Bibliometric Analysis for Papers on Topics Related to Ecosystems Research

This is a bibliometric analysis of the papers prepared by intramural and extramural researchers of the U.S. Environmental Protection Agency (EPA) on topics related to ecosystems research. For this analysis, 1,455 papers were reviewed. These 1,455 papers, published from 1995 to 2005, were cited 13,317 times in the journals covered by Thomson's Web of Science.[1] Of these 1,455 papers, 1,245 (86%) have been cited at least once in a journal.

The analysis was completed using Thomson's Essential Science Indicators (ESI) and Journal Citation Reports (JCR) as benchmarks. ESI provides access to a unique and comprehensive compilation of essential science performance statistics and science trends data derived from Thomson's databases. The chief indicators of output, or productivity, are journal article publication counts. For influence and impact measures, ESI employs both total citation counts and cites per paper scores. The former reveals gross influence while the latter shows weighted influence, also called impact. JCR presents quantifiable statistical data that provide a systematic, objective way to evaluate the world's leading journals and their impact and influence in the global research community.

Summary of Analysis

Nearly one-fifth of the ecosystems publications are highly cited papers. A review of the citations indicates that 283 (19.4%) of the ecosystem papers qualify as highly cited when using the ESI criteria for the top 10% of highly cited publications. Twenty-nine (2.0%) of the ecosystem papers qualify as highly cited when using the criteria for the top 1%. Three (0.2%) of these papers qualify as very highly cited (in the top 0.1%). None of the papers meet the highest threshold (the top 0.01%) for highly cited papers.

The ecosystems papers are more highly cited than the average paper. Using the ESI average citation rates for papers published by field as the benchmark, in 15 of the 19 fields in which the EPA ecosystems papers were published, the ratio of actual to expected cites is greater than 1, indicating that the ecosystems papers are more highly cited than the average papers in those fields.

Nearly one-fifth of the ecosystem papers are published in very high impact journals. Two hundred eighty-one (281) of 1,455 papers were published in the top 10% of journals ranked by JCR Impact Factor, representing 19.3% of EPA's ecosystem papers. Nearly one-fifth of the ecosystem papers are published in the top 10% of journals ranked by JCR Immediacy Factor.

[1] Thomson's *Web of Science* provides access to current and retrospective multidisciplinary information from approximately 8,500 of the most prestigious, high impact research journals in the world. *Web of Science* also provides cited reference searching.

Two-hundred eighty-eight (288) of the 1,455 papers appear in the top 10% of journals, representing 19.8% of EPA's ecosystem papers.

Twenty-eight of the ecosystems publications qualified as hot papers. ESI establishes citation thresholds for hot papers, which are selected from the highly cited papers in different fields, but the time frame for citing and cited papers is much shorter—papers must be cited within 2 years of publication and the citations must occur in a 2-month time period. Using the current hot paper thresholds established by ESI as a benchmark, 28 of the ecosystems papers, representing 1.92% of the ecosystems publications, were identified as hot papers in the analysis.

The authors of the ecosystems papers cite themselves less than the average self-citation rate. Eight hundred thirty-four (834) of the 13,317 cites are author self-cites. This 6.26% author self-citation rate is well below the accepted range of 10-30% author self-citation rate.

Highly Cited Ecosystem Publications

The 1,455 ecosystem papers reviewed for this analysis covered 19 of the 22 ESI fields of research. The distribution of the papers among these 19 fields and the number of citations by field are presented in Table 1.

Table 1. Ecosystem Papers by ESI Fields

No. of Citations	ESI Field	No. of EPA Ecosystem Papers	Average Cites/Paper
7,986	Environment/Ecology	954	8.37
1,144	Engineering	148	7.73
870	Multidisciplinary	19	45.79
741	Biology & Biochemistry	49	15.12
536	Microbiology	35	15.31
524	Geosciences	53	9.89
484	Plant & Animal Science	56	8.64
437	Chemistry	43	10.16
182	Agricultural Sciences	28	6.50
165	Pharmacology & Toxicology	19	8.68
67	Clinical Medicine	4	16.75
41	Mathematics	22	1.86
31	Economics & Business	4	7.75
30	Physics	7	4.28
26	Molecular Biology & Genetics	3	8.67

