



# A Survey of Business Trends at BioOne Publishing Partners and Its Implications for BioOne

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**abstract:** This paper describes a survey of BioOne participating publishers that was conducted during the fall of 2003. In that survey, BioOne collected data from 18 not-for-profit publishers on circulation levels, scholarly output in terms of pages and articles produced, revenues, and expenditures. From eight of the publishers, complete profit, loss, and circulation information was gathered, while the remaining 10 publishers only provided circulation data and answered general operations questions. This information was then compiled to compare the business operations of these publishers against industry-standard benchmarks to assess their business practices and to examine the effect of recent trends on publishers' revenue streams and costs. The paper also explores these data in relation to shifting to a publishing model based not on print but electronic subscriptions.

## Introduction

As digital versions of scholarly journals are gaining wider acceptance among librarians and users, there is an increasing trend away from print-based subscriptions to electronic-only access as a means for receiving scientific information. This trend has a number of causes, primarily centered on the increased functionality, ease of use, searchability, and accessibility of the online versions of these publications. A great deal of research substantiates the trend toward increasing usage of online journals and the overwhelming preference among scholars for electronic versions of journals. A sampling of recent research on this topic supporting this conclusion includes: Sarah E. Aerni et al.'s 2003 study of electronic journal usage at three universities; the 2001 Boston Consulting Group and Harris Interactive report on doctors' online

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usage; Steve Hiller's 2001 survey of the University of Washington users; Sandra DeGroot and Josephine Dorsch's 2003 analysis of user preferences at Illinois University at Chicago Library; and Janet Palmer and Mark Sandler's 2003 research at Michigan University.<sup>1</sup>

However, while print is reduced in importance and the electronic version gains in prominence, the financial burden of operations must also shift from a print-based subscription model, in which the majority of revenue is derived from sales of print copies of the journal, to one in which the electronic version provides a proportionate share of total income. To establish a basis for managing this shift, several important questions need to be answered. These include: What are the content creation costs, i.e., the costs associated with producing the editorial content of a journal? What percentage of overall revenue is derived from institutional subscriptions, and what might be the likely effects of the shift by librarians away from print subscriptions in this revenue pattern? How quickly are institutional print subscriptions declining? Finally, how can BioOne and its participating publishers anticipate these changes and prepare for them?

There is little empirical data available publicly that addresses these questions—primarily because such information is proprietary, and publishers have no incentive or reason to release it—indeed, there could be a competitive disadvantage in doing so. However, we believe that a broad understanding of the trends taking place in scholarly publishing and how these trends affect not-for-profit publishers is crucial to a balanced approach in finding a solution to the problems facing libraries. The purpose of sharing the results of this survey is to enlighten the participants in the scholarly communications community about some emerging trends affecting BioOne publishers and to add to the ongoing discussions about the future of online publishing, be it through subscription or open access models.

This survey was undertaken to examine the costs of producing a scholarly, scientific journal at the small to mid-sized academic societies that participate in BioOne and to establish a baseline for the revenue needs to produce the content and support publications within such societies. We also wanted to analyze the revenue streams that support publication, to quantify the importance of each income source, and to determine how these are shifting in the transition to online formats. We examined trends in circulation data that are affecting these revenue streams. The overall purpose of the study was to help frame internal discussions about future plans in the light of factual information provided by the publishers. In particular, we are exploring the potential need to shift our business model, which currently provides participating publishers with online production capabilities and modest incremental royalty revenues from participation in BioOne. Given changes in publishers' circulation and revenues, BioOne may need to respond by developing a model that provides revenue replacement, as distinct from current supplementary royalties to publishers, to compensate them for declines in print-based revenue.

It is important to note that this was not a comprehensive survey of all of scholarly publishing or even all of the not-for-profit segment of the industry. It represents only a snapshot of a small cross-section of one particular publishing niche; and although some generalizations can be drawn and are articulated here, they clearly should not be drawn too broadly.

