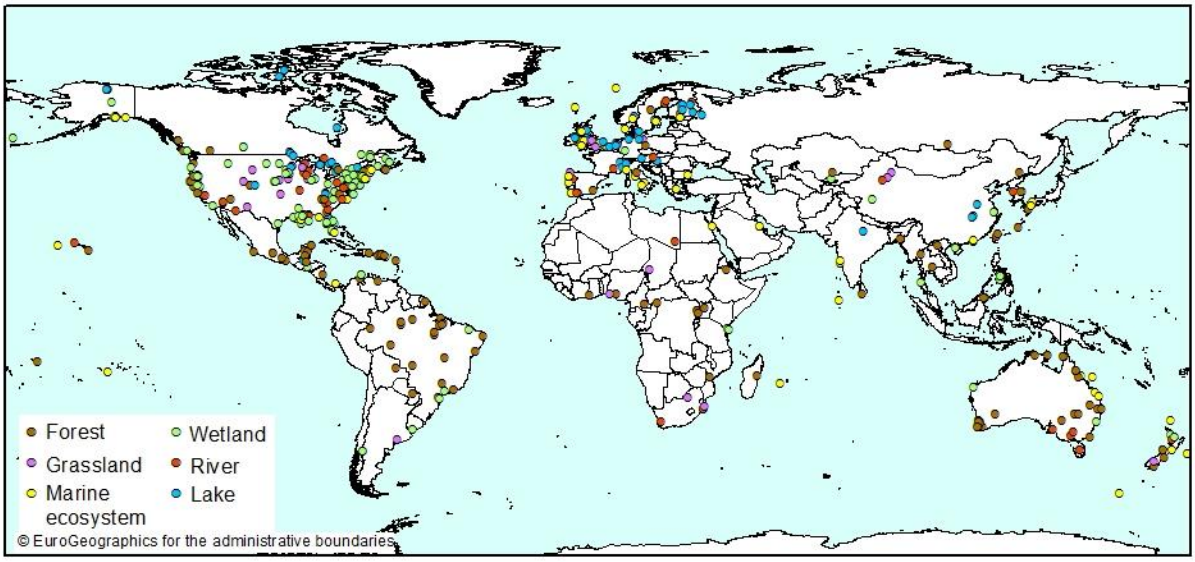
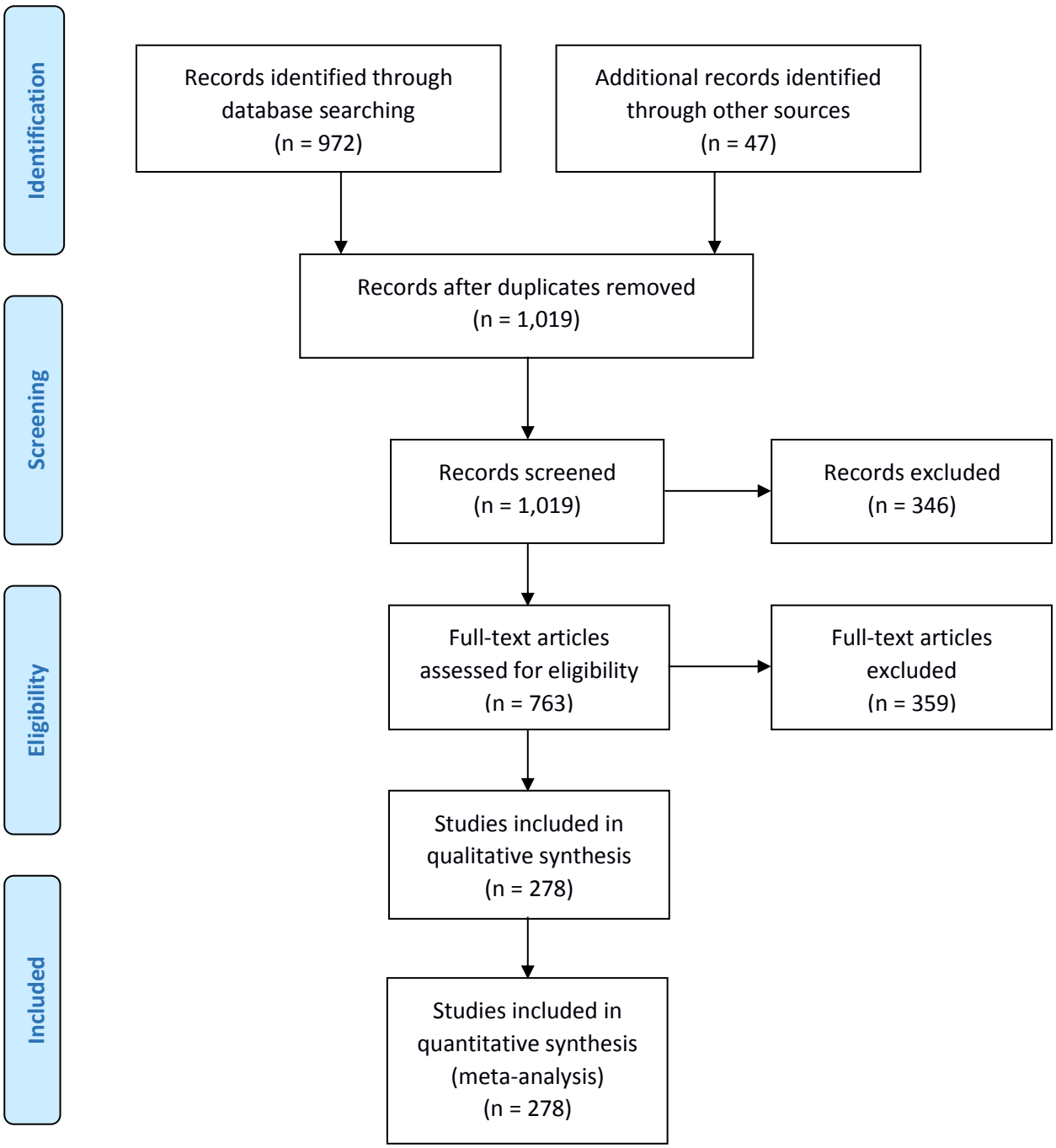
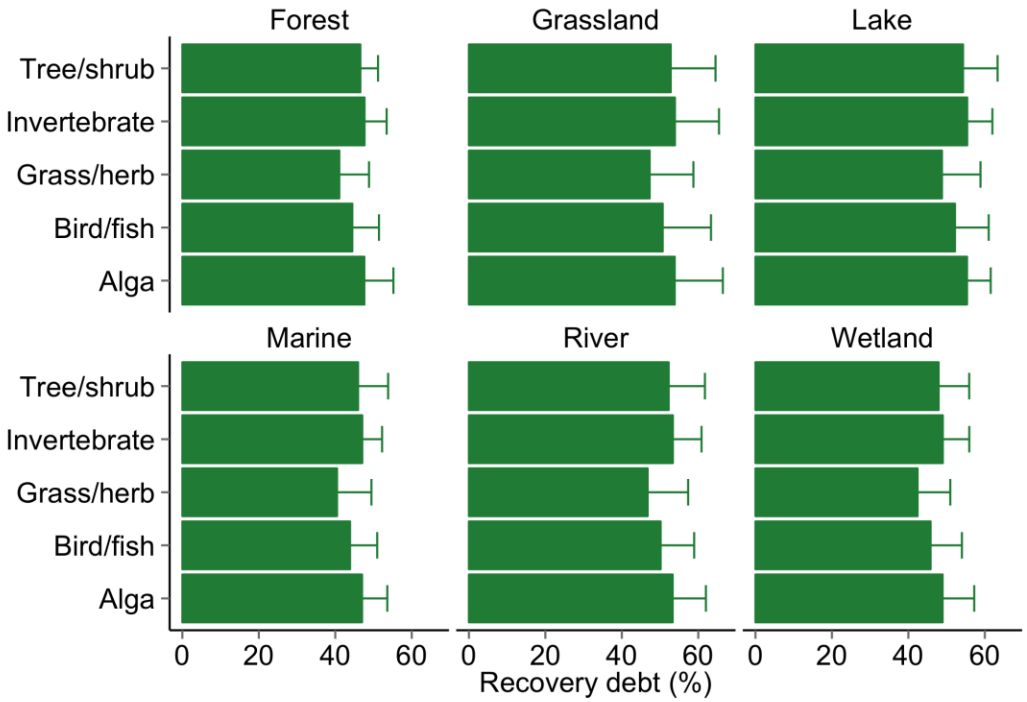