No. of Citations	ESI Field	No. of EPA Ecosystem Papers	Average Cites/Paper
26	Computer Science	8	3.25
21	Immunology	1	21.00
6	Social Sciences	1	6.00
0	Materials Science	1	0.00
Total = 13,317		**Total = 1,455**	**9.15**

There were 283 (19.4% of the papers analyzed) highly cited EPA ecosystems papers in 14 of the 19 fields—Environment/Ecology, Multidisciplinary, Engineering, Biology & Biochemistry, Plant & Animal Science, Microbiology, Geosciences, Chemistry, Agricultural Sciences, Pharmacology & Toxicology, Economics & Business, Clinical Medicine, Mathematics, and Computer Science—when using the ESI criteria for the **top 10% of papers**. Table 2 shows the number of EPA papers in those 14 fields that met the **top 10% threshold in ESI**.

Twenty-nine (2.0%) of the papers analyzed qualified as highly cited when using the ESI criteria for the **top 1% of papers**. These papers were categorized in five fields—Environment/Ecology, Multidisciplinary, Biology & Biochemistry, Engineering, and Plant & Animal Science. Table 3 shows the 29 papers by field that met the **top 1% threshold in ESI**. There were three (0.2% of the papers analyzed) very highly cited EPA ecosystems papers in two fields—Environment/ Ecology and Engineering. These three papers met the **top 0.1% threshold in ESI**. None of the ecosystems papers met the highest threshold for highly cited papers (i.e., the **top 0.01% threshold)** in ESI.

Table 2. Number of Highly Cited Ecosystems Papers by Field (top 10%)

No. of Citations	ESI Field	No. of Papers	Average Cites/Paper	% of EPA Papers in Field
4,457	Environment/Ecology	164	27.18	17.19%
853	Multidisciplinary	14	60.93	73.68%
739	Engineering	48	15.40	32.43%
514	Biology & Biochemistry	8	64.25	16.33%
348	Plant & Animal Science	14	24.86	26.92%
258	Microbiology	6	43.00	17.14%

No. of Citations	ESI Field	No. of Papers	Average Cites/Paper	% of EPA Papers in Field
227	Geosciences	9	25.22	16.98%
215	Chemistry	6	35.83	13.95%
101	Agricultural Sciences	5	20.20	17.86%
85	Pharmacology & Toxicology	2	42.50	10.52%
27	Economics & Business	1	27.00	25.00%
49	Clinical Medicine	2	24.50	50.00%
13	Mathematics	3	4.33	13.64%
3	Computer Science	1	3.00	12.50%
Total = 7,889		**Total = 283**	**27.88**	

Table 3. Number of Highly Cited Ecosystems Papers by Field (top 1%)

No. of Citations	ESI Field	No. of Papers	Average Cites/Paper	% of EPA Papers in Field
1,140	Environment/Ecology	16	71.25	1.68%
463	Multidisciplinary	3	154.33	15.79%
355	Biology & Biochemistry	2	177.50	4.08%
301	Engineering	5	60.20	3.38%
146	Plant & Animal Science	3	48.67	5.36%
Total = 2,405		**Total = 29**		

The citations for the highly cited papers in the top 1% are presented in Tables 4 through 8. The citations for the very highly cited papers are listed in Table 9.

Table 4. Highly Cited Ecosystems Papers in the Field of Environment/Ecology (top 1%)

