2019

Dissemination, Access, Preservation: A Case Study of Publications from the Organic Agriculture Research and Extension Initiative

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Abstract

The Organic Agriculture Research and Extension Initiative, administered by USDA-NIFA, is the major federal funder of organic agricultural research. Analysis of 733 publications produced during the initiative's first five years explored the dissemination of this research, and accessibility to and preservation of the publications. Publications associated with conferences (e.g., abstracts) were most numerous (36%). Many publications (69%) were openly accessible online in 2017 but fewer than 10% of these appeared in a stable digital repository. In four of the eight publication categories, access disappeared over time. No program exists to systematically collect and preserve these outputs of organic agricultural research.

Keywords: Digital preservation, open access, organic agriculture, peer-review, scholarly communication

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Published in *Journal of Agricultural & Food Information* (2019)
doi 10.1080/10496505.2018.1532297

Submitted 29 August 2018; accepted 2 October 2018; published 25 January 2019.

Introduction

The U.S. organic agriculture sector continues to grow, according to the U.S. Department of Agriculture-Economic Research Service (USDA-ERS); fresh produce is the top-selling commodity, and consumers expect locally grown, organic foods to be available at the nation's increasing number of farmers' markets (2017). The ERS reports, "Organic products have shifted from being a lifestyle choice for a small share of consumers to being consumed at least occasionally by a majority of Americans" ("Organic Consumers Are Increasingly Mainstream," para. 3, 2017). Since the passage of the Farm Security and Rural Investment Act of 2002, otherwise known as the Farm Bill, there has been an investment of taxpayer dollars in organic agricultural research, specifically through the USDA's National Institute of Food and Agriculture (NIFA). The NIFA administers the Organic Agriculture Research and Extension Initiative (OREI) and the Organic Transitions Program (ORG). Funding for OREI is part of the Farm Bill, making it the major federal funding program for organic agricultural research; ORG funding is not included in the Farm Bill legislation and so is not as plentiful nor assured (Schonbeck, Jerkins, & Ory, 2016). **Figure 1** illustrates the funding trends for OREI, from the first awards in fiscal year (FY) 2004 through 2017, when awards totaled $16.49 million USD, a value tabulated from reports available from the USDA, NIFA, Organic Agriculture Research and Extension Initiative (2017a).

Given the financial investment in OREI ($151.4 M USD to date; Figure 1) and the unique research it supports, an evaluation of the publication outputs from this research is of interest, providing insight into the publication practices of these researchers. In addition, the analysis provides data with which to assess the validity of the assertion that OREI's research output is widely available in the peer-reviewed literature. This assertion was the explanation for the elimination, in FY 2009, of the requirement to document a search of USDA's Current Research Information System (CRIS) in proposals submitted to OREI. As "extension" is part of OREI's charge it is also of interest to determine how accessible OREI's information is to producers and researchers, and the preservation status of these publications. Lastly, this study is an example of mining publicly available data.

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
USD (millions)	2.84	2.86	2.85	2.81	2.82	15.67	19.10	15.90	14.77		19.63	18.02	17.64	16.49
No. of Awards	6	5	6	7	5	24	26	18	8		19	20	18	16

Figure 1. The dollar amount and number of grants awarded by the Organic Agriculture Research and Extension Initiative (OREI), FY 2004–2017. There were no awards in FY 2013.

Materials and methods

In this study of dissemination, access, and preservation, the publications analyzed are those resulting from awards made during the first five years (FY 2004–2008) of OREI funding. These publications are candidates for loss given the passage of time. In addition, this group of OREI projects pre-date the initiation of the National Agricultural Library's *PubAg* (U.S. Department of Agriculture, National Agricultural Library, n.d., b) and the memorandum from the U.S. Office of Science and Technology Policy, *Increasing Access to the Results of Federally Funded Scientific Research* (Holdren, 2013). The proposals funded during this five-year period are a relatively homogeneous group, with 26 of the 29 projects emphasizing research and extension rather than conference planning or curriculum development (**Table 1**), sharing a funding cap of under $1 M per award (Schonbeck et al., 2016), and comparable total annual awards totaling ~$2.8 M USD (Figure 1). Beginning in 2009 (with 2012 as an exception; see Figure 1), the OREI began funding a wider mix of projects, supporting conference planning and "planning grants" for future research proposals, and the majority of the individual awards were much larger (Schonbeck et al., 2016). Finally, the proposals for these initial 29 projects also required documentation of a search in the CRIS—specifically, a list of search terms and an explanation of any redundancy with previously funded projects.