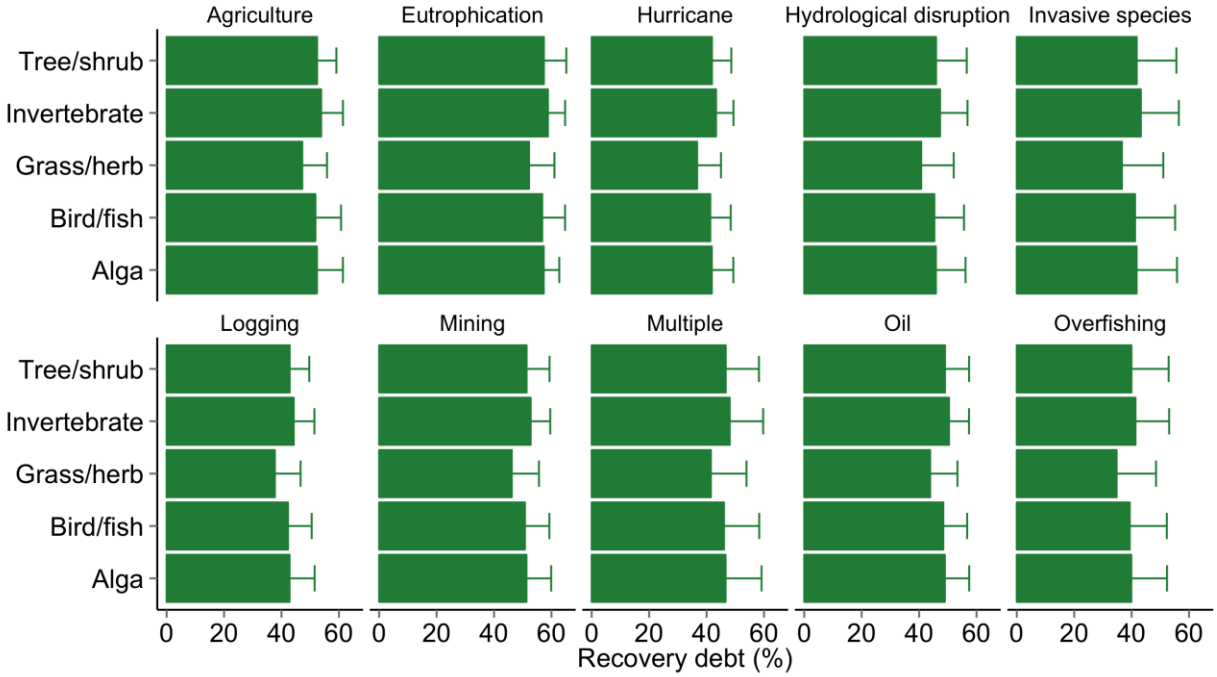
Supplementary Figure 1. Global distribution of the sampling sites per ecosystem category. One dot is used per primary study and each dot may represent several studies and/or sites undergoing recovery.



