

Point Discharge Nutrient Monitoring Results

Eutrophication Expert Panel Meeting
November 2nd & 3rd, 2016



Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Presented to an advisory committee of the DRBC on May 11, 2017.
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Background...

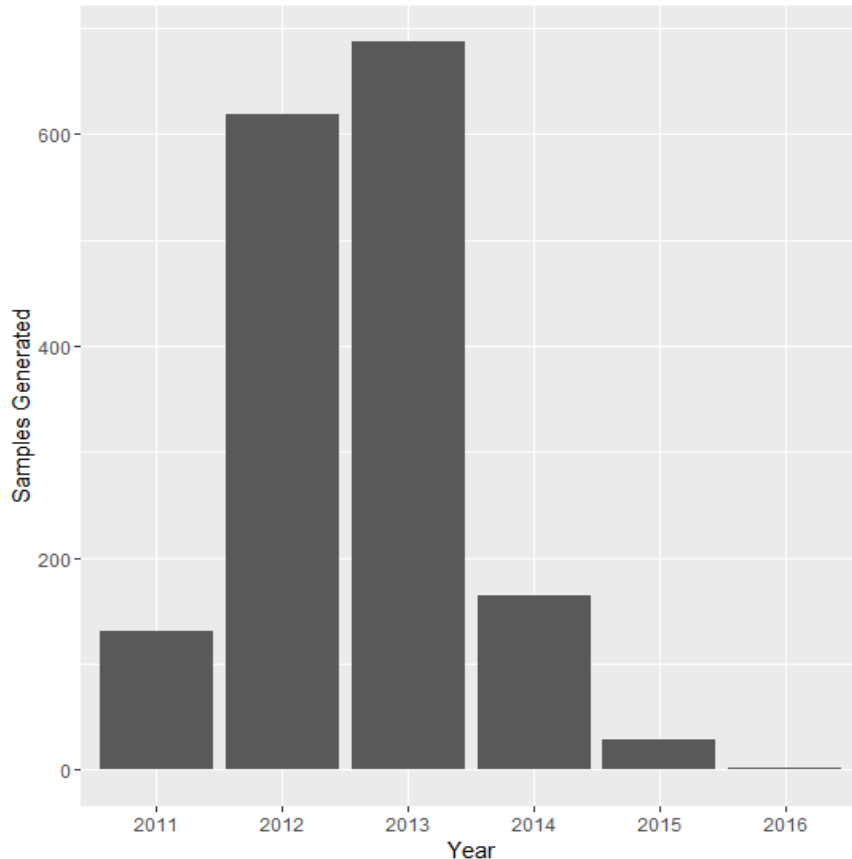
- * By resolution dated July 14, 2010, the Commission authorized and directed the Executive Director to require point source dischargers to the Delaware Estuary (Zones 2 – 6) to perform data collection and analysis of their discharges at their own cost and expense in order to characterize point source loadings of nutrients and related parameters to the Delaware Estuary for a period of up to 24 months.

Point Discharger nutrient monitoring

- * Facilities < 1 MGD: quarterly for 2 years (28 facilities)
- * Facilities > 1 MGD: monthly for 2 years (55 facilities) for:
 - * Phosphorus: Total Phosphorus, Soluble Reactive Phosphorus (SRP)
 - * Nitrogen: Ammonia, NO₃, NO₂, TKN, SKN
 - * BOD₅, CBOD₅, BOD₂₀
 - * Discharge flow (Q), Temperature, D.O., Conductivity, pH
 - * Ultimate BOD (UBOD) by the 21 discharges with largest BOD loads twice (1 summer, 1 winter)

DRBC Effluent Nutrient Data Set

Sample Sets per Year, Point Discharge Nutrient Data

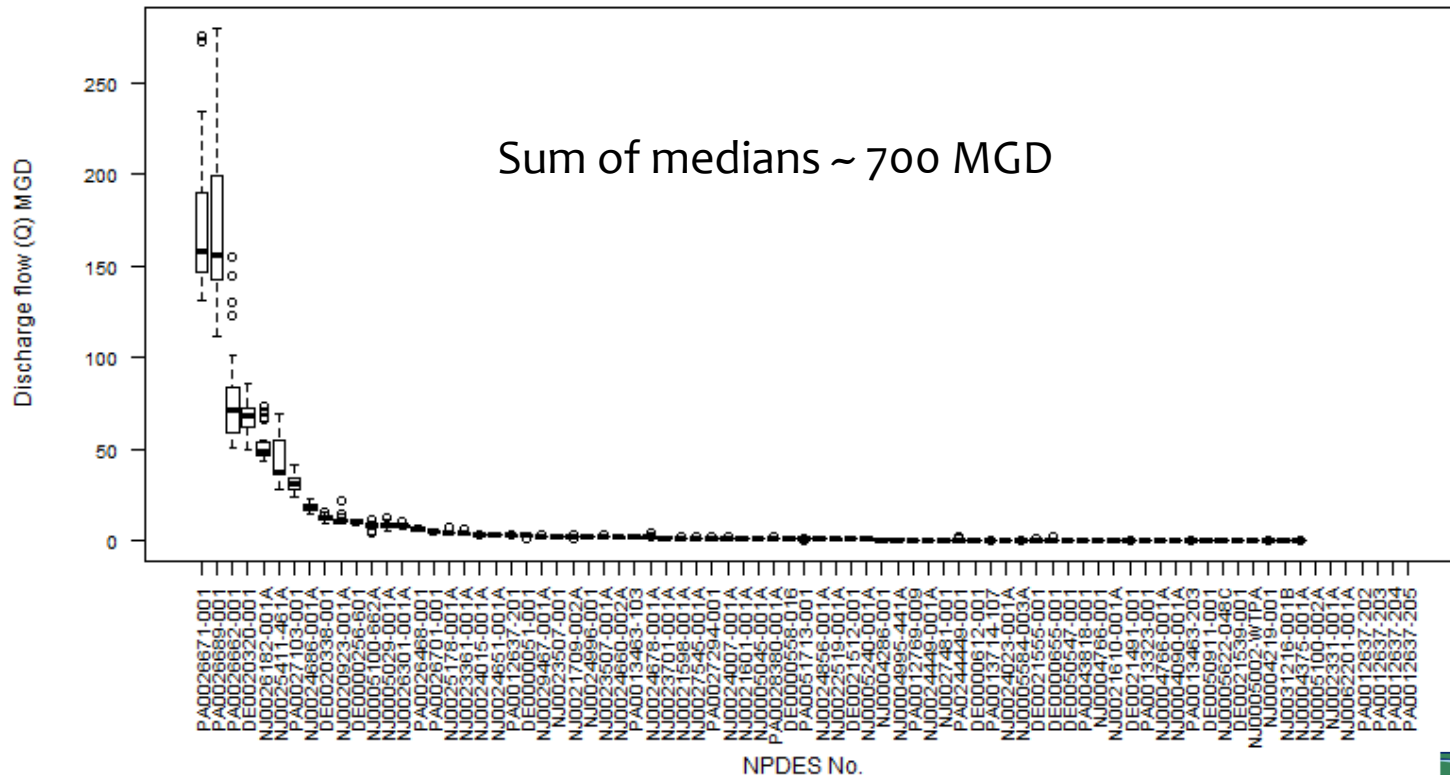


- * 71 facilities discharging to estuary
- * Also looked at AEMR and ICIS data sets
- * this data set is more complete

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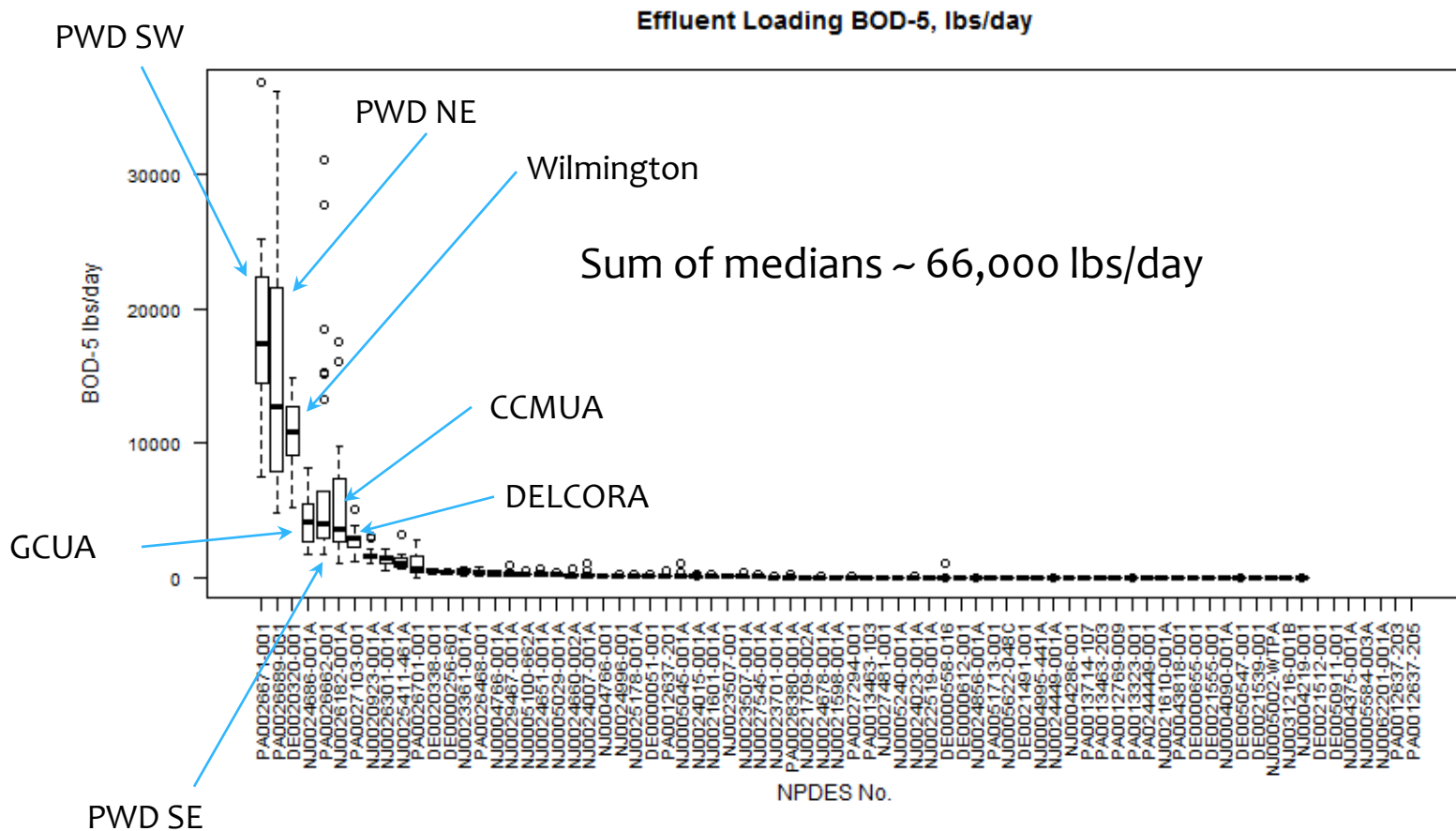
Discharge flow MGD