No. of Cites	First Author	Paper
181	Sakai AK	The population biology of invasive species. *Annual Review of Ecology and Systematics* 2001;32:305-332.
172	Huston MA	Local processes and regional patterns: appropriate scales for understanding variation in the diversity of plants and animals. *Oikos* 1999;86(2):393-401.
156	Burkholder JM	*Pfiesteria piscicida* and other *Pfiesteria*-like dinoflagellates: behavior, impacts, and environmental controls. *Limnology and Oceanography* 1997;42(5):1052-1075.
111	Morel FMM	The chemical cycle and bioaccumulation of mercury. *Annual Review of Ecology Evolution and Systematics* 1998;29:543-566.
91	Oberdorster G	Pulmonary effects of inhaled ultrafine particles. *International Archives of Occupational and Environmental Health* 2001;74(1):1-8.
74	Moran MA	Carbon loss and optical property changes during long-term photochemical and biological degradation of estuarine dissolved organic matter. *Limnology and Oceanography* 2000;45(6):1254-1264.
65	Chase TN	Simulated impacts of historical land cover changes on global climate in northern winter. *Climate Dynamics* 2000;16(2-3):93-105.
49	Phillips DL	Incorporating concentration dependence in stable isotope mixing models. *Oecologia* 2002;130(1):114-125.
46	Law BE	Environmental controls over carbon dioxide and water vapor exchange of terrestrial vegetation. *Agricultural and Forest Meteorology* 2002;113(1-4):97-120.
39	Davidson C	Spatial tests of the pesticide drift, habitat destruction, UV-B, and climate-change hypotheses for California amphibian declines. *Conservation Biology* 2002;16(6):1588-1601.
34	Ollinger SV	Regional variation in foliar chemistry and N cycling among forests of diverse history and composition. *Ecology* 2002;83(2):339-355.
33	Wiens JA	Riverine landscapes: taking landscape ecology into the water. *Freshwater Biology* 2002;47(4):501-515.
29	Law BE	Changes in carbon storage and fluxes in a chronosequence of ponderosa pine. *Global Change Biology* 2003;9(4):510-524.
20	Cohen WB	An improved strategy for regression of biophysical variables and Landsat ETM+ data. *Remote Sensing of Environment* 2003;84(4):561-571.

No. of Cites	First Author	Paper
20	Mazdai A	Polybrominated diphenyl ethers in maternal and fetal blood samples. *Environmental Health Perspectives* 2003;111(9):1249-1252.
20	Gray MJ	Effects of agricultural cultivation on demographicsof Southern High Plains amphibians. *Conservation Biology* 2004;18(5):1368-1377.

Table 5. Highly Cited Ecosystems Papers in the Field of Multidisciplinary (top 1%)

No. of Cites	First Author	Paper
185	Matson PA	Agricultural intensification and ecosystem properties. *Science* 1997;277(5325):504-509.
184	Stoddard JL	Regional trends in aquatic recovery from acidification in North America and Europe. *Nature* 1999;401(6753):575-578.
94	Wolfenbarger LL	Biotechnology and ecology – the ecological risks and benefits of genetically engineered plants. *Science* 2000;290(5499):2088-2093.

Table 6. Highly Cited Ecosystems Papers in the Field of Biology & Biochemistry (top 1%)

No. of Cites	First Author	Paper
245	Aber J	Nitrogen saturation in temperate forest ecosystems – hypotheses revisited. *Bioscience* 1998;48(11):921-934.
110	Driscoll CT	Acidic deposition in the northeastern U.S.: sources and inputs, ecosystem effects, and management strategies. *Bioscience* 2001;51(3):180-198.

Table 7. Highly Cited Ecosystems Papers in the Field of Engineering (top 1%)

No. of Cites	First Author	Paper
130	Mason RP	Uptake, toxicity, and trophic transfer of mercury in a coastal diatom. *Environmental Science & Technology* 1996;30(6):1835-1845.
50	Amyot M	Production and loss of dissolved gaseous mercury in coastal seawater. *Environmental Science & Technology* 1997;31(12):3606-3611.
47	Reuter JE	Concentrations, sources, and fate of the gasoline oxygenate methyl tert-butyl ether (MTBE) in a multiple use lake. *Environmental Science & Technology* 1998;32(23):3666-3672.

No. of Cites	First Author	Paper
46	Douglas EM	Trends in floods and low flows in the United States: impact of spatial correlation. *Journal of Hydrology* 2000;240(1-2):90-105.
28	Schneider AR	Recent declines in PAH, PCB, and toxaphene levels in the northern Great Lakes as determined from high resolution sediment cores. *Environmental Science & Technology* 2001;35(19):3809-3815.