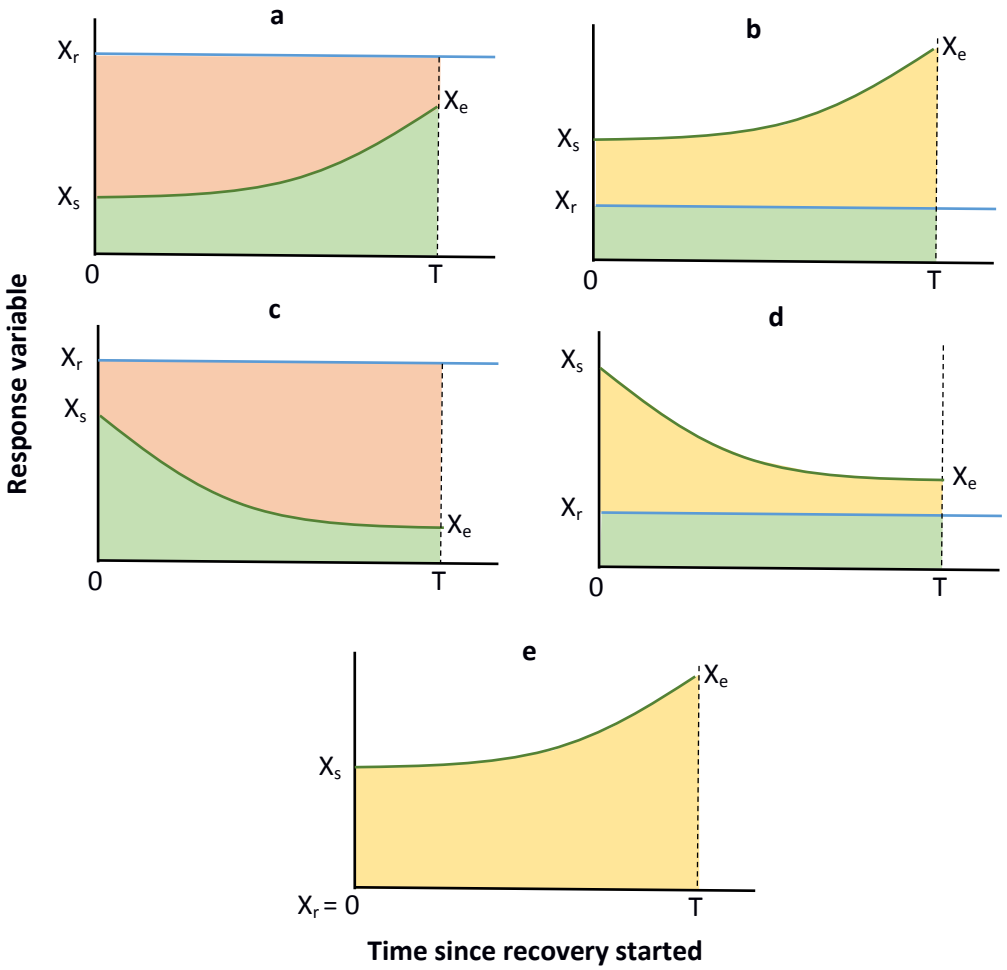
Supplementary Figure 2. PRISMA flow chart of studies included in the meta-analysis. It does not include studies coming from studies refs. 1 and 2 that have been previously published. Structure and template for flow chart from ref. 3.