Each field—indeed, each publication—is affected differently by changes in the marketplace. How each organization faces the particular challenges of its publishing



business will depend on its specific mission and structures, as well as an assessment of its long-term goals and strategy in the context of the most pressing issues facing it. By making this data and subsequent analysis available, we hope to provide some points of comparison that academics, administrators, librarians, and societies who are facing issues related to scholarly publishing can use to make informed decisions about how to best manage their operations.

## Role of Societies

Scientific societies play a vital role in the promotion and communication of science, and they do this in a number of ways. A recent survey conducted by *The Scientist* magazine indicated that over 80 percent of scientists belong to at least one scholarly society. When asked why they join professional societies, readers cited participation in meetings and conferences (67.4 percent), association with fellow scientists (65.6 percent), and subscriptions to research journals (60.1 percent) as their major motivations.<sup>2</sup> In addition to fostering the development and dissemination of research, societies also provide services that foster the public good, such as education, outreach programs, professional certification, and legislative activities. While journal publication is one important part of societies' activities, it is by no means the only important activity of these organizations; however, publishing often generates a portion of the revenues that support other activities.

## What is BioOne?

In 1999 representatives from libraries, scholarly societies, commercial business, and academe formed BioOne to provide an electronic publishing platform for journals in the biological sciences. This unique collaboration developed in response to two key observable trends: increasing prices for scholarly information and the consolidation of journals within commercial publishers as a result of mergers and acquisitions. Much has been written on the economic basis for these trends, particularly Mark McCabe's work on the impact of mergers on journal prices.<sup>3</sup> From the outset, BioOne's mission has been to work collectively with stakeholders in the scholarly publishing system to preserve cost-effective access to high-quality scientific literature produced by not-for-profit publishers. Initially providing an electronic service for 35 journals in the ecological, organismal, and environmental sciences, BioOne has doubled in three years the number of titles it hosts.

BioOne is also currently returning modest income to the publishers for participating in BioOne. Royalties are paid to each participating publisher to compensate them for including their content in BioOne. (N.B. There are three titles that participate in BioOne that are open access journals. There is no charge to libraries for their content, and they do not receive any payment for participation in BioOne, as other journals outlined here do.) The funds to pay these royalties are drawn from a pool that represents 50 percent of the annual net income BioOne receives from all subscription sales. These funds are then distributed to each publisher based on a year-end calculation of a journal's number of pages in the database and the relative number of article hits the

journal received during the prior year. The remaining funds support the technical conversion of the pre-publication files BioOne receives from the publisher, the costs for Web hosting and development, and all other BioOne operations. As a not-for-profit organization, BioOne's charter limits the amount of any annual surplus BioOne can retain. Any annual surplus beyond that specified limit is added to the pool of funds that is distributed to the participating publishers. This structure allows the greatest percentage of funds from subscription sales to pass directly to the publishers while simultaneously allowing BioOne to negotiate competitive rates for technological services on behalf of the participants.

From its first release in the spring of 2001, BioOne has grown rapidly; it now reaches more than 5.5 million scholars, students, and researchers at 560 subscribing institutions worldwide. BioOne is also fulfilling its goal of providing non-profit publishers a means of publishing their content online at a reasonable cost and, thereby, improving distribution of their scientific knowledge while maintaining their editorial independence.

### **What We Set Out to Do With This Survey**

In the summer of 2003, BioOne undertook a survey of a representative sample of our participating publishers. With the help of Mary Waltham, a publishing consultant, we contacted 18 of our 51 participating publishers. From eight of the publishers, representing 12 journals, we requested a complete set of their financial and circulation data from the last three complete fiscal years, which they willingly provided based on a clear conviction from all involved that this was essential for understanding the status quo and that such information would be treated in utter confidence. From the additional 10 publishers, representing 11 more journals, we requested and received a smaller range of data, focusing primarily on circulation levels. By analyzing all of these data, we hoped to accomplish four main objectives. First, we hoped to measure the rate of movement of institutional libraries away from purchasing print and toward electronic versions of journals. Next, we wanted to measure the effects that this had on net revenue to the publishers. Third, we wanted to compare all of the fixed and variable costs of our participating publishers' journals to determine if they fell within industry-standard ranges, and, if possible, to find and propose ways our publishers might reduce those costs. Finally, we hoped to determine within our group of publishers the range of total fixed costs of producing a scholarly journal, whether print or online. Building on these results would provide a benchmark for restructuring the BioOne business model so that the participating publishers could prepare for the financial shift associated with the transition from a print-based model (in which electronic royalties—such as those from BioOne—add incremental revenue to the participating journals' business) to an electronic-based model (in which a significant portion of those journals' costs are borne by revenue from electronic sales.)