Effluent Discharge flow (Q) MGD



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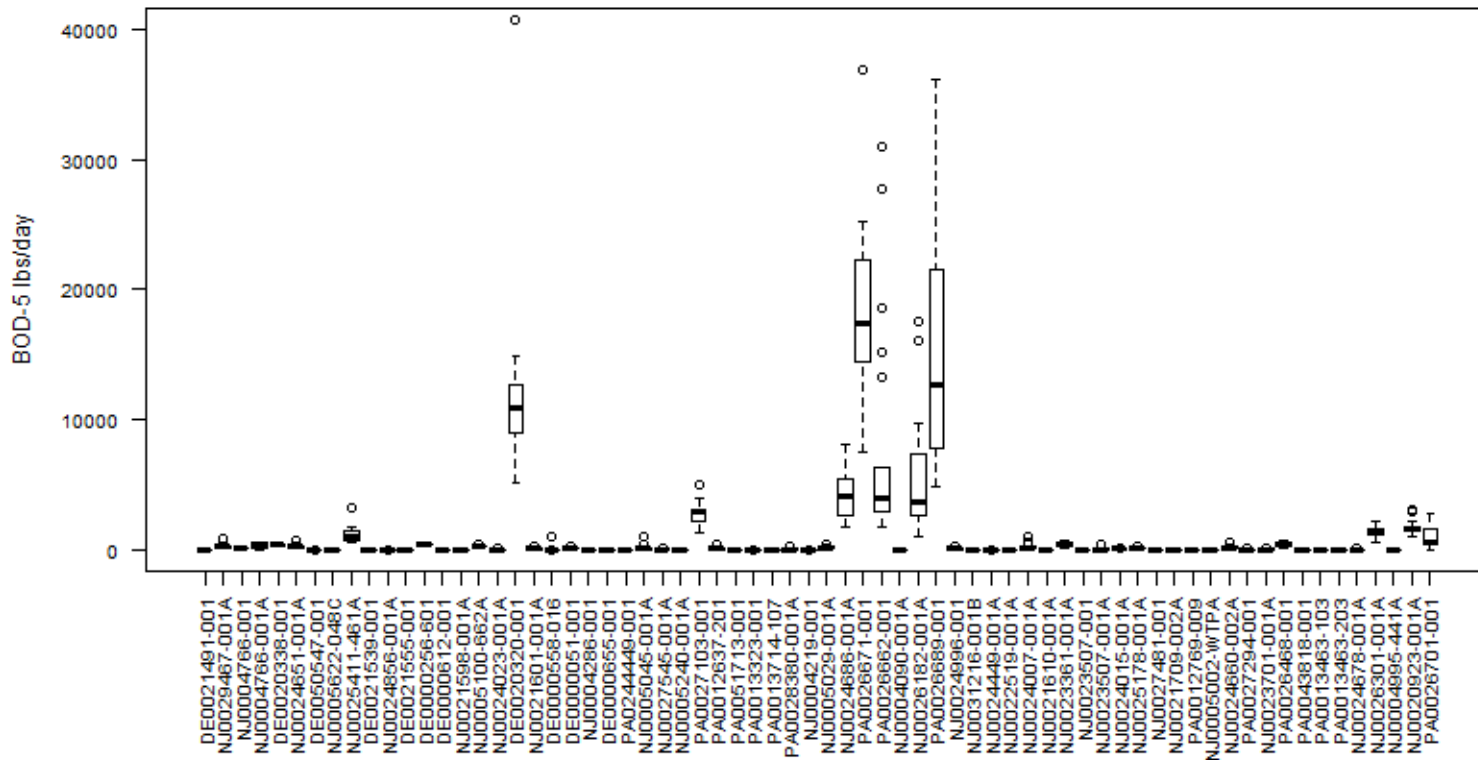
BOD5 Loadings (lbs/day)



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BOD5 Loadings sorted by River Mile

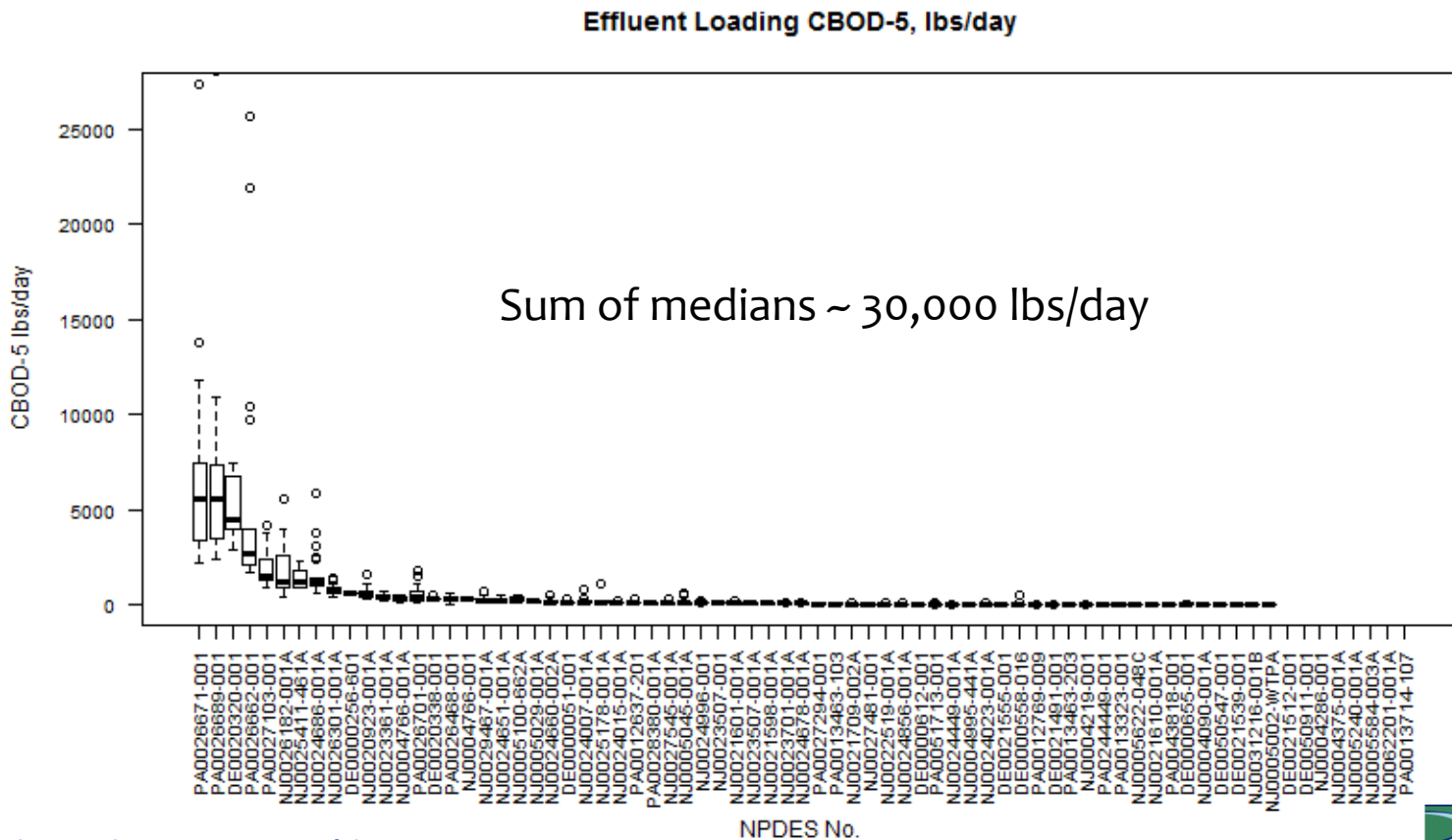
Effluent Loading BOD-5 , lbs/day, by River Mile