Table 1. Details of the 29 OREI projects analyzed in this study.

Fiscal year	*Principal investigator*	*Project Title (CRIS accession no.)*	*Project duration (years)*	*Grant amount (USD)*	*Number of publications reported*
2004	Mohler, C.L.	Building on the best: a systems research and education partnership for increased competitiveness of organic grain and vegetable farms (0201262)	5	575,028	8
2004	Parson, R.L.	Profitability and transitional analysis of northeast organic dairy farms (0201265)	5	301,161	13
2004	Mazzola, M.	Use of resident biological resources for the management of replant disease in organic tree fruit production systems (0201286)	4	303,267	27
2004	Jahn, M.	The Organic Seed Partnership (0201292)	4	894,450	18
2004	Gliessman, S.R.	Improving fertility and pest management strategies for organic crop production and strengthening researcher/grower networks (0201343)	5	571,902	60
2004	Lockeretz, W.	Strengthening the scientific foundation of organic standards on animal health and welfare (0201444)	3	197,768	2
2005	Kloepper, J.W.	Integration of organic production systems for summer production of tomato and pepper in Alabama (0204954)	5	561,828	25
2005	Shapiro, C.A.	Improving organic farming systems across Nebraska agroecoregions (0204958)	5	762,949	37
2005	Snapp, S.S.	Partnering to cultivate organic agriculture in Michigan and the Midwest (0205007)	4	754,442	14
2005	DeWitt, J.	Evaluation of strategies for management of soybean rust in organic systems (0205058)	3	483,542	15
2005	Burke, J.M.	Development of sustainable gastrointestinal nematode control in organic small ruminant production (0205379)	3	299,632	23
2006	Browdy, C.L.	Organic farming of marine shrimp: a holistic approach to management of feeds & microbial dynamics (0206743)	3	431,203	39
2006	Andersen, P.C.	Organic production of blueberries in the southeastern United States: development of best management practices (0206795)	4	364,156	20
2006	Berkett, L.	Using new alternatives to enhance adoption of organic apple production through integrated research, education, and extension (0206819)	4	666,839	22
2006	Chase, C.A.	Crop diversification complexity and pest beneficial organism communities in humid tropical and sub-tropical climatic regions (0206897)	1	226,139	3
2006	Sheaffer, C.C.	Beyond corn and soybean: alternative organic crops for the upper Midwest (0206968)	5	615,840	2
2006	Cardina, J.	Transition strategies that control perennial weeds and build soil (0207346)	5	545,102	4
2007	Baenziger, P.S.	Developing small grains cultivars and systems optimally suited for organic production (0210057)	5	755,937	10
2007	Carey, T.	Effects of organic fertility management on crop health and phytochemical content of vegetables under open field and high tunnel production (0210178)	5	500,698	15
2007	Renner, K.A.	Building integrated weed management knowledge in organic systems (0210208)	2	106,335	21
2007	Epstein, D.L.	Integrating benefits of organic apple and pork production (0210223)	2	33,478	8
2007	Padgham, J.	Midwest Organic Research Symposium (0210285)	1	50,000	1
2007	Diez-Gonzalez, F.	Development of sanitizers for utilization in organic food processing and crop production (0210345)	4	747,993	14
2007	Stone, A.G.	eOrganic: extension for organic agriculture (0210542)	3	611,985	196
2008	Jaworski, D.M.	NWTC's organic agriculture program features an annual professional development training series and an organic farming certificate program (0213593)	4	434,925	4
2008	Strik, B.	Integrating weed management and fertility in organic highbush blueberry production systems to optimize plant growth, yield and grower return (0213611)	3	469,851	24
2008	Mazzola, M.	Predictive management of soil microbial communities using defined amendments to enhance production in organic cropping systems (0213651)	4	517,798	38
2008	Cogger, C.G.	Designing production strategies for stewardship and profits on fresh market organic farms (0213730)	5	644,232	13
2008	Rom, C.	Best management practices for organic orchard nutrition (0213893)	5	757,882	57
Totals				14,186,362	733

Within a fiscal year, projects appear by ascending CRIS accession number.