### **Survey Methodology**

The first stage of our two-part survey was to collect and review financial and circulation data from 12 journals published by eight publishers. These publishers are all par-

ticipants in BioOne and represent a range of the types of publications included in the BioOne service. The journals varied in frequency from quarterly to monthly, with the majority being issued bi-monthly. Each publisher was asked to provide the following information for the years 2000, 2001, and 2002:

- Profit and loss statements detailing revenues and expenses
- Circulation figures for member, non-member, and institutions
- The number of articles, pages, and issues published per calendar year

An additional 10 publishers of 11 journals participated in the second stage, and they were asked to provide:

- Member, non-member, and institutional subscription figures for 2000, 2001, and 2002
- Membership dues increases in dollar and percentage terms in 2000, 2001, 2002
- Increases in journal publishing costs per year from 2000 to 2002
- The percentage of total revenue from each of the various sources
- Whether the journal has a page budget and how it is controlled
- Ranking of the greatest threats facing the journal

## Pricing

There is little doubt that the societies and publishers that participate in BioOne produce high-quality content and distribute that content in a cost-effective manner at a reasonable price to libraries. The average price for a BioOne participating journal in 2004 is \$186. This compares with an average price per title among the 222 journals ranked by the Institute for Scientific Information (ISI) in the biological sciences of \$1,377 according to the 2004 *Library Journal* periodical pricing survey.<sup>4</sup> For titles in the field of botany, this figure is \$1,048 among those 62 journals. And among the 100 titles in the field of zoology, the average price per title is \$918. Of the 70 journals in BioOne, 54 are currently ranked by ISI. Over the four years encompassed by this survey, 27 percent (17 of 63) of BioOne journals did not increase their prices. Of those that did increase their prices (46 journals) the median price to institutions for BioOne journals increased by 19.6 percent or at an average annual rate of 6.1 percent. This compares to an average increase across the ISI-ranked biological science journals of \$379 or 38 percent during the same time period or at an average annual increase of 8.3 percent.

It is important to note here that percentages are often used as a baseline in library decisions. However, the pricing of print versions of the BioOne journals is a perfect example of Margaret Landesman's argument in the *Charleston Advisor* about examining percentages versus the actual dollar increases those percentages represent.<sup>5</sup> In percent-

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**However, there is a significant difference in quality between a 6.1 percent increase per year on an average \$186.00 product, where the increase is \$11.63, and an increase of 8.3 percent per year on a \$1,377.00 subscription, where the increase amounts to \$114.29.**

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age changes, one could argue that there is little difference between the BioOne journals' price increases and the overall increase in biological science journals. However, there is a significant difference in quality between a 6.1 percent increase per year on an average \$186.00 product, where the increase is \$11.63, and an increase of 8.3 percent per year on a \$1,377.00 subscription, where the increase amounts to \$114.29. While the percentage increases are comparable, the net expenditure change is over ten times as much. The *percentage increase* for the print versions of BioOne titles and all biological science titles was roughly the same from 2000 to 2004. During the same period (2000–2004), the net price increase for 64 BioOne titles was \$2,160 (\$32 average increase /title), and the net increase for all 222 biological sciences titles was \$84,138 (\$379 average increase /title).