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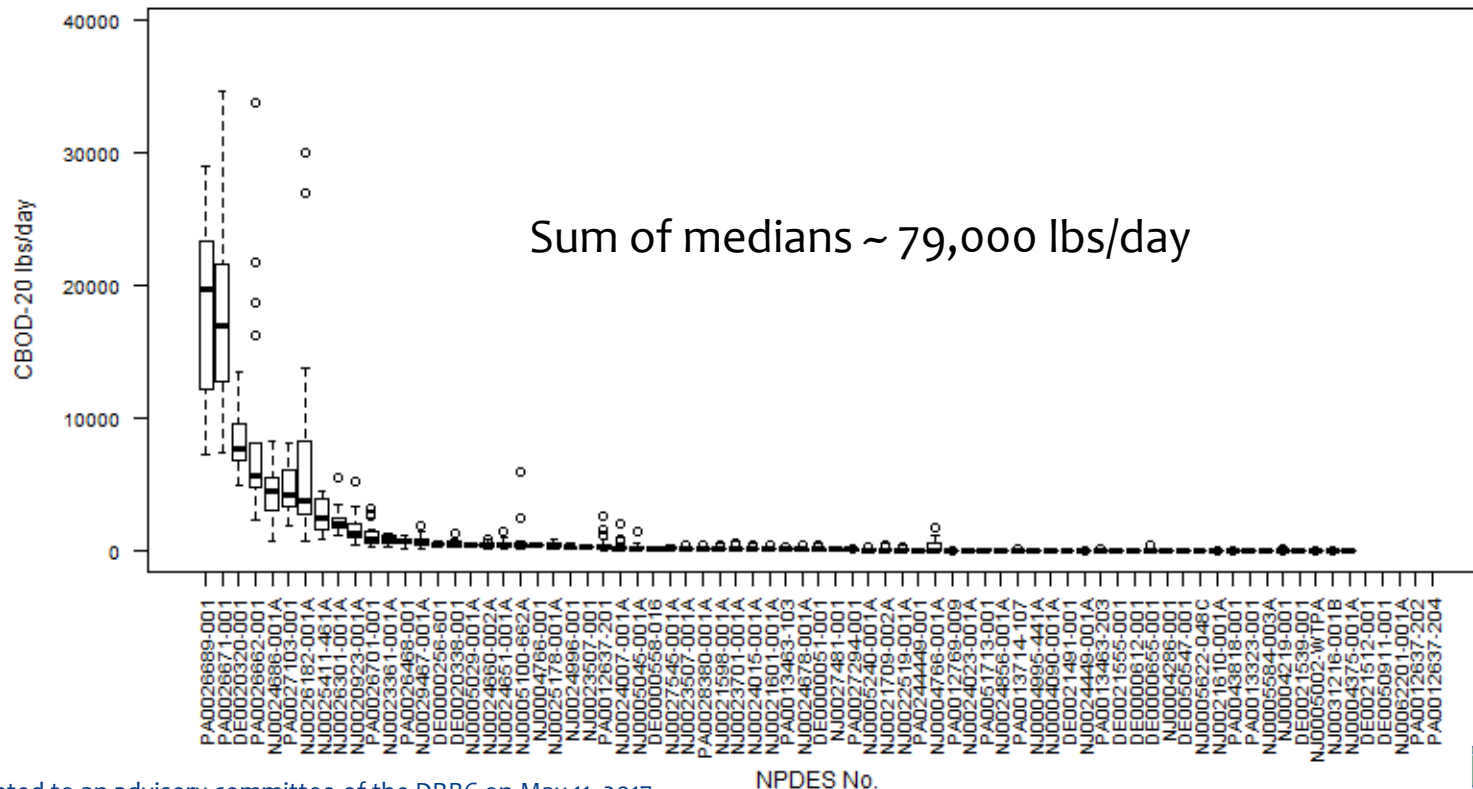
CBOD5 Loadings (lbs/day)



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CBOD20 Loadings (lbs/day)

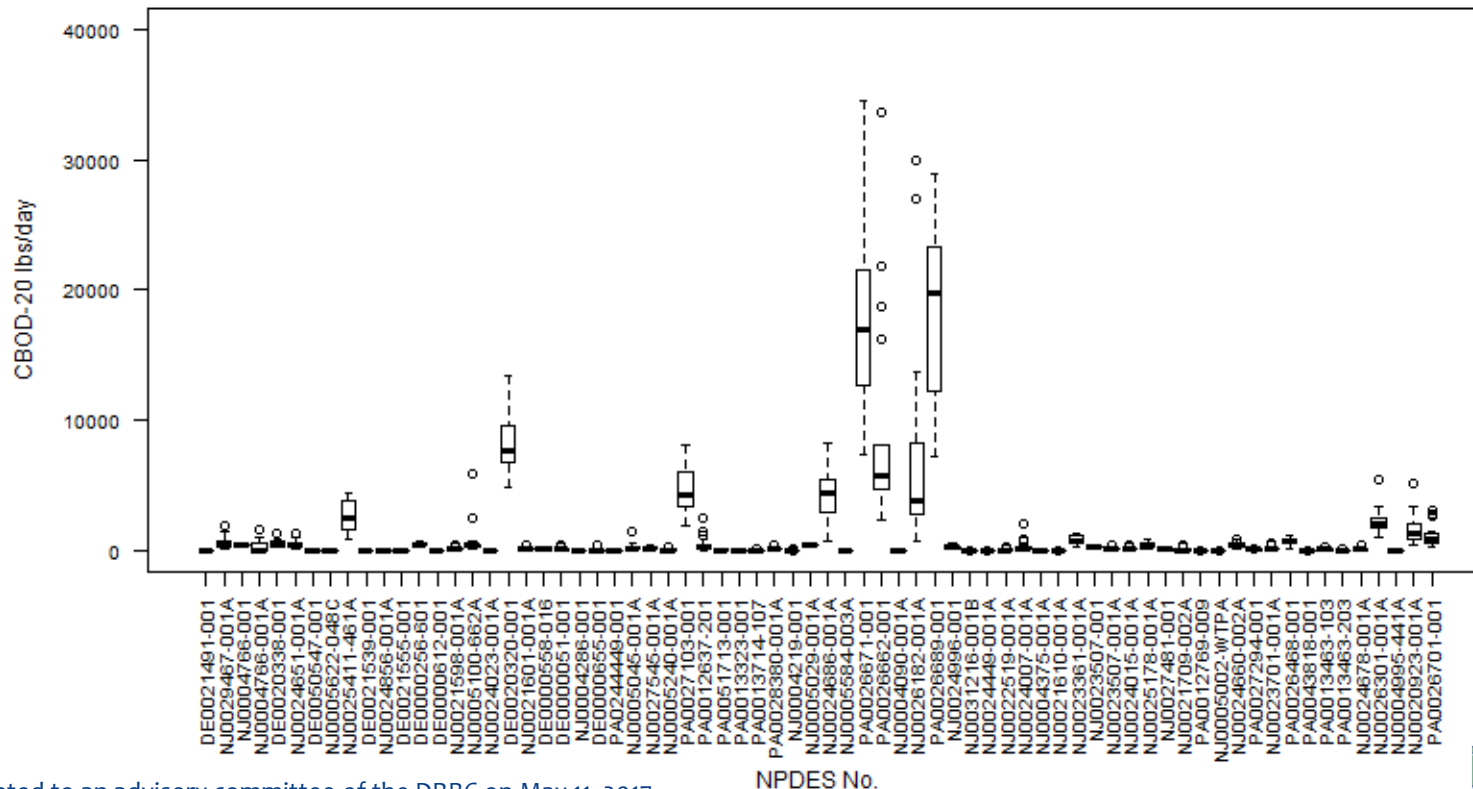
Effluent Loading CBOD-20, lbs/day



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CBOD₂₀ Loadings sorted by River Mile

