MESAW (Grimvall&Stålnacke 1996)

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MESAW

$$L_i = \sum_{j=1}^{n}(1 - R_{i,j})L_j + (1 - R)S_i + (1 - R)P_i + (1 - R)D_i + e_i$$

$$S_i = \beta_1 a_{1i} + \beta_2 a_{2i} + \beta_3 a_{3i}$$

$$R = 1 - \frac{1}{1 + (PAR \cdot X)}$$

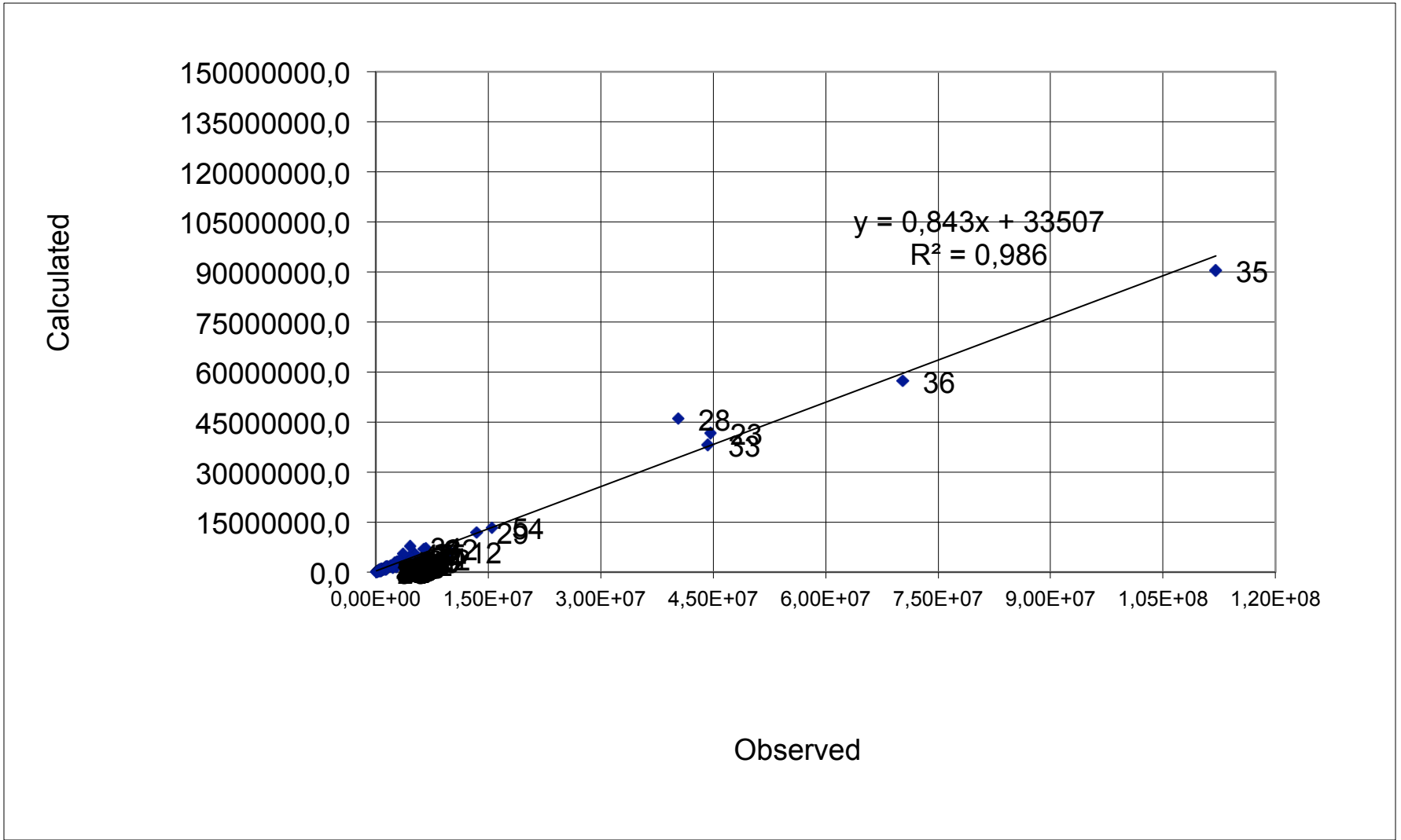
= q*c1= q*c2+PAR V c2; equilibrium assumption