Table 8. Highly Cited Ecosystem Ecosystems Papers in the Field of Plant & Animal Science (top 1%)

No. of Cites	First Author	Paper
75	Zak DR	Elevated atmospheric CO_2, fine roots and the response of soil microorganisms: a review and hypothesis. *New Phytologist* 2000;147(1):201-222.
51	Burkholder JM	Overview and present status of the toxic *Pfiesteria* complex (Dinophyceae). *Phycologia* 2001;40(3):186-214.
20	Andersen CP	Source-sink balance and carbon allocation below ground in plants exposed to ozone. *New Phytologist* 2003;157(2):213-228.

Table 9. Very Highly Cited Ecosystems Papers (Top 0.1%)

Field	No. of Cites	First Author	Paper
Environment/Ecology	181	Sakai AK	The population biology of invasive species. *Annual Review of Ecology and Systematics* 2001;32:305-332.
	172	Huston MA	Local processes and regional patterns: appropriate scales for understanding variation in the diversity of plants and animals. *Oikos* 1999;86(2):393-401.
Engineering	130	Mason RP	Uptake, toxicity, and trophic transfer of mercury in a coastal diatom. *Environmental Science & Technology* 1996;30(6):1835-1845.

Ratio of Actual Cites to Expected Citation Rates

The expected citation rate is the average number of cites that a paper published in the same journal in the same year and of the same document type (article, review, editorial, etc.) has received from the year of publication to the present. Using the ESI average citation rates for

papers published by field as the benchmark, in 15 of the 19 fields in which the EPA ecosystems papers were published, the ratio of actual to expected cites is greater than 1, indicating that the EPA papers are more highly cited than the average papers in those fields (see Table 10).

Table 10. Ratio of Average Cites to Expected Cites for Ecosystems Papers by Field

ESI Field	Total Cites	Expected Cite Rate	Ratio
Environment/Ecology	7,986	5,379.63	1.48
Engineering	1,144	369.46	3.10
Multidisciplinary	870	70.71	12.30
Biology & Biochemistry	741	518.15	1.43
Microbiology	536	319.39	1.68
Geosciences	524	289.37	1.81
Plant & Animal Science	484	234.84	2.06
Chemistry	437	319.87	1.37
Agricultural Sciences	182	110.53	1.65
Pharmacology & Toxicology	165	110.98	1.49
Clinical Medicine	67	39.95	1.68
Mathematics	41	27.63	1.48
Economics & Business	31	8.06	3.85
Physics	30	50.02	0.60
Molecular Biology & Genetics	26	47.29	0.55
Computer Science	26	19.23	1.35
Immunology	21	21.11	0.99
Social Sciences	6	4.30	1.40
Materials Science	0	5.66	0.00

JCR Benchmarks

The Impact Factor is a well known metric in citation analysis. It is a measure of the frequency with which the *average article* in a journal has been cited in a particular year. The Impact Factor

helps evaluate a journal's relative importance, especially when compared to others in the same field. The Impact Factor is calculated by dividing the number of citations in the current year to articles published in the 2 previous years by the total number of articles published in the 2 previous years.

Table 11 indicates the number of ecosystems papers published in the top 10% of journals, based on the JCR Impact Factor. Two hundred eighy-one (281) of 1,455 papers were published in the top 10% of journals, representing 19.3% of EPA's ecosystems papers.

Table 11. Ecosystem Papers in Top 10% of Journals by JCR Impact Factor

EPA Ecosystems Papers in that Journal	Journal	Impact Factor (IF)	JCR IF Rank
37	Environmental Science & Technology	3.557	540
37	Ecological Applications	3.287	623
19	Applied and Environmental Microbiology	3.810	470
19	Bioscience	3.041	730
19	Limnology and Oceanography	3.024	737
12	Ecology	4.104	394
12	Remote Sensing of Environment	3.185	666
10	Environmental Health Perspectives	3.929	439
10	Conservation Biology	3.672	504
10	Ecosystems	3.283	624
8	Journal of Chromatography A	3.359	602
7	Nature	32.182	9
7	Science	31.853	10
7	Analytical Chemistry	5.450	243
7	Global Change Biology	4.333	358
7	Ecology Letters	3.914	445
6	Journal of Climate	3.500	558
6	New Phytologist	3.355	603