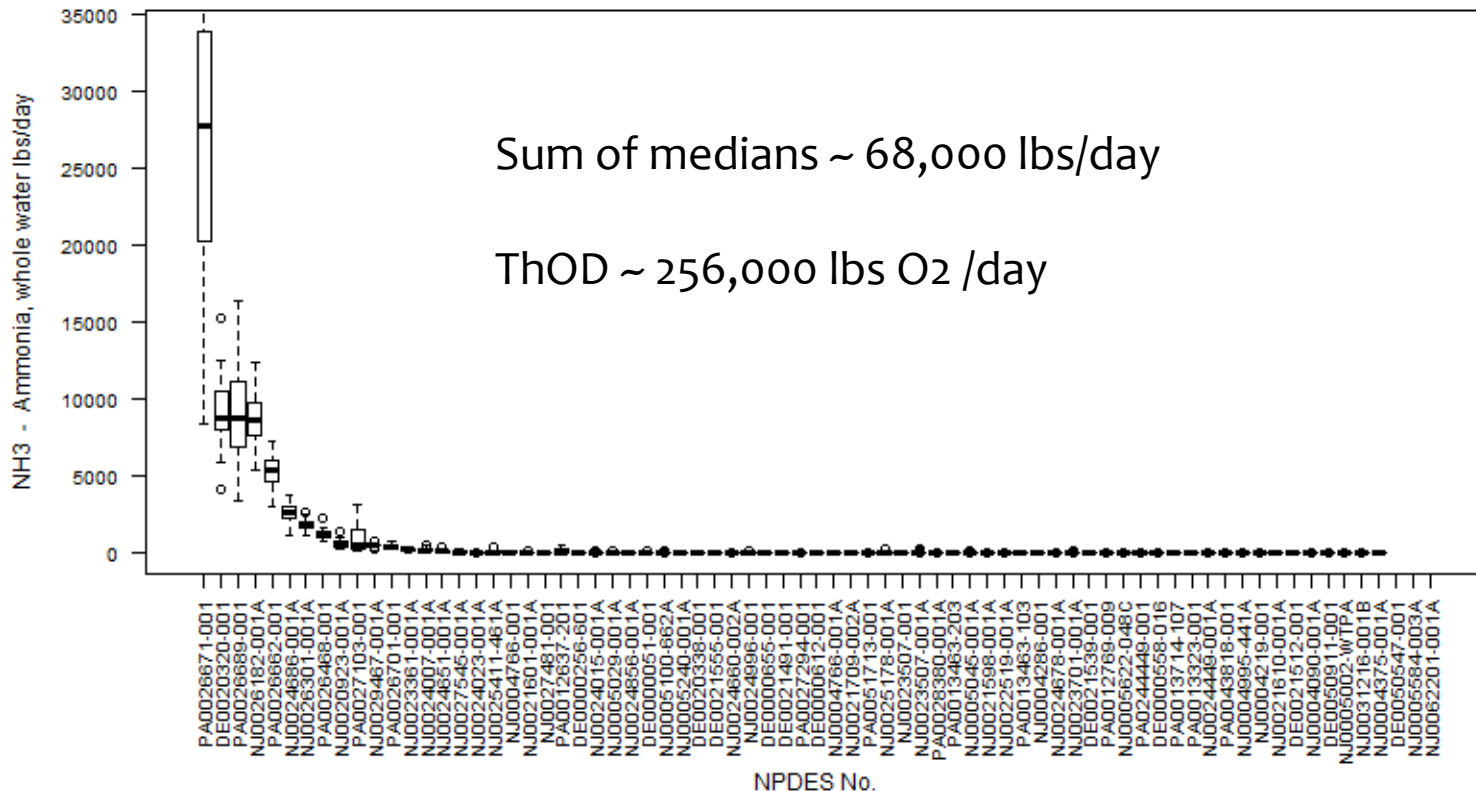
Effluent Loading CBOD-20 , lbs/day, by River Mile



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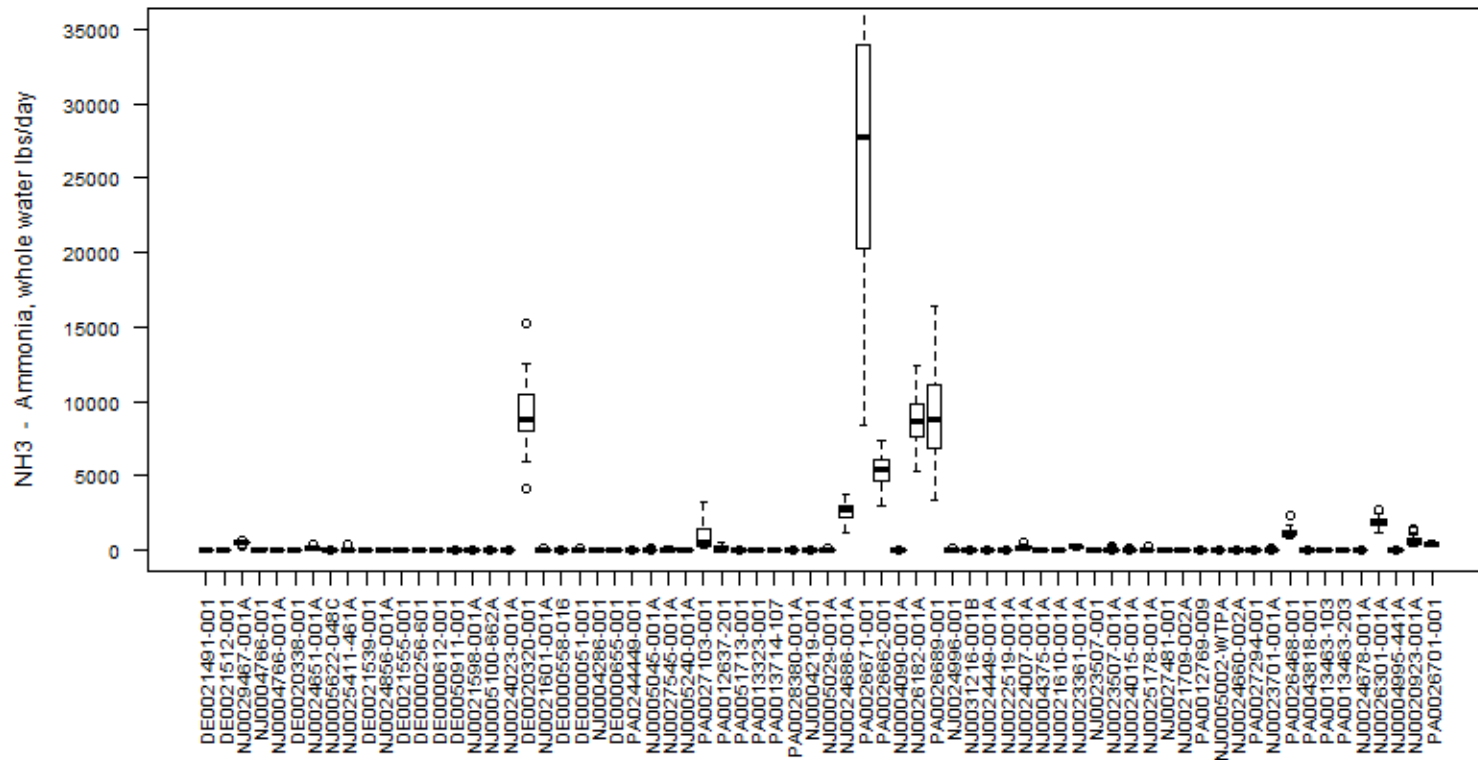
Ammonia Loadings (lbs/day)

Effluent Loading NH3 - Ammonia, whole water, lbs/day



Ammonia Loadings sorted by River Mile

Effluent Loading NH3 - Ammonia, whole water , lbs/day, by River Mile

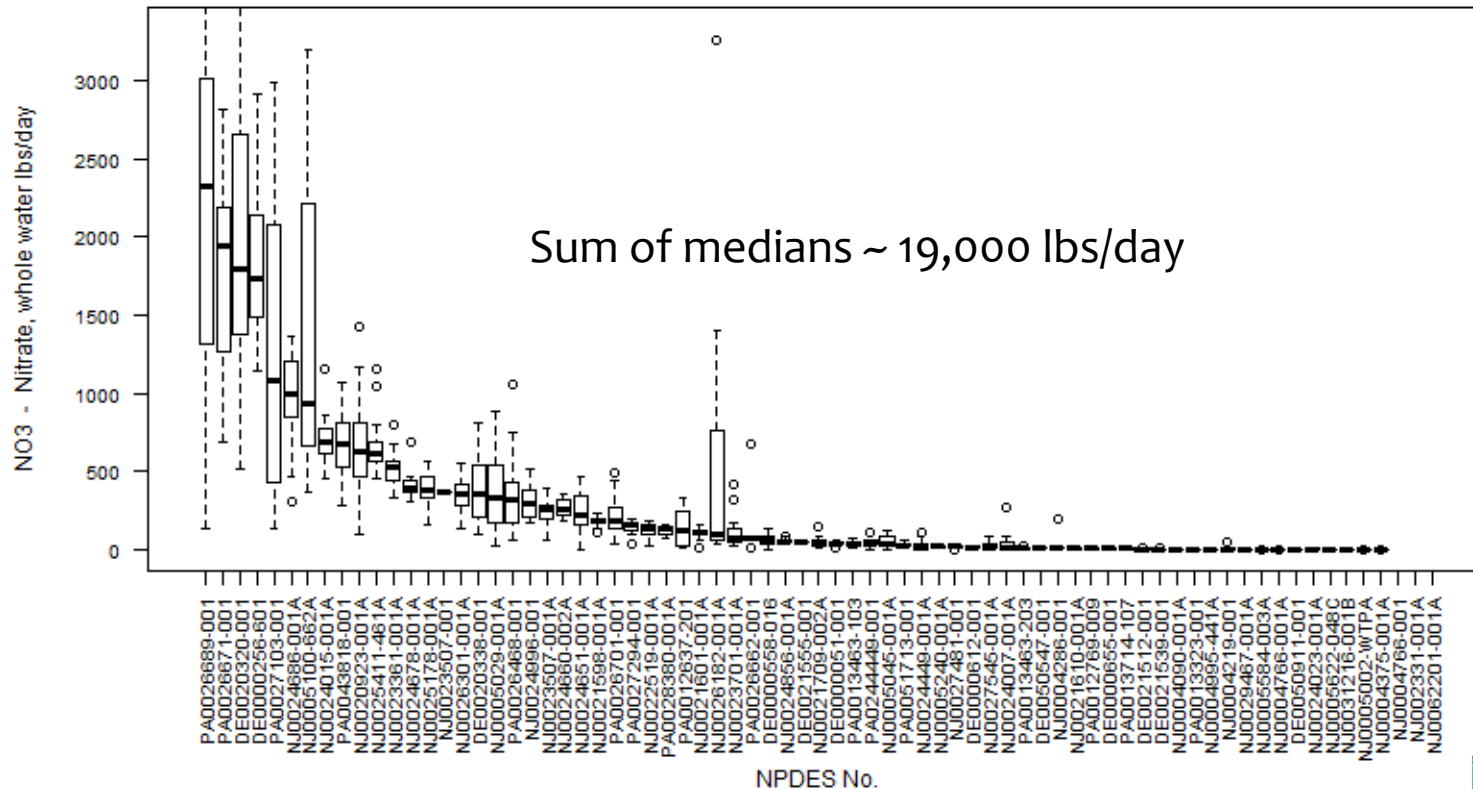


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Nitrate Loadings (lbs/day)