## Revenue

During the period covered by this survey, the primary source of revenue for these titles was paid print-based subscriptions. In the survey, during the years from 2000 to 2003, subscription revenue accounted for between 64 percent and 69 percent of overall publishing income for the publishers. The other sources of substantial journal revenue included: member dues, non-member individual subscriptions, author charges (i.e., reprints, page charges, color charges, etc.), advertising, sponsorship, BioOne royalty payments, and reprints. BioOne royalties are paid to each journal according to the distribution method described previously. Other royalties include income derived from permissions to reprint articles contained in the journal in other published works, rights to produce course packs, income from other online distribution arrangements, among others. (N.B. BioOne's license agreements are not exclusive, meaning that publishers are free to submit their articles to other online distribution vendors. However, 86 percent of participating journals are available only through BioOne. Only one of the journals included in this survey is available online through another service.) Table 1 provides a break down of the percentage revenues from each source for all the journals combined. Since revenue figures were not available for two of the journals in 2000, the key figures in table 1 are the percentages of revenue from each income source despite the variations in sample size. While there is significant dependence on subscription revenue, there are also reasonably robust sources of other revenue—a positive sign for these publishers.

To compare the figures across the three years covered by the survey, we examined trend data among 10 of the 12 titles from stage one of the survey where complete data were available. Combined revenue figures are shown in table 2 for the 10 journals for which a full three years of revenue data were available. Since 2000, the total revenue for the 10 journals has dropped only slightly over the three years by some 0.5 percent. But this small total percentage fall in revenue masks some more troubling trends. Between 2000 and 2002, only four revenue lines saw an increase while seven of the revenue lines saw decreases. The total revenue contributed by the four revenue lines that increased represented only 11.6 percent of the total income for all of the 12 journals at the end of 2002. Excluding the positive effect on overall revenues of the increases in BioOne royalties, the situation is considerably bleaker with net revenues down by \$151,504—a 5.5 percent drop from 2000 to 2002, and in particular an 11.9 percent drop between 2001 and 2002.



# Table 1

## Journal Revenue by Source

Revenues by source	2000	2001	2002
	% of total (10 jnls)	% of total (12 jnls)	% of total (12 jnls)
Subscriptions	69.00%	64.00%	66.00%
Members dues/subs	3.70%	4.80%	5.00%
Advertising	3.50%	3.30%	3.60%
Sponsorships/supplement	0.44%	1.00%	0.01%
Reprints	4.30%	4.70%	4.00%
Page charges	14.20%	12.20%	11.40%
Color fees	0.65%	2.00%	2.00%
Back issues	0.15%	0.20%	0.13%
Royalties (excluding BioOne royalty)	1.00%	1.00%	1.35%
BioOne royalties	0.00%	4.70%	4.70%
Misc/other	2.30%	2.13%	1.65%

In addition to the BioOne royalty, the three revenue lines that showed some increases were: advertising, royalty payments, and color fees. Color fees are tied explicitly to production costs incurred by the publisher and charged to authors for the color figures in their article. While this revenue line showed an increase, it was offset by similar increases in production costs. There was a very modest increase in advertising revenue—but few of the journals accept advertising so this is likely to be unrepresentative. Royalties (other than from BioOne) also increased moderately. While collectively the journals saw an increase of total revenue from 2000 to 2001, this positive revenue movement was reversed from 2001 to 2002.

The year 2001 saw a peak in revenues over 2000 for these publications, with a total revenue increase of 7.2 percent. The majority of this increase was a result of royalty payments from BioOne. If BioOne royalties are removed from the mix, the increase in revenues was much more modest, rising only 1.9 percent from 2000 to 2001. The remaining increase came from modest increases in print prices, mitigating modest losses of print subscriptions. Sponsorships and one-time supplement sales also increased significantly in 2001, contributing to the increase in overall revenues. But again, only a small number of the journals accept this business; and so, as with advertising, the results are not representative of the group of journals.