The original, direct access point for information about the 29 OREI awards of FY 2004–2008 was a link ("Abstracts of Funded Projects") on the 2012 OREI webpage (U.S. Department of Agriculture, 2012). That link now redirects to the current OREI website, where the link to "Read the Abstracts" (U.S. Department of Agriculture, National Institute of Food and Agriculture, Organic Agriculture Research and Extension Initiative, 2017a) resolves to a list of later awards (2009–2017). Currently, the search outlined below of the REEIS portal (U.S. Department of Agriculture, Research, Education, & Economics Information System, n.d.) generates the list of pre-2009 awards:

- *Search these terms*: organic
- *Apply filters*:
    - *Sponsoring agency*=National Institute of Food and Agriculture
    - *Project status*=Complete
    - *Initial award fiscal year*=2004, 2005, 2006, 2007, 2008
    - *Financial data code*=[51300] Organic Research and Extension Initiative.

Alternatively, individual awards are available in CRIS (U.S. Department of Agriculture, National Institute of Food and Agriculture, 2017), using the "assisted search" option. Enter a project's CRIS accession number (Table 1) in the "fulltext terms" box.

The full report for each award provided an annual publication list, as well as narrative discussing accomplishments and impacts for the funding period, which ranged from one to five years (Table 1). For each of the 29 projects, the author

- reviewed the publication lists for citations to publications
- reviewed the narratives for descriptions of published products omitted from the publication lists
- organized the publications chronologically
- de-duplicated to determine the number of unique publications per project (Table 1) and
- categorized each publication.

The eight categories of publications were peer-reviewed journals or series, books, book chapters, extension and agricultural experiment station (AES) publications, abstracts/conference papers/presentations, theses and dissertations, miscellaneous (e.g., newsletters and trade magazines),

and websites. While some abstracts, conference papers, and presentations may have been peer-reviewed or juried, it was beyond the scope of this review to make that determination; as a result, all outputs related to conferences were treated as a single publication type. The aggregated pool of 733 publications ranged in date from 2004 to 2015.

The author attempted to locate each publication, either in digital or print form. Search strategies employed were those available to a U.S. resident with access to a land-grant institution's library system (**Table 2**). If attempts to discover and access the publication failed, the author requested the assistance of interlibrary loan (ILL). If ILL was unable to obtain a publication within one month of the request, the author categorized it as inaccessible.

For those items discovered and accessed, the author noted the following information: citation (confirmed or corrected), DOI (if available), and whether the publication was (1) peer-reviewed, (2) openly accessible, and (3) preserved in a stable digital repository (e.g., a university institutional repository, or a disciplinary repository such as *AgEconSearch*). The

Table 2. Strategies employed to locate OREI publications.

Publication type	*Sources/strategies*
Peer-reviewed	
• reasonably complete or accurate citation	• institutional subscription content; open-access subject repositories (e.g., AgEconSearch, Organic Eprints, PubMed); open content from professional or trade organizations; Google Scholar
• incomplete or inaccurate citation	• relevant database (e.g., Agricola, CAB Abstracts & Global Health); Google Scholar; Google
Books, book chapters	WorldCat; publisher sites; Google Scholar; Google
Extension, AES publications	Google; university extension website and/or institutional repository; Internet Archive's WayBack Machine
Abstracts, conference papers, posters	Professional or trade society's website; university institutional and/or subject repository; Google
Theses, dissertations	University institutional repository; Google Scholar; ProQuest's Dissertations and Theses A&I
Miscellaneous	Google; professional or trade society's website; institutional website
Websites	URL listed in CRIS report; Google; Internet Archive's WayBack Machine

author compiled accurate bibliographies for each of the 29 OREI projects; these **supplementary data** are available at FigShare (https://figshare.com/projects/Organic_Agriculture_Research_Extension_Initiative_OREI_-_Bibliographies_FY_2004-FY2008_awards/38048) and attached to the cover page in this repository.

As the numerical data generated in this study did not follow a normal distribution, analyses primarily involved descriptive statistics and nonparametric tests (e.g., chi-square *p* value) where appropriate. The evaluation of the data was within award year and in aggregate, looking at totals and trends in publication categories as a measure of dissemination. The data also provided a longitudinal look at access to and preservation of these publications, through a comparison of the data set of 2014 with that of 2017.