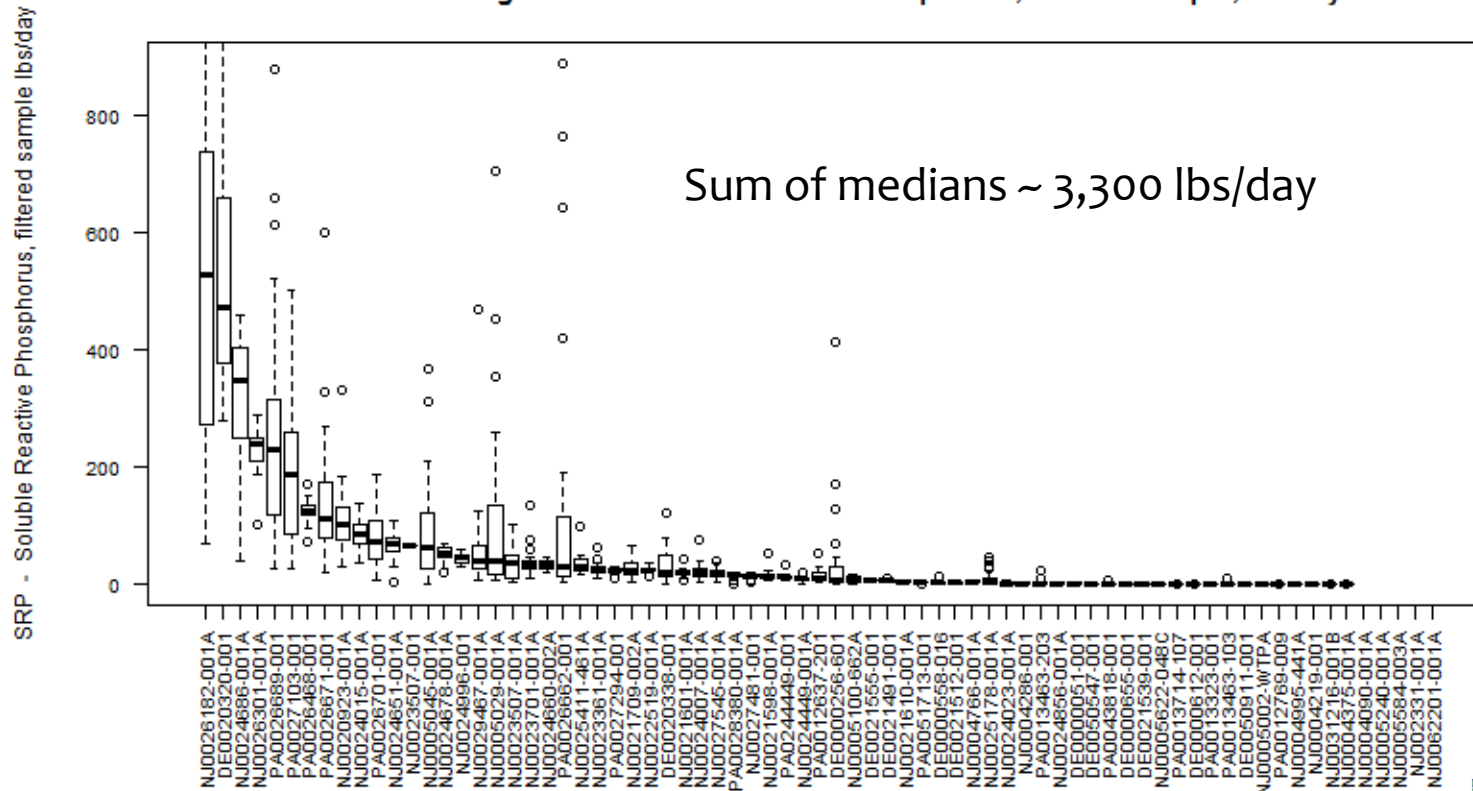
Effluent Loading NO3 - Nitrate, whole water, lbs/day



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Soluble Reactive Phosphorus Loadings (lbs/day)

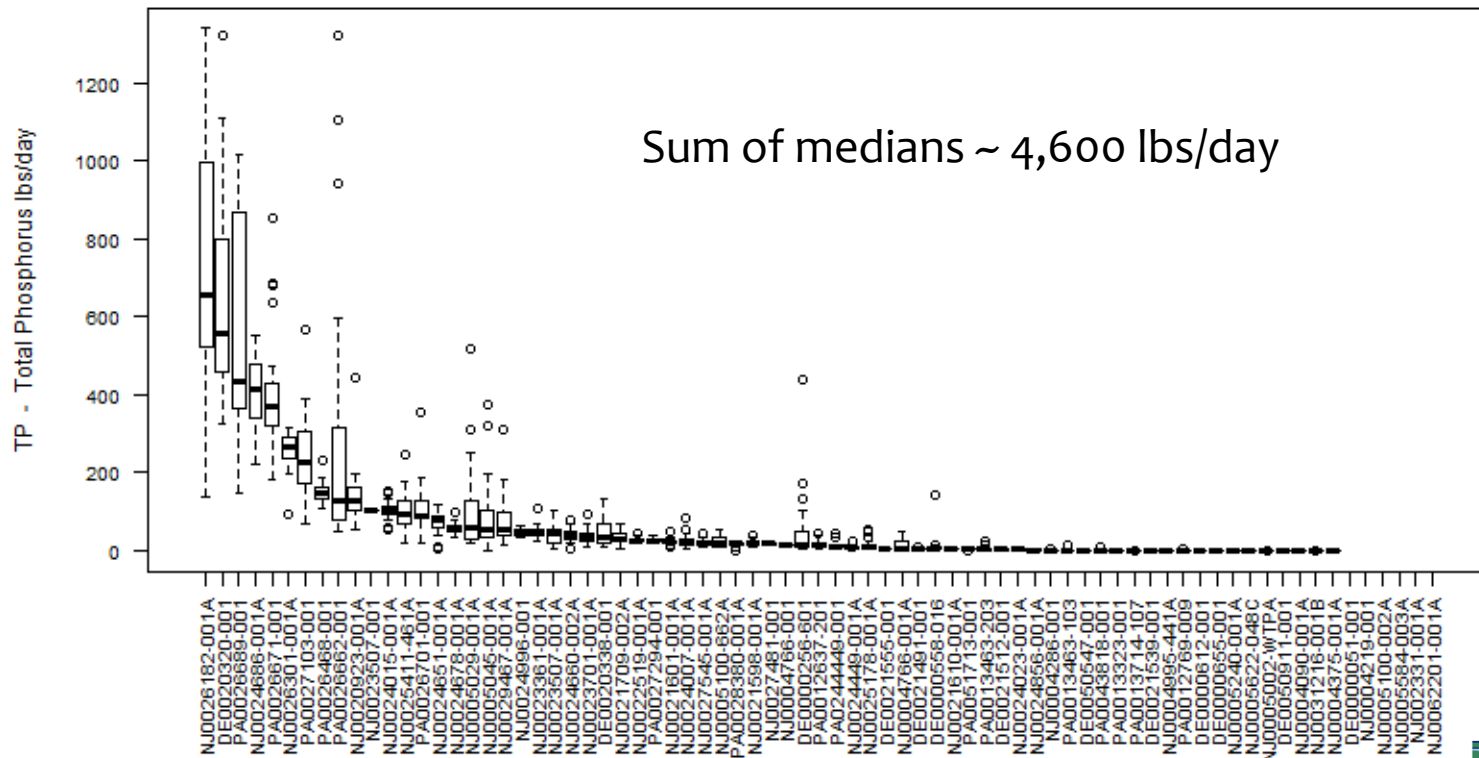
Effluent Loading SRP - Soluble Reactive Phosphorus, filtered sample, lbs/day



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Total Phosphorus Loadings (lbs/day)