EPA Ecosystems Papers in that Journal	Journal	Impact Factor (IF)	JCR IF Rank
4	Annual Review of Ecology Evolution and Systematics	9.429	102
4	Ecological Monographs	5.016	282
3	Molecular Ecology	4.375	351
3	Electrophoresis	3.743	482
3	Toxicological Sciences	3.391	591
2	Evolution	3.719	490
2	Proceedings of the Royal Society of London Series B-Biological Sciences	3.653	509
2	Plant Cell and Environment	3.634	517
1	JAMA-Journal of the American Medical Association	24.831	15
1	Lancet	21.713	20
1	Gastroenterology	13.092	61
1	Proceedings of the National Academy of Sciences of the United States of America	10.452	88
1	Reviews of Geophysics	8.667	114
1	Molecular Biology of the Cell	7.517	151
1	Plant Physiology	5.881	214
1	Emerging Infectious Diseases	5.643	230
1	Biochemistry	4.008	421
1	Environmental Microbiology	3.995	427
1	Epidemiology	3.840	459
1	Drug Metabolism and Disposition	3.836	461
1	Geochimica et Cosmochimica Acta	3.811	468
1	Mutation Research-Reviews in Mutation Research	3.667	506
1	Climate Dynamics	3.497	561
1	Journal of Experimental Botany	3.366	597

EPA Ecosystems Papers in that Journal	Journal	Impact Factor (IF)	JCR IF Rank
1	Journal of Applied Ecology	3.266	629
1	American Journal of Public Health	3.241	642
Total = 281			

Immediacy Index

The journal Immediacy Index is a measure of how quickly the *average article* in a journal is cited. It indicates how often articles published in a journal are cited within the year they are published. The Immediacy Index is calculated by dividing the number of citations to articles published in a given year by the number of articles published in that year.

Table 12 indicates the number of EPA papers published in the top 10% of journals, based on the JCR Immediacy Index. Two hundred eighty-eight (288) of the 1,455 papers appear in the top 10% of journals, representing 19.8% of EPA's ecosystems papers.

Table 12. Ecosystems Papers in Top 10% of Journals by JCR Immediacy Index

EPA Ecosystems Papers in that Journal	Journal	Immediacy Index (II)	JCR II Rank
37	Ecological Applications	0.747	466
37	Environmental Science & Technology	0.623	617
32	Hydrobiologia	0.681	532
19	Bioscience	0.863	356
17	Journal of Geophysical Research	0.617	630
13	Freshwater Biology	0.664	558
12	Ecology	0.590	676
10	Ecosystems	2.048	76
10	Environmental Health Perspectives	1.202	202
10	Conservation Biology	0.744	468

EPA Ecosystems Papers in that Journal	Journal	Immediacy Index (II)	JCR II Rank
8	Climatic Change	1.235	195
7	Science	7.379	3
7	Nature	6.089	5
7	Analytical Chemistry	0.885	346
7	Ecology Letters	0.754	459
6	New Phytologist	0.876	349
5	Ecotoxicology	1.450	151
3	Ambio	1.435	156
3	Aquatic Sciences	0.800	413
3	Molecular Ecology	0.674	545
3	Aerosol Science and Technology	0.595	668
3	Electrophoresis	0.575	697
2	Natural Resources Journal	1.034	262
2	Plant Cell and Environment	0.605	653
1	JAMA – Journal of the American Medical Association	5.499	9
1	Lancet	5.017	12
1	Gastroenterology	2.529	51
1	Proceedings of the National Academy of Sciences of the United States of America	1.923	89
1	Reviews of Geophysics	1.714	110
1	Molecular Biology of the Cell	1.641	119
1	Journal of Paleolimnology	1.581	132
1	Emerging Infectious Diseases	1.350	169
1	Ecology Law Quarterly	1.174	213
1	Mutation Research-Reviews in Mutation Research	1.125	224
1	Hydrology and Earth System Sciences	1.069	242