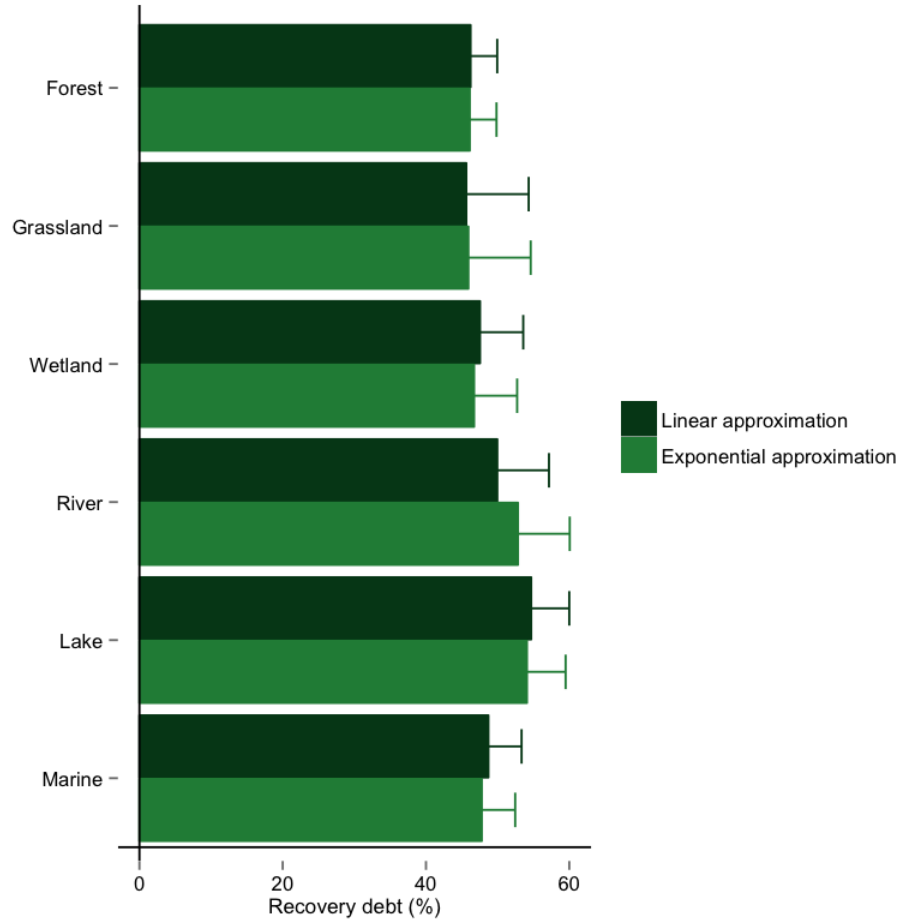
Supplementary Figure 3. Mean recovery debt values and 95% confidence intervals of the abundance of organisms across organism and ecosystem types. Only abundance was included because it was the only metric with enough data to perform the comparison.