Effluent Loading TP - Total Phosphorus, lbs/day

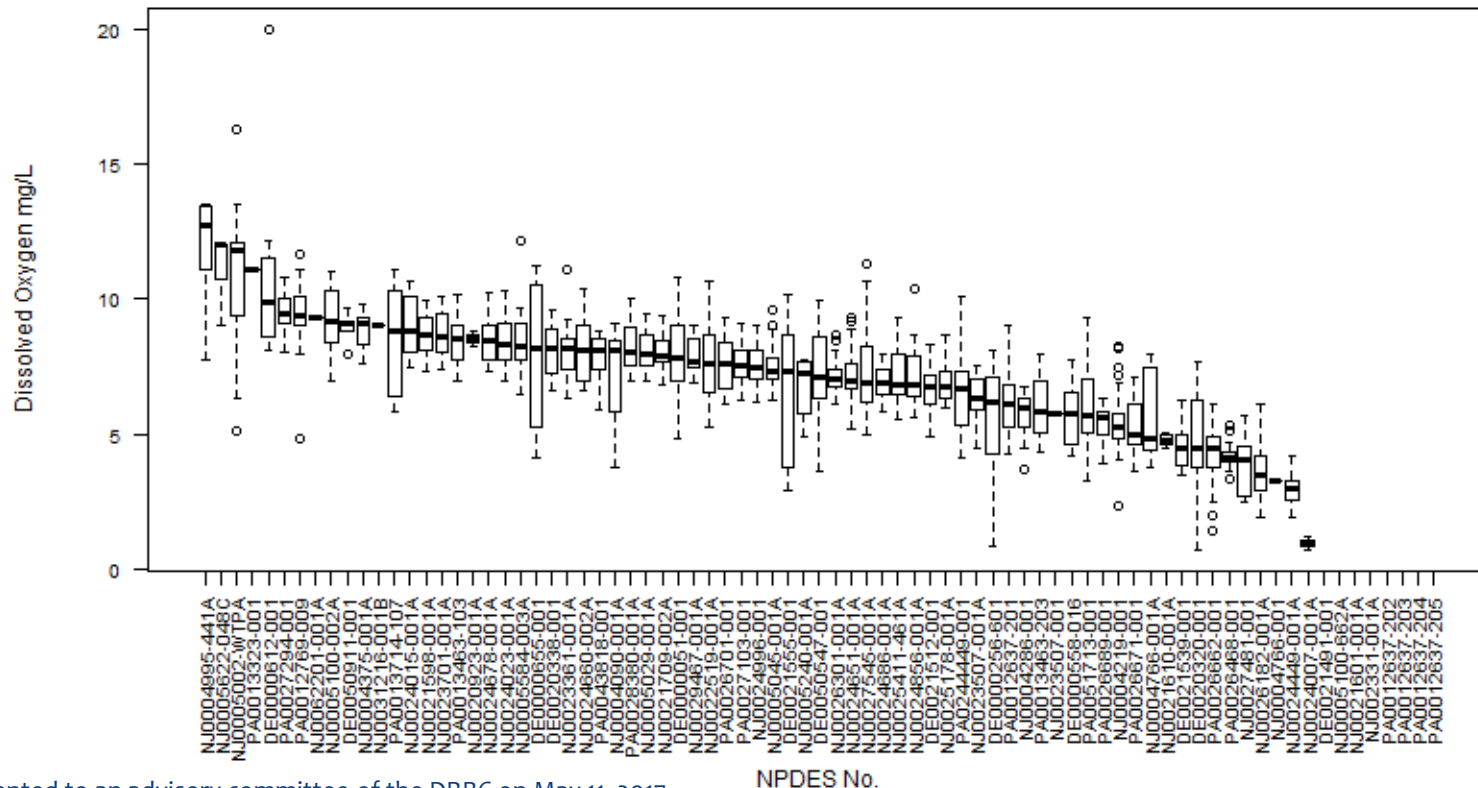


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Dissolved Oxygen Concentration (mg/L)

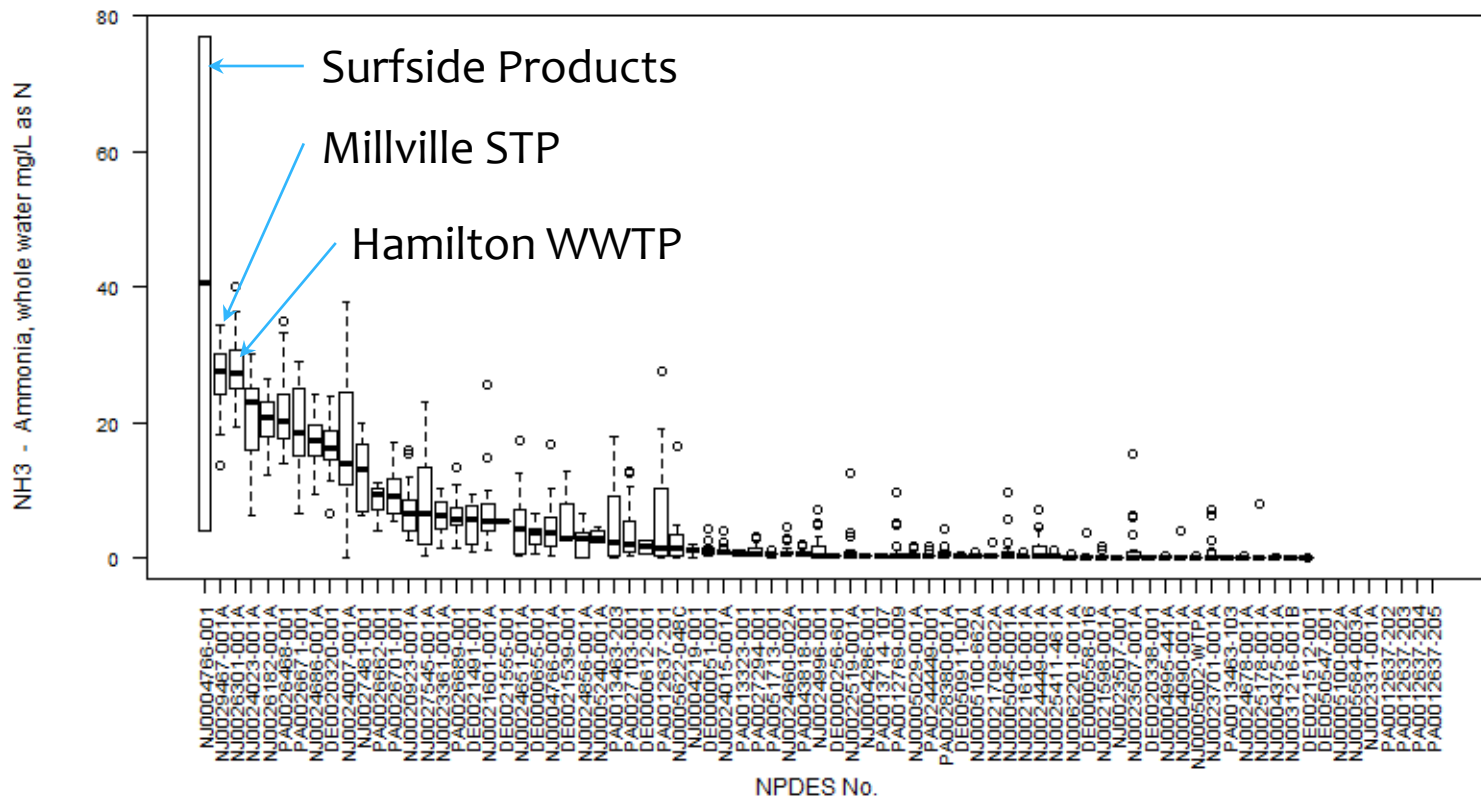
Effluent Dissolved Oxygen mg/L



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Ammonia Concentration (mg/L)

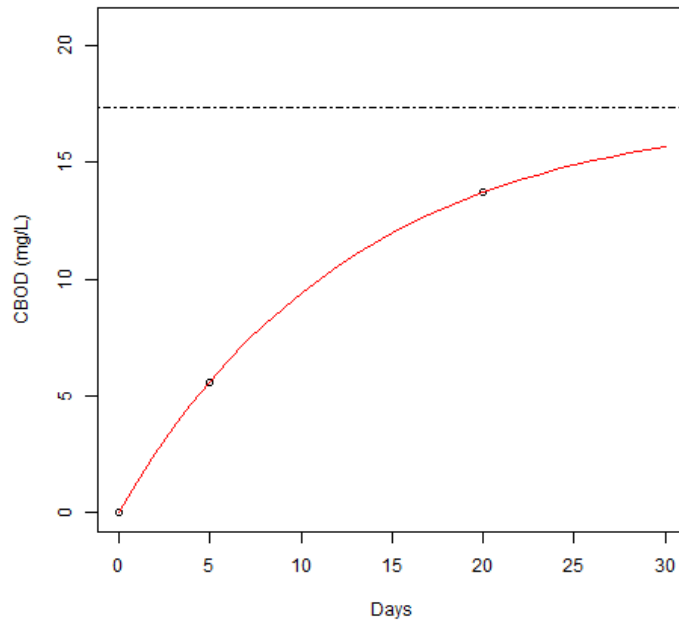
Effluent NH3 - Ammonia, whole water mg/L as N



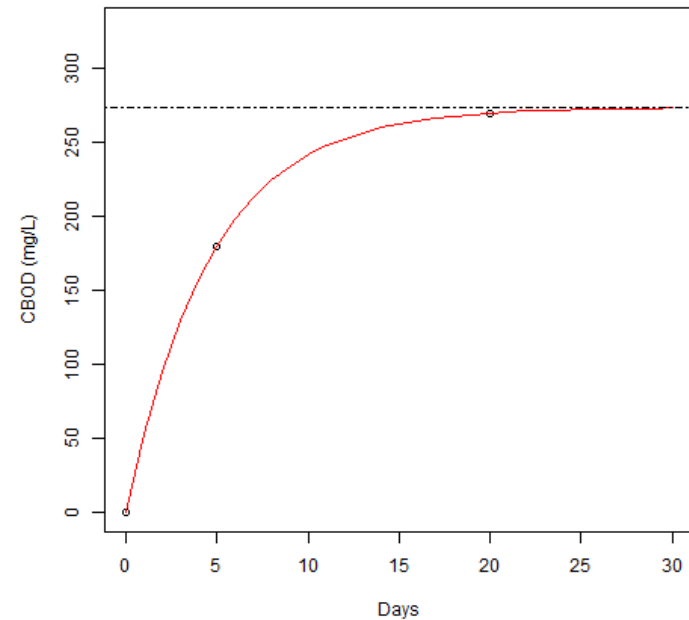
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For all available CBOD₅ : CBOD₂₀ pairs, estimated L and k

