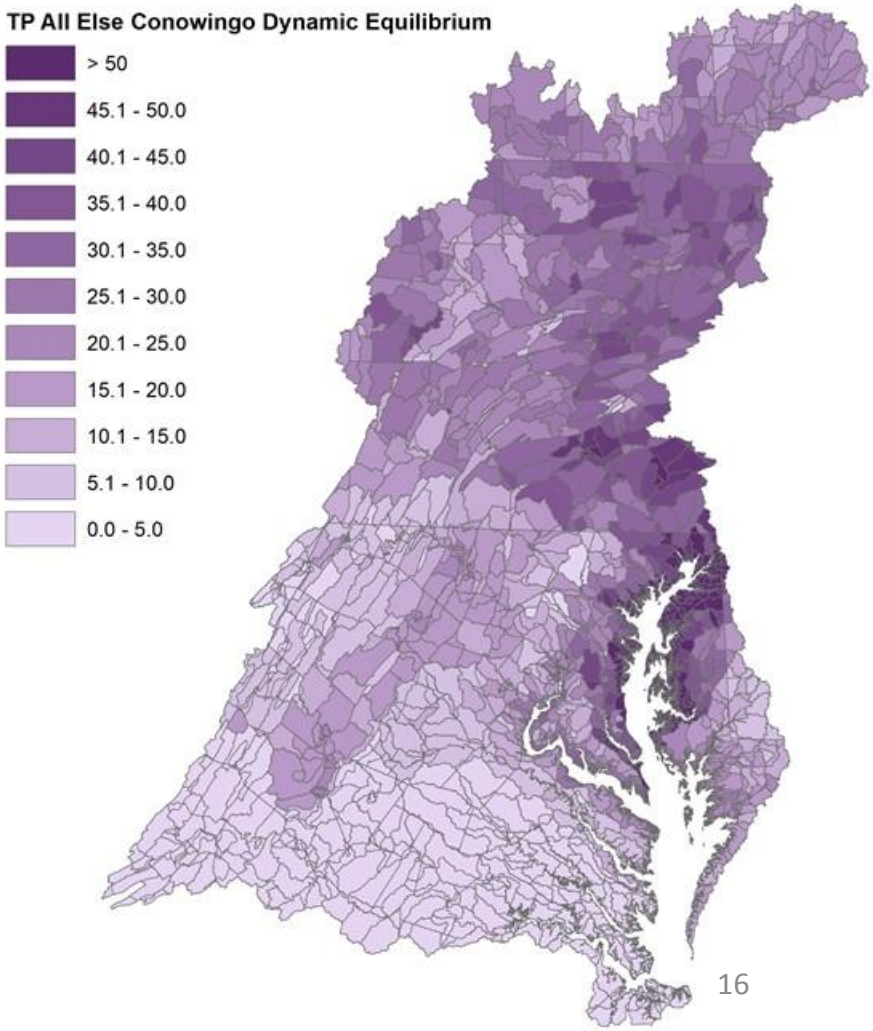


Phosphorus Relative Effectiveness

P5



P6



Schedule

- Geo runs on WQSTM version 223 have started
- Will be complete by 10/23/17
- Watershed model complete by 11/1
- New relative effectiveness in early November