- R1= lake area / drainage area
- R2 = drainage area ^{0,6}

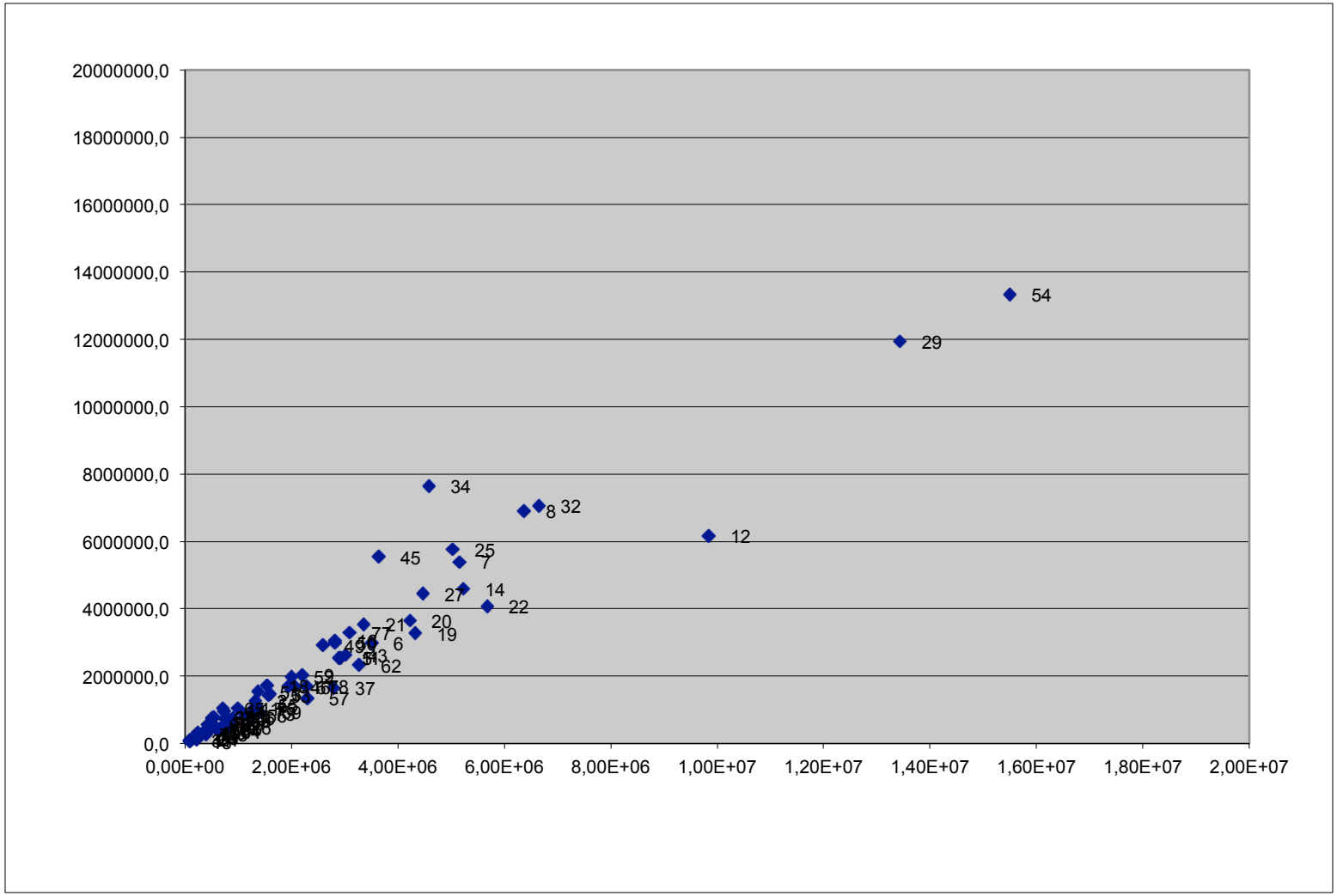
NITROGEN

- 81 river basins (out of 117) due to lack of river loaddata for all basins
- Data from SU: River load data (annual long-term average), land use (cultivated, wetland, other, surface water), point sources (small and big WWTPs, industry), N-deposition