DE0000051-001 2012-06-27
L = 17.349 : k = 0.078



NJ0004766-001 2014-10-15
L = 273.768 : k = 0.214



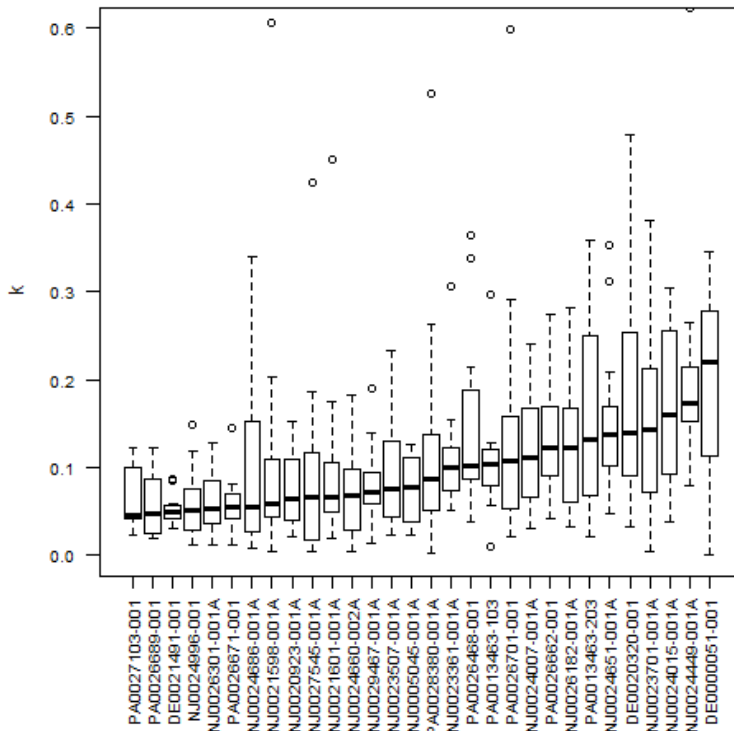
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Caveats

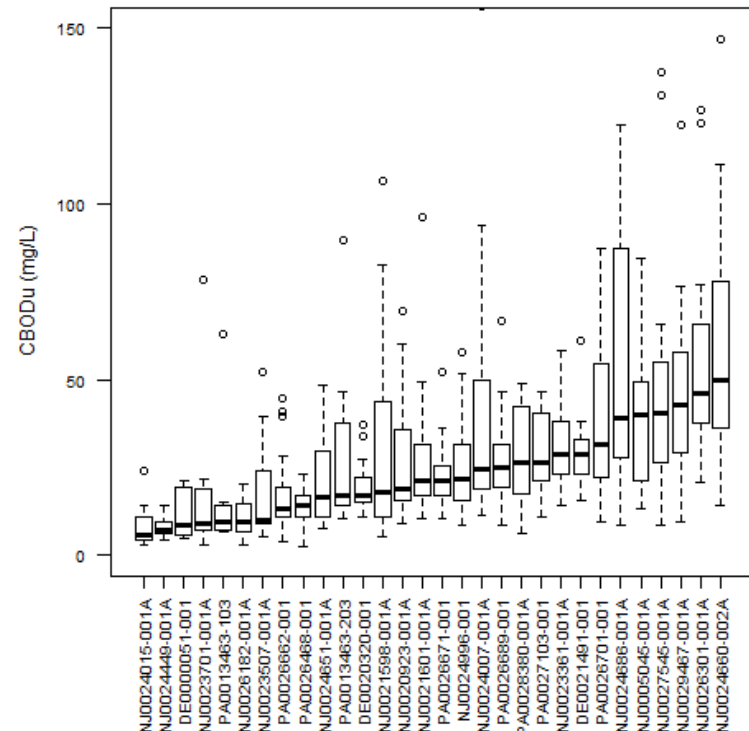
- * Values (k and L) only computable where paired CBOD₅ and CBOD₂₀ are both quantifiable;
- * Of 1689 pairs, only 612 pairs (36%) quantified both CBOD₅ and CBOD₂₀;
- * Better performing treatment (CBOD₅ ~ ND) probably under represented.

Distributions of estimated k and L from paired observations of CBOD₅ and CBOD₂₀

Distribution of estimated CBOD k values by Discharger

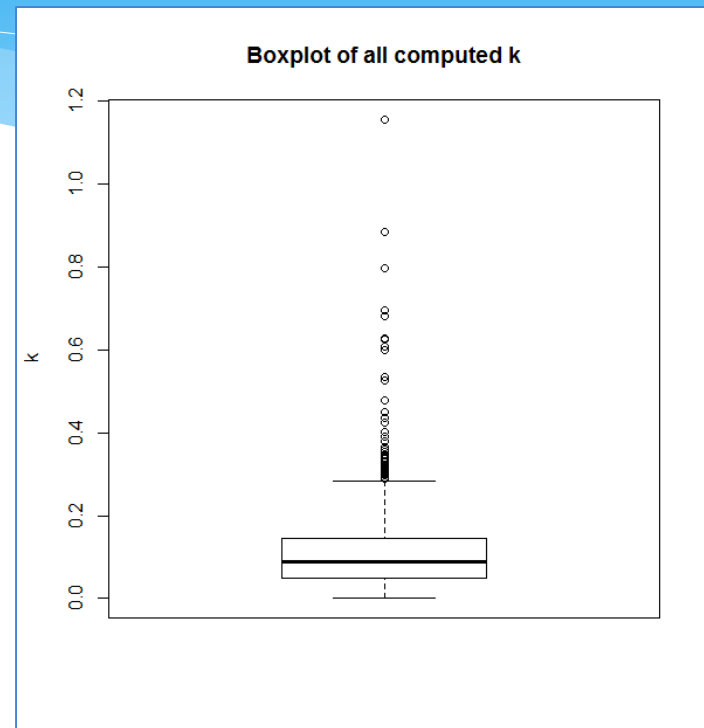
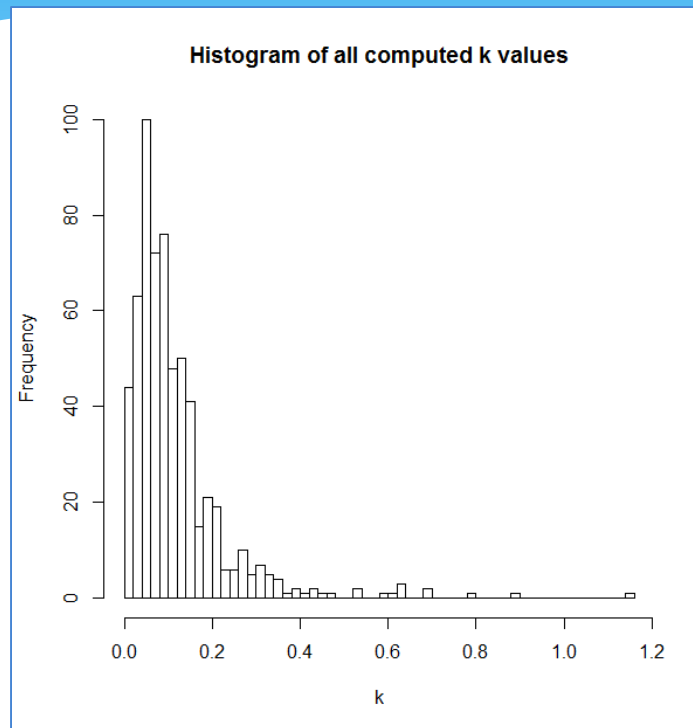


Distribution of estimated CBODu (L) values by Discharger



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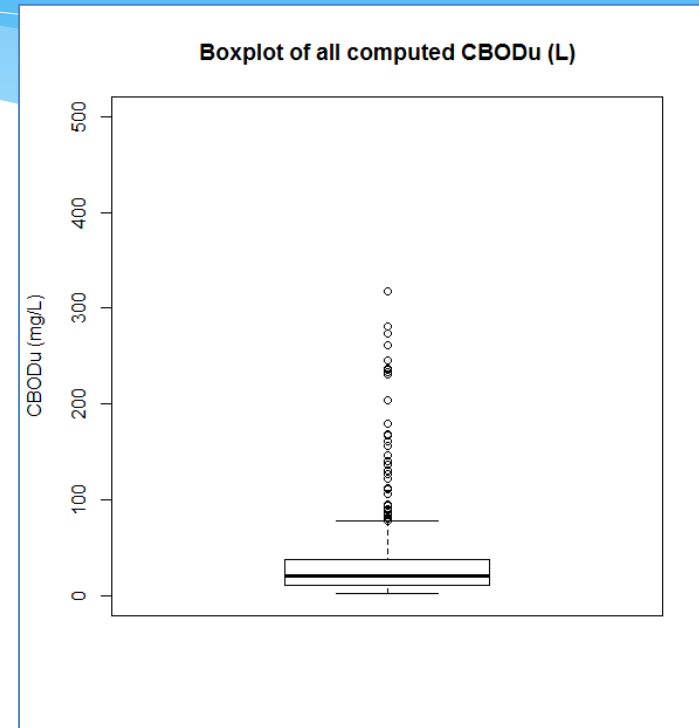
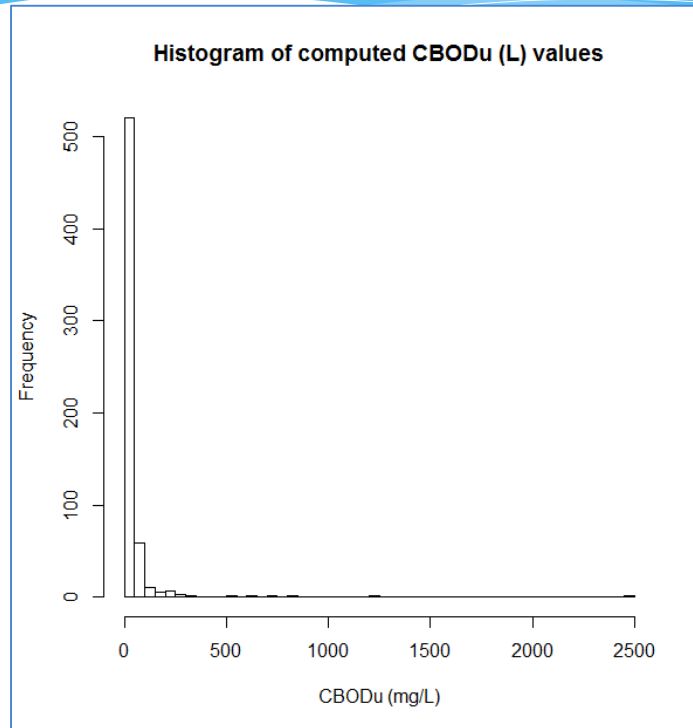
Distribution of all computed k values