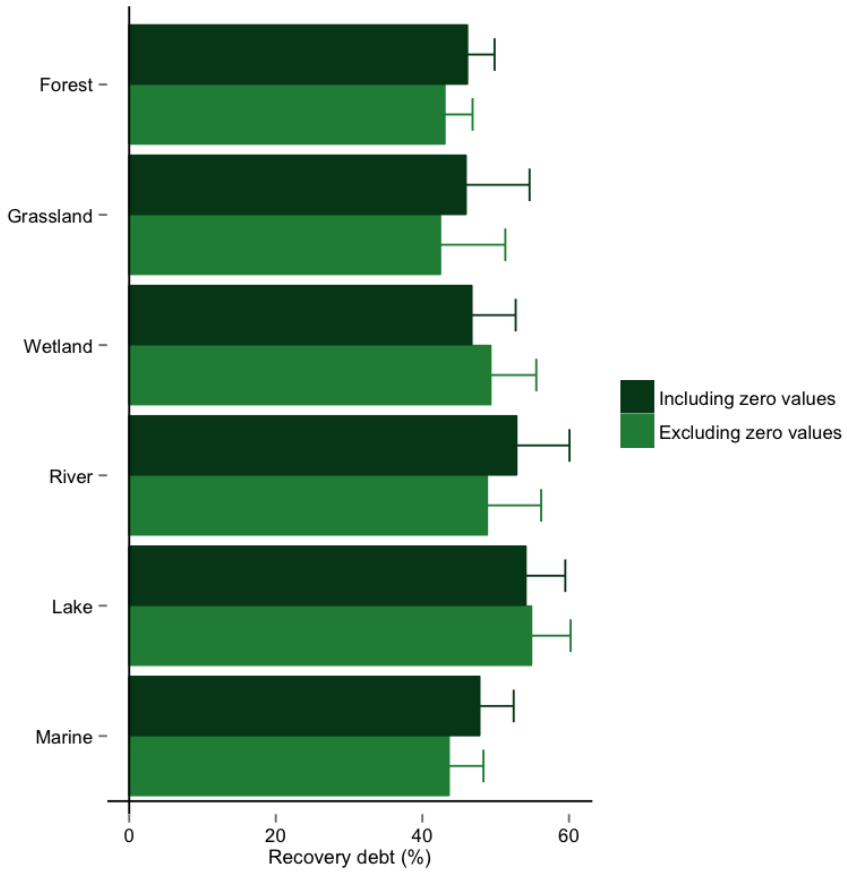
Supplementary Figure 4. Mean recovery debt values and 95% confidence intervals of the abundance of organisms across organism types and degradation categories. Only abundance was included because it was the only metric with enough data to perform the comparison.



Supplementary Figure 5. Scenarios used to estimate the recovery debt. X_s, value of the outcome measure at the starting point; X_e, value at the end point in the recovery trajectory; and X_r, reference value at the reference system. T is the time elapsed between the starting and the end point. Orange shading represents recovery debt estimated without transformation; yellow shading represents recovery debt estimated after transforming X_s and X_e into $Z_{s,e}$ (see Methods); and green shading represents areas under the curve used to estimate recovery debt. Note than in scenario *e*, $X_r = 0$.