Good fit but model underestimates



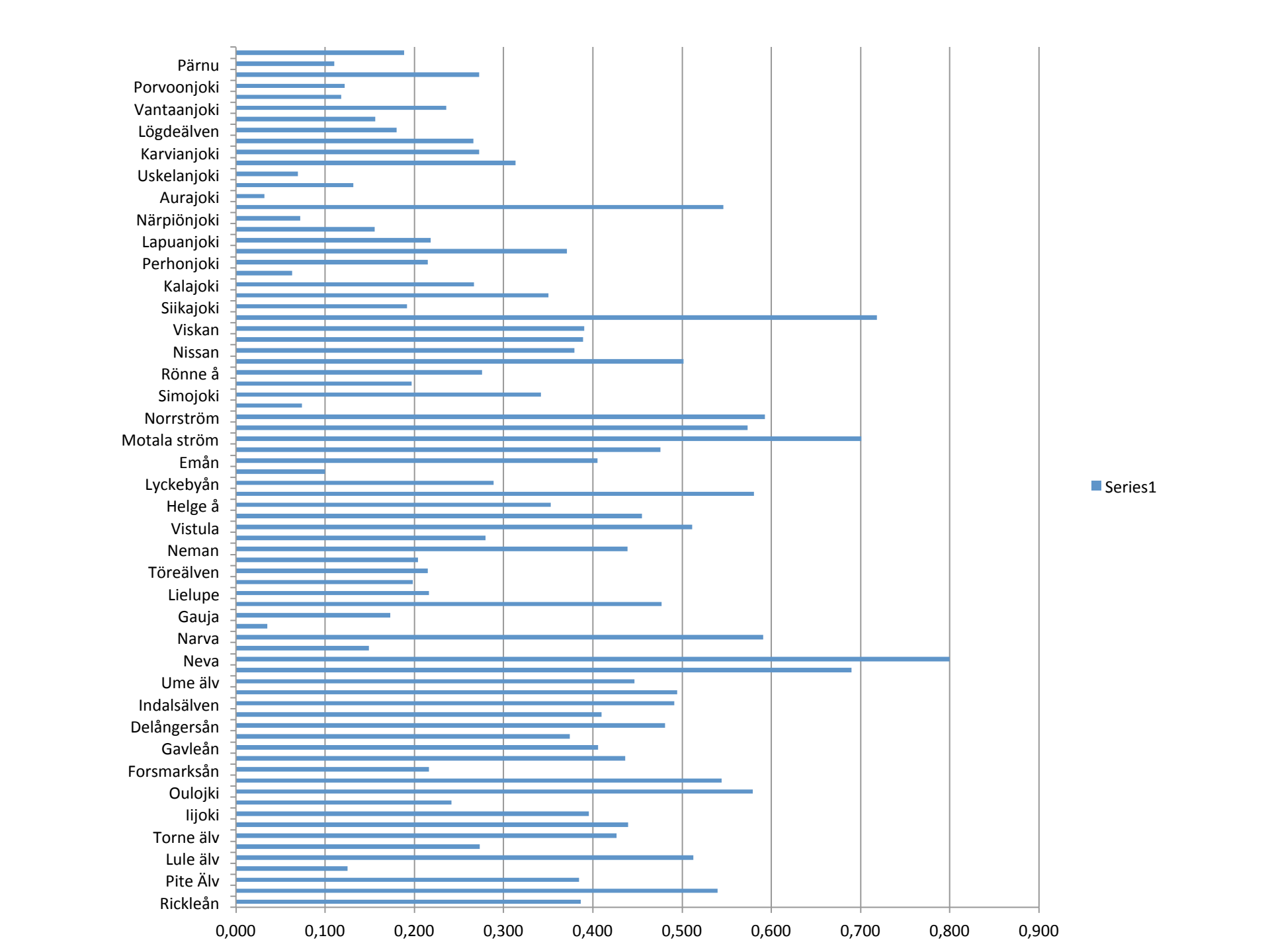
Largest rivers removed



Source emission and retention parameter estimates

Landcover class	Arable	Wetland	other
Initial export coefficients for landcover classes	40	10	
Estimated coefficients	1242	314,6	203,8755
Standard errors	181,6	625,4	80,75268
t-ratio	6,84	0,503	2,52469

Esitmated coefficients	8,85E+00	5,73E-04
Standard error	4,14E+00	1,93E-04
t-ratio	2,14	2,98
Fixed coefficients		
Retention covariate	Lake area/ Drainage area	Drainage area^0,6


Pärnu
Porvoonjoki
Vantaanjoki
Lögdeälven
Karvianjoki
Uskelanjoki
Aurajoki
Närpiönjoki
Lapuanjoki
Perhonjoki
Kalajoki
Siikajoki
Viskan
Nissan
Rönne å
Simojoki
Norrström
Motala ström
Emån
Lyckebyån
Helge å
Vistula
Neman
Töreälven
Lielupe
Gauja
Narva
Neva
Ume älv
Indalsälven
Delångersån
Gavleån
Forsmarksån
Oulojki
Iijoki
Torne älv
Lule älv
Pite Älv
Rickleån
0,000
0,100
0,200
0,300
0,400
0,500
0,600
0,700
0,800
0,900
Series1

Outliers

- 2-3 times lower model estimates in: Neva, Daugava, Helge å, Rønne å, Lagan, Viskan, Nissan, Ætran, Gøta ælv
- 2 times higer model estimates: Ähtävänjoki , Pregolia, Narva

Limitations

- Same diffuse emission parameters for all basins
- Uncertain point source data
- No Danish basins included
- Risk: Overestimated diffuse losses can be compensated by higher retention and vice versa