Results and discussion

Dissemination

The predominant publishing activity in the first five years of the OREI (36%, 264 of 733 publications) consisted of abstracts, conference papers, and presentations made at professional, trade, and extension meetings (**Figure 2**). The activity was reasonably constant over the first five years of the OREI. The "Great Recession" of 2007–2009 might explain the reduced conference-related output of FY 2007 awards; alternatively, the fact that one award (Stone, 2007) reported no conference outputs could be a factor (**Figure 3**). Not surprisingly, conferences frequently provided a venue for student-researchers to present their results. Many agricultural researchers reported, in the recent Ithaka S+R study of their practices, that conference participation was an important practice for current awareness as well as for documenting their program's research emphases and progress (Cooper, 2017; Delserone & Dinkelman, 2017). However, given that abstracts, conference papers, and presentations document much of this research, what is the status of continuing access to and preservation of these publications (see "Accessibility and preservation" section)?

For a program with "extension" in its title, extension and AES publications accounted for less than one-third (30%; 223 of 733) of the publication pool (Figure 2). If not for the large number (190) of born-digital extension publications reported by the FY 2007 award *eOrganic: Extension for Organic Agriculture* (Stone, 2007), this dissemination venue would be

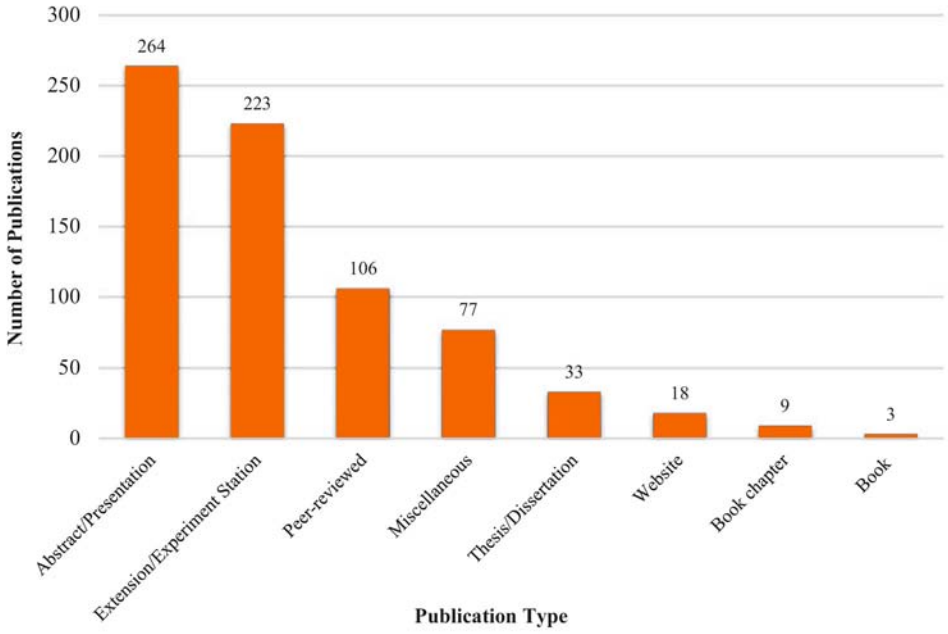

Figure 2. Total number of publications from 29 OREI awards (FY 2004–2008), by publication type.

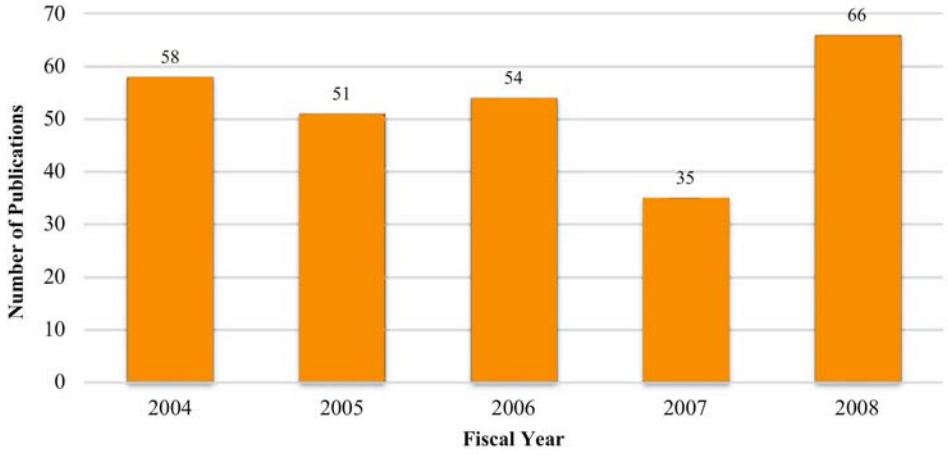

Figure 3. Number of abstracts, conference papers, and presentations per FY from OREI projects.