Quantile	Computed k
25th	0.05
50th	0.087
75th	0.144

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Distribution of all computed CBODu (L) values

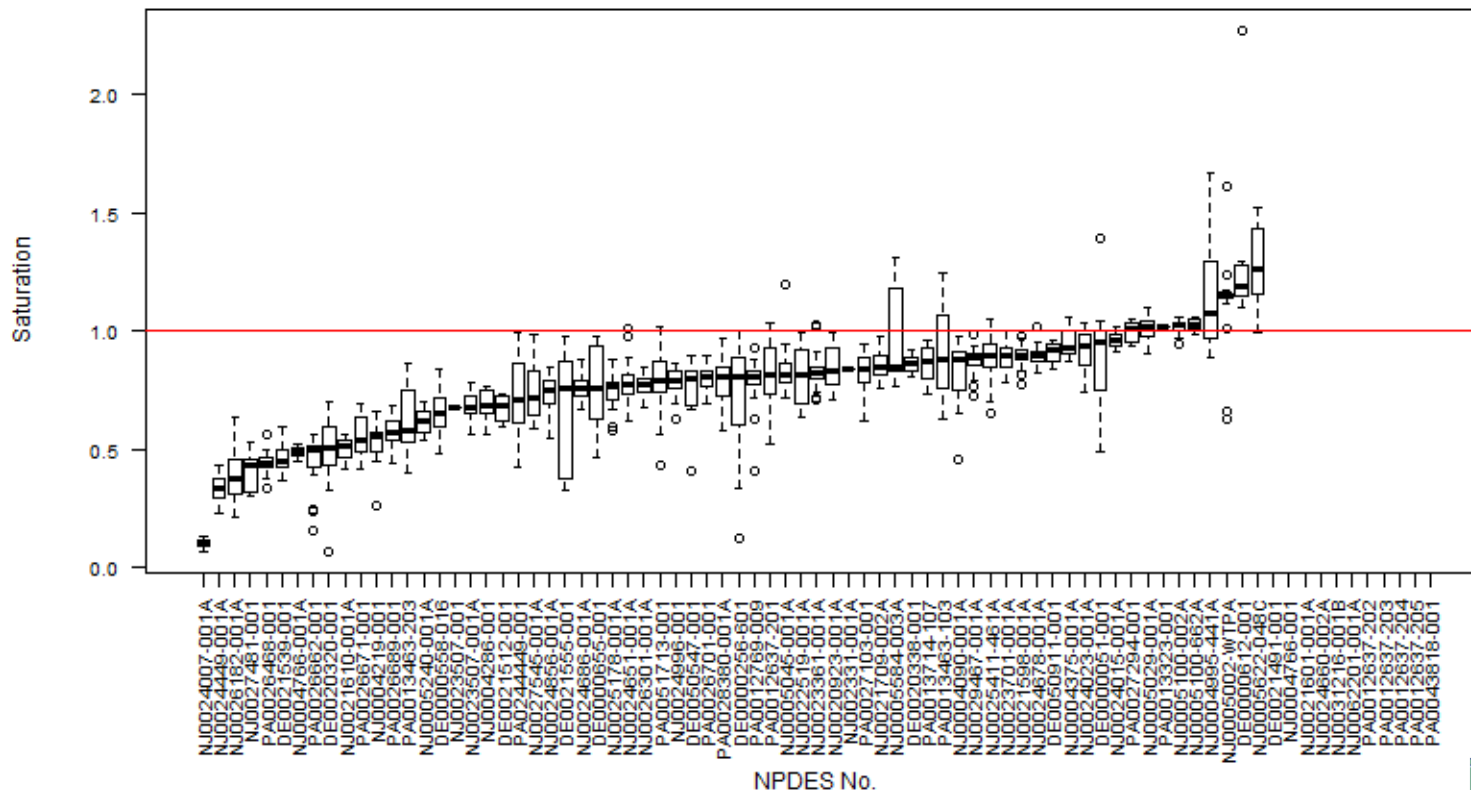


Quantile	Computed CBODu
25th	11.78
50th	21.22
75th	38.34

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Percent of Dissolved Oxygen Saturation

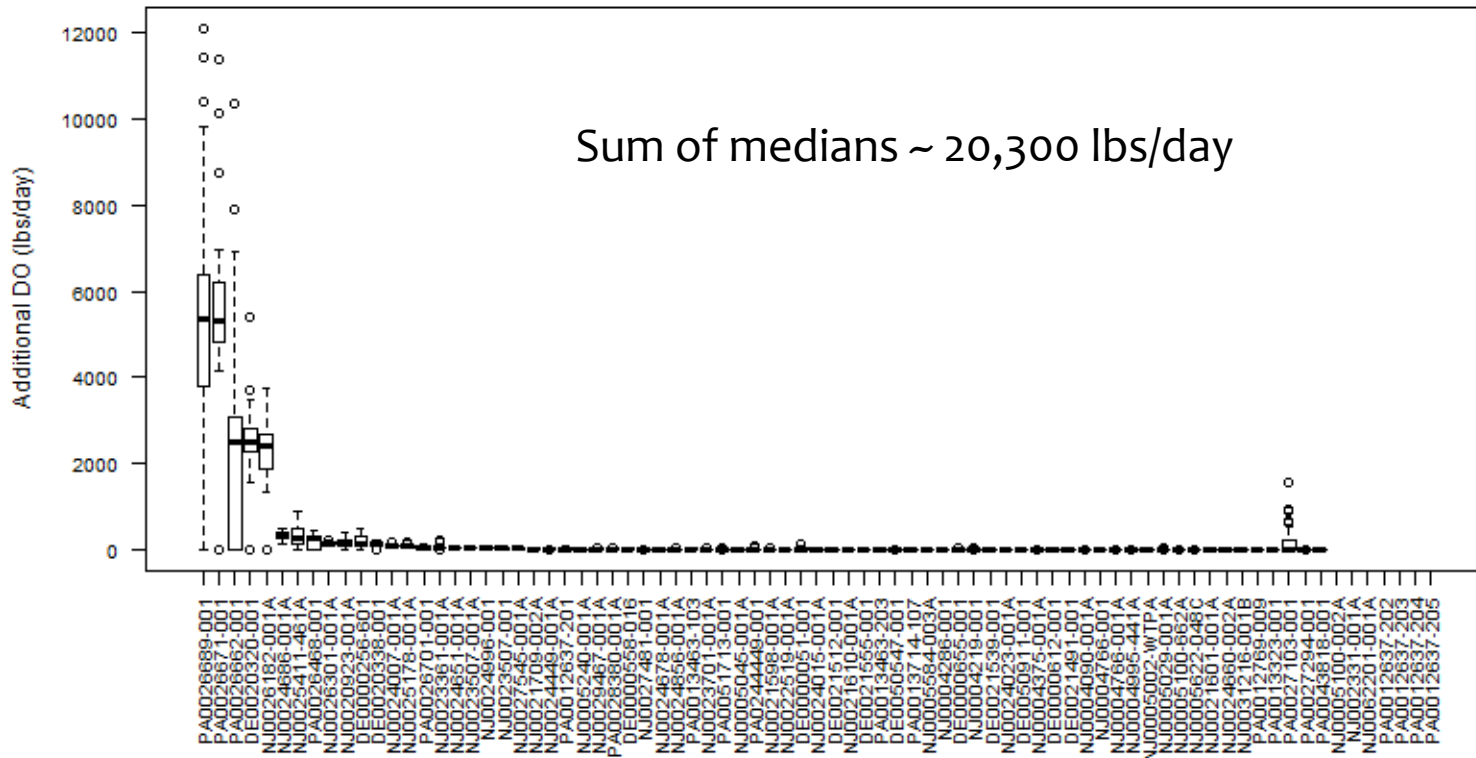
Percent of DO Saturation by Discharger



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DO Added if all at Saturation

Additional DO Added (lbs/day) if all discharging at DO Saturation



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Next Steps / Questions

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- * Expect to repeat monitoring during 2018.

Questions

- * Other evaluations / analyses?
- * Monitoring frequency during 2018?
- * Other parameters?