EPA Ecosystems Papers in that Journal	Journal	Immediacy Index (II)	JCR II Rank
1	Plant Physiology	0.961	296
1	Bulletin of the American Meteorological Society	0.895	341
1	Epidemiology	0.864	354
1	Marine Geology	0.842	373
1	American Journal of Botany	0.768	445
1	Biochemistry	0.737	477
1	American Journal of Public Health	0.723	489
1	Journal of Applied Ecology	0.718	493
1	Geochimica et Cosmochimica Acta	0.680	535
1	Environmental Microbiology	0.677	539
1	Tellus Series B-Chemical and Physical Meteorology	0.610	646
1	Drug Metabolism and Disposition	0.590	676
1	Journal of Physical Oceanography	0.565	718
1	Theoretical and Applied Climatology	0.564	718
Total = 288			

Hot Papers

ESI establishes citation thresholds for hot papers, which are selected from the highly cited papers in different fields, but the time frame for citing and cited papers is much shorter—papers must be cited within 2 years of publication and the citations must occur in a 2-month time period. Papers are assigned to 2-month periods and thresholds are set for each period and field to select 0.1% of papers. There were no hot papers identified for the current 2-month period (i.e., September-October 2005), but there were 28 hot papers identified from previous periods.

Using the current hot paper thresholds established by ESI as a benchmark, 28 hot papers, representing 1.92% of the ecosystems papers, were identified in the fields of Environment/Ecology, Engineering, Plant & Animal Science, Mathematics, and Multidisciplinary. The hot papers are listed in Table 13.

Table 13. Hot Papers Identified Using Current ESI Thresholds

Field	ESI Hot Papers Threshold	No. of Cites in 2-Month Period	Paper
Environment/ Ecology	6	8 cites in April-May 2002	Watts JM, et al. Thermal, mixing, and oxygen regimes of the Salton Sea, California, 1997-1999. *Hydrobiologia* 2001;466(1-3):159-176.
	8	8 cites in May-June 2000	Polsky C, et al. The Mid-Atlantic Region and its climate: past, present, and future. *Climate Research* 2000;14(3):161-173.
	7	8 cites in May-June 2003	Sakai AK, et al. The population biology of invasive species. *Annual Review of Ecology and Systematics* 2001;32:305-332.
	7	7 cites in September-October 2004	Brooks JR, et al. Hydraulic redistribution of soil water during summer drought in two contrasting Pacific Northwest coniferous forests. *Tree Physiology* 2002;22(15-16):1107-1117.
	7	7 cites in January-February 2001	Huston MA. Local processes and regional patterns: appropriate scales for understanding variation in the diversity of plants and animals. *Oikos* 1999;86(3):393-401.
	7	7 cites in September-October 2002	Oberdorster G. Pulmonary effects of inhaled ultrafine particles. *International Archives of Occupational and Environmental Health* 2001;74(1):1-8.
	5	6 cites in September-October 2001	Glasgow HB, Burkholder JM. Water quality trends and management implications from a five-year study of a eutrophic estuary. *Ecological Applications* 2000;10(4):1024-1046.
	3	5 cites in April-May 2004	Hulse DW, et al. Envisioning alternatives: using citizen guidance to map future land and water use. *Ecological Applications* 2004;14(2):325-341.
	3	4 cites in April-May 2004	Baker JP, et al. Alternative futures for the Willamette River Basin, Oregon. *Ecological Applications* 2004;14(2):313-324.