negligible (**Figure 4**). It is important to note that several investigators reported in their narratives about distributing information at extension workshops; however, there was no corresponding entry on the publications list nor anything discoverable by the author. An objective of the

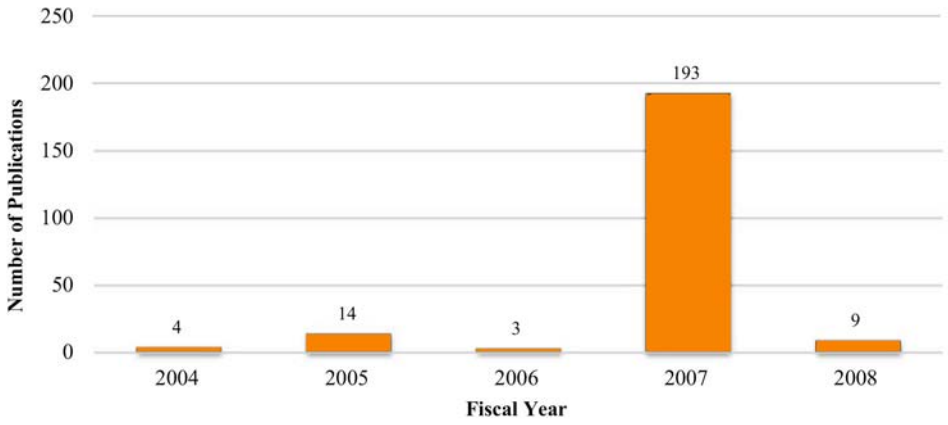

Figure 4. Number of extension and agricultural experiment station publications per FY from OREI projects.

eOrganic project was to create an online venue for publication and dissemination of the results of OREI projects (Schonbeck et al., 2016). Of the OREI projects funded in FY 2007 and 2008, only one other researcher (Strik, 2008) published on the eOrganic site; the content consisted of two webinars and two born-digital articles. Schonbeck et al. (2016) reported increased use of the eOrganic site through 2014, but noted that "at least half of the projects funded since the 2007 launch of eOrganic have not used this venue and have not indicated plans to do so in their proposals" (p. 52). In a recent review of the publications listed in the 2007 eOrganic CRIS report (Stone, 2007), the author noted that the most recent updates to the articles occurred in 2015, perhaps tied to the termination of eXtension's financial support for the eOrganic community of practice (Schonbeck et al., 2016). Interestingly, this initial group of OREI researchers did not engage significantly in traditional publishing with state extension services or did not capture it in the narratives. For most, their research predated or barely overlapped with the initiation of an attempt to create a national clearinghouse for OREI and other organic agricultural research outputs.

In contrast to the preceding cases, the publication of organic agricultural research in peer-reviewed venues was modest, representing only 14.5% (106 of 733) of the total publications (Figure 2). In fact, the number of peer-reviewed publications trended downward during the first four years of the program (**Figure 5**). This analysis does not provide strong support for the assertion that the program's research was widely represented in peer-reviewed journals prior to 2009. While 19 of the 29 projects reported peer-reviewed publications, 14 of these reported five or fewer publications; six projects reported the most common output of

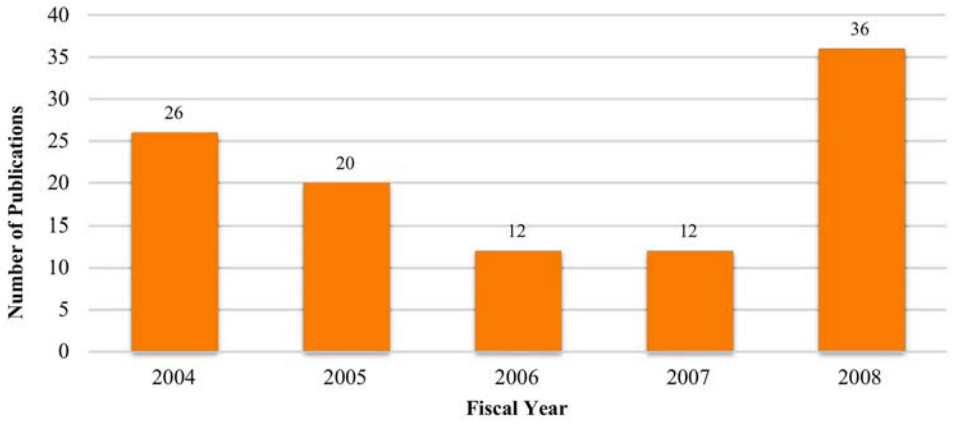

Figure 5. Number of publications appearing in peer-reviewed journals or series per FY from OREI projects.

three publications. Remarkable exceptions are the peer-reviewed publication records of two USDA-Agricultural Research Service (ARS) scientists, who account for three projects during the period under study (Burke, 2005; Mazzola, 2004, 2008). These two researchers produced 41.5% of the peer-reviewed OREI publications (44 of 106). It is important to note that, for some projects, a peer-reviewed venue might not be the best way to communicate results; lack of peer-reviewed publications is not a negative reflection on the value of the research.