Supplementary Figure 6. Comparison between exponential and linear approaches to estimate the recovery debt. Only abundance means predicted by the model and confidence intervals by ecosystem categories are showed.



Supplementary Figure 7. Comparison between recovery debts calculated excluding outcome measures containing zero values and including transformed zero values. Only abundance means predicted by the model and confidence intervals by ecosystem categories are showed.

Supplementary Table 1. Distribution of outcome measures, primary studies, sites, and recovering area by ecosystem and disturbance categories. Studies may report outcome measures from multiple ecosystem categories or disturbance categories and thus the totals do not match the total amount of studies selected for the meta-analysis.

Ecosystem	**No. outcome measures**	**Average (min. – max.) no. outcome measures per study**	**No. studies**	**No. sites recovering**	**No. reference sites**	**Area recovering (km^2)**	**Studies reporting restored area (%)**
Forest	1,616	11.6 (1 – 72)	139	1,334	729	206,010	72
Grassland	254	9.8 (1 – 52)	26	151	53	1,051	59
Wetland	322	7.3 (1 – 32)	44	352	211	15,574	83
River	271	7.7 (1 – 38)	35	156	82	5,340	35
Lake	646	12.2 (1 – 75)	53	353	188	34,823	81
Marine system	707	10.6 (1 – 48)	67	689	349	287,888	65
Disturbance							
Agriculture	625	11.2 (1 – 56)	56	525	184	103,180	68
Logging	506	9.7 (1 – 52)	52	368	268	51,017	72
Mining	646	13.5 (1 – 48)	48	274	199	1,320	68
Invasive species	72	8.0 (1 – 9)	9	46	37	24,153	89
Hydrological disruption	123	5.3 (1 – 23)	23	227	93	5,556	64
Eutrophication	811	12.9 (1 – 63)	63	406	214	9,690	78
Oil spill	307	8.3 (1 – 37)	37	148	80	35,244	40
Overfishing	84	6.5 (1 – 13)	13	193	34	325	85
Multiple	58	3.6 (1 – 16)	16	305	72	405,321	100
Hurricanes	584	14.2 (1 – 41)	41	543	414	15,986	67

Supplementary Table 2. Results of the test of moderator effects on the selected response metrics.

Subset	Moderator	Q_M	df	Test of moderators *p*-value
Abundance	Habitat	189.11	5	<0.0001
Abundance	Disturbance	42.83	9	<0.0001
Diversity	Habitat	7.36	5	0.1951
Diversity	Disturbance	21.39	7	0.0032
Carbon	Habitat	5.85	5	0.3213
Carbon	Disturbance	59.35	4	<0.0001
Nitrogen	Habitat	8.21	4	0.084
Nitrogen	Disturbance	9.77	5	0.0822

Supplementary Table 3. Results of the test to select the optimal amount to be added to outcome measures with zero values. We used Mann-Whitney rank sum tests to compare values of the *r* parameter (see Methods) of the database excluding outcome measures that contain zero values and of the full database using nine different strategies. The first row shows the results for the database excluding outcome measures containing zero values. = OM, amount added of the same order of magnitude that X_s and X_g. OM+1, amount added one order of magnitude larger than X_s and X_g. X.1, amount added is the smallest value of the order of magnitude (e.g. 0.1, 1, 10). X.5, amount added is the median of the order of magnitude (e.g. 0.5, 5, 50).

Amount added	n	Median	CI 25%	CI 75%	*U*	*p*
0	3,405	0.0336	0.00212	0.173		
0.01	366	0.317	0.138	1.024	270,049	<0.001
0.05	366	0.217	0.0956	0.665	320,288	<0.001
0.1	366	0.176	0.0743	0.596	345,922	<0.001
0.5	366	0.107	0.0294	0.421	431,846	<0.001
1	366	0.0754	0.0174	0.339	477,439	<0.001
= OM, X.1	366	0.077	0.0322	0.25	446,684	<0.001
= OM, X.5	366	0.0228	0.00733	0.0741	602,144	0.316
OM + 1, X.1	366	0.016	0.00567	0.0538	570,178	0.007
OM + 1, X.5	366	0.00358	0.00126	0.0118	417,130	<0.001

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