Field	ESI Hot Papers Threshold	No. of Cites in 2-Month Period	Paper
Environment/ Ecology	3	4 cites in April-May 2004	Schumaker NH, et al. Projecting wildlife responses to alternative future landscapes in Oregon's Willamette Basin. *Ecological Applications* 2004;14(2):381-400.
	3	4 cites in April-May 2004	Berger PA, Bolte JP. Evaluating the impact of policy options on agricultural landscapes: an alternative-futures approach. *Ecological Applications* 2004;14(2):342-354.
	3	4 cites in April-May 2004	Dole D, Niemi E. Future water allocation and in-stream values in the Willamette River Basin: a basin-wide analysis. *Ecological Applications* 2004;14(2):355-367.
	3	4 cites in April-May 2003	Breitburg DL, et al. The pattern and influence of low dissolved oxygen in the Patuxent River, a seasonally hypoxic estuary. *Estuaries* 2003;26(2A):280-297.
	3	4 cites in September-October 2003	Leibowitz SG, Vining KC. Temporal connectivity in a prairie pothole complex. *Wetlands* 2003;23(1):13-25.
	3	4 cites in April-May 2002	Wiens JA. Riverine landscapes: taking landscape ecology into the water. *Freshwater Biology* 2002;47(4):501-515.
	3	4 cites in April-May 2002	Detwiler PM, et al. The benthic invertebrates of the Salton Sea: distribution and seasonal dynamics. *Hydrobiologia* 2002;473(1-3):139-160.
	3	3 cites in April-May 2004	Van Sickle J, et al. Projecting the biological condition of streams under alternative scenarios of human land use. *Ecological Applications* 2004;14(2):368-380.
	3	3 cites in April-May 2002	Rogerson A, Hauer G. Naked amoebae (Protozoa) of the Salton Sea, California. *Hydrobiologia* 2002;473(1-3):161-177.

Field	ESI Hot Papers Threshold	No. of Cites in 2-Month Period	Paper
Environment/ Ecology	3	3 cites in March-April 1999	Karr JR. Defining and measuring river health. *Freshwater Biology* 1999;41(2):221-234.
Engineering	6	6 cites in June-July 2002	Douglas EM, et al. Trends in floods and low flows in the United States: impact of spatial correlation. *Journal of Hydrology* 2000;240(1-2):90-105.
	4	5 cites in October-November 2002	Thomas-Smith TE, Blough NV. Photoproduction of hydrated electron from constituents of natural waters. *Environmental Science & Technology* 2001;35(13):2721-2726.
	4	5 cites in November-December 1997	Mason RP, et al. Uptake, toxicity, and trophic transfer of mercury in a coastal diatom. *Environmental Science & Technology* 1996;30(6):1835-1845.
	2	3 cites in September-October 2004	Karr JR, Yoder CO. Biological assessment and criteria improve total maximum daily load decision making. *Journal of Environmental Engineering-ASCE* 2004;130(6):594-604.
Plant & Animal Science	3	10 cites in October-November 2001	Glasgow HB, et al. A second species of ichthyotoxic *Pfiesteria* (Dinamoebales, Dinophyceae). *Phycologia* 2001;40(3):234-245.
	3	4 cites in July-August 2000	Zak DR, et al. Elevated atmospheric CO_2, fine roots and the response of soil microorganisms: a review and hypothesis. *New Phytologist* 2000;147(1):201-222.
Mathematics	3	3 cites in September 2005	Drake JM. Allee effects and the risk of biological invasion. *Risk Analysis* 2004;24(4):795-802.
Multidisciplinary	11	31 cites in September-October 2001	Stoddard JL, et al. Regional trends in aquatic recovery from acidification in North America and Europe. *Nature* 1999;401(6753):575-578.

Field	ESI Hot Papers Threshold	No. of Cites in 2-Month Period	Paper
Multidisciplinary	5	5 cites in September-October 2004	Kolar CS, Lodge DM. Ecological predictions and risk assessment for alien fishes in North America. *Science* 2002;298(5596):1233-1236.

Author Self-Citation

Self-citations are journal article references to articles from that same author (i.e., the first author). Because higher author self-citation rates can inflate the number of citations, the author self-citation rate was calculated for the ecosystems papers. Of the 13,317 total cites, 834 are author self-cites—a 6.26% author self-citation rate. Garfield and Sher[2] found that authors working in research-based disciplines tend to cite themselves on the average of 20% of the time. MacRoberts and MacRoberts[3] claim that approximately 10% to 30% of all the citations listed fall into the category of author self-citation. Therefore, the 6.26% self-cite rate for the ecosystems papers is well below the range for author self-citation.

[2] Garfield E, Sher IH. New factors in the evaluation of scientific literature through citation indexing. *American Documentation* 1963;18(July):195-201.

[3] MacRoberts MH, MacRoberts BR. Problems of citation analysis: a critical review. *Journal of the American Society of Information Science* 1989;40(5):342-349.