What does this review of dissemination venues reveal regarding awareness of past and current OREI research, if CRIS searches are no longer required? These data suggest that investigators preparing OREI proposals should emphasize a review of conference outputs, rather than the peer-reviewed literature, to be current and to avoid submission of redundant proposals. Would required CRIS searches help OREI submitters identify relevant conference outputs more readily? Possibly, but as detailed in the next section, access to these publications could be a problem for researchers, growers, and interested taxpayers.

The other publication types had minimal representation. Miscellaneous publications, appearing most often in newsletters and magazines produced by organic or sustainable agriculture organizations, comprised 10.5% (77 of 733) of total publications (**Figures 2 and 6**). There were 7 projects for which miscellaneous publications were either the sole output (Jaworski, 2008) or comprised 25% or more of the project's publications (Berkett, 2006; DeWitt, 2005; Gliessman, 2004; Jahn, 2004; Mohler, 2004; Renner, 2007), serving as another means of "extension" communication. Interestingly, many researchers did not report theses or dissertations in

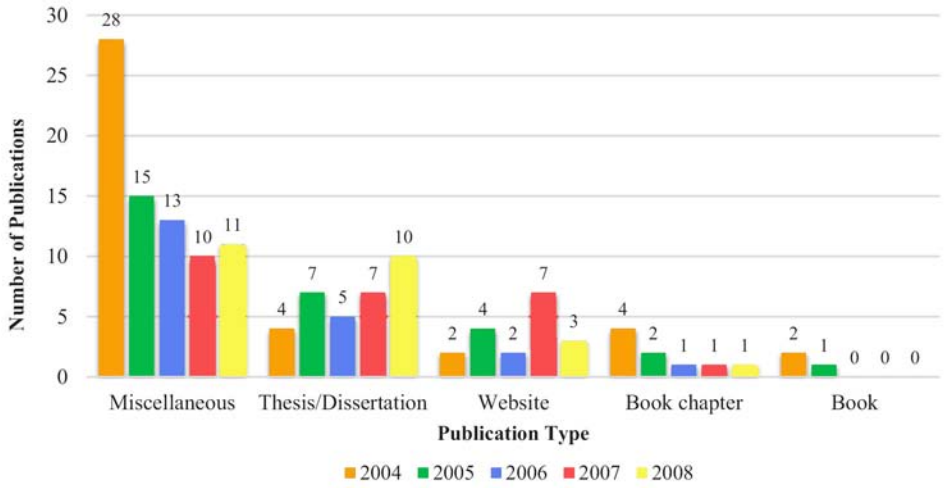

Figure 6. Number of publications in the categories of miscellaneous, thesis/dissertation, website, book chapter, and book per FY from OREI projects.

the CRIS publication lists, but mentioned these works in the narrative describing impacts on education. While librarians view a thesis or dissertation as a publication, scientists often consider the peer-reviewed derivations from the thesis or dissertation as being more valuable. While the total number of websites was small, 12 of the 29 projects reported one or more, most often in the narrative rather than the publication list. In the first round of OREI awards, two of the six projects reported websites (Jahn, 2004; Mohler, 2004). The following FY, four of five projects reported a website as part of their output (Burke, 2005; DeWitt, 2005; Kloepper, 2005; Snapp, 2005). The project reporting the greatest number of websites (5) was *eOrganic: Extension for Organic Agriculture* (Stone, 2007), reflecting the growing emphasis on digital information portals. However, as detailed in the following section, ongoing website access and preservation was a challenge. It is also interesting and ironic that digital delivery of organic agricultural information increased at a time when the federal government and the agricultural and library communities expressed ongoing concerns about the digital divide, particularly for those in rural areas (Rural Satellite and Cable Systems Loan Guarantee Proposal and the Digital Divide in Rural America, 2000). The final categories of book chapters and books, taken together, made up less than 2% of the publications reported. This is consistent with both anecdotal and interview-based observations that neither is a primary publication venue for scientists (Cooper, 2017).

To conclude, some general observations from the analysis of the aggregated data are:

- There was no correlation between the award amount and total publication output. For example, among FY 2004 awards, two similarly funded projects produced 60 (Gliessman, 2004) and eight (Mohler, 2004) publications, respectively, while the most highly funded project reported a total of 18 (Jahn, 2004). Similarly, there was no relationship between award amount and the number of peer-reviewed publications.
- There appeared to be an association between the length of the award and the production of peer-reviewed publications, with a significant increase for projects funded for four years (**Table 3**). However, the data set tested is limited in size; in addition, it is possible the data are skewed because two of the four-year awards went to a highly productive USDA-ARS scientist (Mazzola, 2004, 2008).
- Very few researchers acknowledged the OREI as a funder on their publications, limiting discovery in indexes with a "funding agency" or "funder" search field.

Accessibility and preservation

Overall, 69% of the publications were still accessible, either digitally or in print, as of November 2017. As data collection for this study occurred over several years, the author noted publications that were openly accessible in 2014 and in 2017. However, 2014 data were missing for the publications from one project in FY 2008; as a result, only publications from FY 2004 to 2007 were included in this analysis. In aggregate, there was virtually no change in open access between the two time points: 422 and 420 publications in 2014 and 2017, respectively, accounting for

Table 3. Association between the duration of OREI funding and the production of peer-reviewed publications.

Length of OREI award (years)	*No. of OREI awards (2004–2008)*	*Total no. of peer-reviewed publications*	*Average no. of peer-reviewed publications*
1	2	0	0
2	2	0	0
3	6	19	3.2
4	8	53	6.6
5	11	34	3.1

Chi-square *p* value = 2.54973E–20.

approximately 57% of all the publications. For two publication categories, book chapters and books, there was no change in access over the three-year period (**Table 4**). However, an examination of the other categories reveals gains and losses in access over time. On a positive note, theses and dissertations became more accessible online, as an increasing number of universities made these publications available through their institutional digital repositories. Also increasing in accessibility were abstracts and presentations (for FY 2006 and 2007), due in part to professional societies making their conference outputs available online. Of particular note are the North Central Weed Science Society, World Aquaculture Society, Aquaculture America, and the American Society for Horticultural Science; when this study commenced in 2011, the author had to request abstracts published by these entities via interlibrary loan. Of concern is the loss of access to conference outputs from the earlier years of the OREI awards, due to professional societies, trade associations, and universities removing older content from websites without any discoverable attempt at digital preservation. If this information did not find its way into another, still accessible publication, it may be lost as it lacks a print parallel. There also was a loss of access to extension and experiment station publications, because of revisions to the original content or removal from websites. The loss of conference, extension, and experiment station information detailed in this study—part of the gray literature of agriculture—further underpins concerns expressed by other agricultural information professionals about the loss of an increasing amount of born-digital content (Eells, 2007).

Another aspect of this analysis was to determine the number of the reported outputs of the OREI research that were inaccessible or only available for a fee. As described previously, this is a truncated data set, for awards from FY 2004 through FY 2007, due to missing data. Included in these data are publications that went from being openly accessible

Table 4. Tabulations and trends for openly accessible publications from OREI research (FY 2004-FY 2007), 2014 versus 2017.

Fiscal year	*Abstract/ presentation*		*Extension/ AES*		*Peer-reviewed*		*Miscell-aneous*		*Thesis/ dissertation*		*Book chapter*		*Book*	
2004	33	27	2	2	18	18	19	18	0	2	2	2	1	1
2005	44	41	11	8	12	11	9	9	4	4	1	1	0	0
2006	**29**	**38**	3	2	**3**	**4**	6	6	**2**	**3**	0	0	0	0
2007	**24**	**29**	192	184	2	2	2	1	3	6	0	0	0	0

First value in each category is the number of openly accessible publications in 2014; second value is that for 2017. Shaded cells indicate a loss of access, bold numbers an increase.

Table 5. Tabulation and trends for inaccessible publications from OREI research (FY 2004–FY 2007), 2014 versus 2017.

Fiscal year	*Abstract/ presentation*		*Extension/ AES*		*Peer-reviewed*		*Miscell-aneous*		*Thesis/ dissertation*		*Book chapter*		*Book*	
2004	22	27	1	1	0	0	1	2	0	0	1	1	0	0
2005	9	10	2	4	1	1	3	3	1	1	0	0	0	0
2006	12	15	0	1	0	0	1	4	0	0	0	0	0	0
2007	4	6	2	8	0	0	6	8	0	0	0	0	0	0

First value in each category is the number of inaccessible publications in 2014, second value is that for 2017. Shaded cells indicate an increase in the number of inaccessible publications.

to lost. In 2014, 66 publications (9% of the total) were inaccessible; by 2017, this increased to 92, or 12% of all reported outputs (**Table 5**). Once again, there is a trend towards loss for conference outputs, the primary dissemination venue during the first years of OREI awards, as well as for extension/AES and miscellaneous publications.

There are few organized and openly accessible collections of organic agricultural research information. Notable exceptions are *eOrganic* (Oregon State University, 2014), the National Agricultural Library's historical *Organic Roots Collection* (U.S. Department of Agriculture, National Agricultural Library, n.d., a) and *Organic Eprints*, established by the International Centre for Research in Organic Food Systems (n.d.). The latter two collections also serve as stable digital repositories. As alluded to earlier, concerns about the preservation of born-digital scholarship and its underlying research data pre-date this study. There was limited evidence of digital preservation (**Table 6**). In evaluating abstracts, conference proceedings, and presentation, digital preservation in a trusted repository was poor; most of this information appeared on conference websites, some of which disappeared over time. Most conference outputs were not present in eOrganic, even for projects still ongoing after its 2007 inception; while not a trusted repository, eOrganic was to be a

Table 6. Digital preservation of OREI publications, from FY 2004–FY 2008 awards, as of November 2017.

Fiscal year	*Abstract/ presentation*	*Extension/ AES*	*Peer-reviewed*	*Miscell-aneous*	*Thesis/ dissertation*	*Book chapter*	*Book*
2004	0	2	9	9	2	0	0
2005	0	0	10	2	6	0	0
2006	2	0	0	0	3	0	0
2007	0	0	0	0	6	0	0
2008	0	0	7	0	8	1	0

digital clearinghouse for OREI and other organic agricultural research information. In other cases, URLs reported in CRIS were broken, but rarely was there a re-direct. The author discovered the new URLs via Google searches; perhaps a grower or researcher would make that effort, but they might assume the information is no longer available. There was little representation of lost conference information in the Internet Archive's WayBack Machine, also not a repository; however, project websites that were no longer available at the reported URL were available there. As previously mentioned, the efforts of academic institutions to preserve theses and dissertations was evident, with 76% of these publications available and preserved in institutional repositories. Another relatively positive area for preservation was peer-reviewed publications (24%), primarily due to NAL's efforts to capture USDA-ARS scientists' work in *PubAg*, and the University of Minnesota's preservation of agricultural and applied economists' publications in *AgEconSearch*. Overall, only 9% of the publications from OREI's first five years were in stable repositories.

This analysis further documents the ephemeral nature of extension information and of organic agricultural research. These data support the concern expressed by the Organic Farming and Research Foundation (Schonbeck et al., 2016) about a lack of dissemination and access to pre- 2007 OREI research, predating the eOrganic effort. These authors recommend that USDA develop "a 'one-stop shop' consisting of a searchable database leading to links to key practical outcomes or research findings on any topic or commodity, [to] assist searches by producers and agricultural professionals, thereby facilitating both future research efforts and producer adoption of existing outcomes" (Schonbeck et al., 2016, p. 52). It is unfortunate that the OREI investigators did not fully adopt the eOrganic clearinghouse model and that the alternative relies on USDA to develop another tool for organic producers to use. It is interesting that another clearinghouse, Farm Answers (University of Minnesota, 2018), which supports the USDA's Beginning Farmer and Rancher Development Program, appears to be more successful in its efforts to collect and disseminate information to producers; this may be due to more consistent funding and/or stronger requirements for information deposit there. Could NAL and/or another institution(s) develop a subject repository for USDA-funded organic agricultural research and data? In OREI's recent Request for Applications, applicants are to discuss public availability of research data in the data management plan, and are "encouraged to consider using platforms…provided by USDA (e.g., the Ag Data Commons)" (U.S. Department of Agriculture, National Institute for Food and Agriculture, Organic Agriculture Research and Extension Initiative,

2017b, pp. 21–22). With the opportunity to do data-literature linking in the Ag Data Commons, much of the output of these projects might be captured and preserved. These suggestions do not address retrospective capture of publications and data, however. That work may continue to be the responsibility of the community of agricultural librarians.

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