However, these modest gains deteriorated in 2002. The total revenue saw a drop of more than 7 percent—or \$213,869 from 2001 to 2002. While almost every revenue line saw decreases, the most significant declines were in the subscription revenue, reprints, one-time supplements, and miscellaneous/other revenue. The subscription revenue line

**Table 2**  
**Revenue Sources—Ten BioOne Journals**

Revenues by source in \$	2000 (10 Jrnls)	2001 (10 Jrnls)	2000–2001 % Inc/Dec	2002 (10 Jrnls)	2001–2002 % Inc/Dec	Net 00–02 \$ Change	Net 00–02 % Inc/Dec
Subscriptions	1,922,541	1,957,167	1.80%	1,843,159	-5.83%	-79,382	-4.13%
Members dues/subs	102,314	93,908	-8.22%	99,906	6.39%	-2,408	-2.35%
Advertising	97,224	101,956	4.87%	104,753	2.74%	7,529	7.74%
Sponsorships/supplement	12,035	33,107	175.09%	415	-98.75%	-11,620	-96.55%
Reprints	119,787	125,361	4.65%	107,071	-14.59%	-12,716	-10.62%
Page charges	390,760	376,729	-3.59%	335,608	-10.92%	-55,152	-14.11%
Color fees	17,831	17,341	-2.75%	20,505	18.25%	2,674	15.00%
Back issues	4,233	2,672	-36.88%	2,655	-0.64%	-1,578	-37.28%
Royalties	26,904	34,460	28.09%	42,079	22.11%	15,175	56.40%
BioOne royalty	0	147,920	>1000.00%	137,108	-7.31%	137,107	>1000.00%
Misc/other	63,287	65,768	3.92%	49,263	-25.10%	-14,024	-22.16%
<b>TOTAL</b>	<b>2,756,916</b>	<b>2,956,389</b>	<b>7.24%</b>	<b>2,742,520</b>	<b>-7.23%</b>	<b>-14,396</b>	<b>-0.52%</b>
Net Change		199,473		-213,869			-14,396
Net Change sans BioOne		51,553		-350,977			-151,504
Net % change (excl. BioOne)		1.87%		-11.87%			-5.50%

Note: Profit & Loss statements for 2 of the journals were not available for year 2000, so these titles are not included.



dropped more than \$114,000 (5.8 percent) compared with 2001 and accounted for more than half of the overall drop in revenue, year on year.

Again, the overall revenue trend was mitigated by the royalty income provided by BioOne in 2002. Subtracting the royalty that these publishers received from BioOne, the net drop in income was \$350,977 or 11.9 percent year over year. Even though revenue from BioOne decreased in 2002 from 2001 by 7.3 percent across the 10 journals surveyed, it still represented the only revenue line to show a significant increase from 2000 to 2002. By the end of 2002, revenue for this group of 10 journals from BioOne was some 4.7 percent of total income while the remaining 95 percent was from other sources—mostly print-related.

The decrease in BioOne royalty payments was due to an increase in the number of titles participating in BioOne and the subsequent increase in the number of royalty pool distributions. While 35 titles were added to the service—doubling its size in content terms—the average price paid by libraries only increased by 20 percent over the same time period. Subsequently, while the overall royalty pool increased, the royalty pool funds from BioOne were divided across more journals without an adequate increase in the size of the pool to reflect the increased level of content, thus diminishing the proportion each participating journal received.

## What are the Costs of Publishing a Journal?

The study also focused on developing a deeper understanding of the actual costs that BioOne publishers incur to produce their journals. Publishing costs can be divided into two component categories: *fixed* costs that are incurred regardless of the number of subscribers and *variable* costs that are associated with each subscription and, in general, increase or decrease as the number of subscriptions increase or decrease.

*Fixed* costs involve both content creation and publishing support activities:

- Content creation is all the costs associated with preparing the editorial content for publication. It includes the editorial office and reviewing, editing, SGML/HTML/XML coding, and page composition of both articles and non-article content, such as letters to the editor, book reviews, and advertising—all done in preparation for print or online distribution.
- Publishing support activities are non-editorial yet fixed journal costs—such as marketing, advertising sales, finance, office costs, and administration.

*Variable* costs include:

- Manufacturing—paper, printing, and binding
- Distribution costs of the print journal or as an electronic product
- Order fulfillment—subscriber file maintenance of all subscriber types

Each publisher maintains its own specific cost-accounting system, and an attempt at standardization was required to provide comparative data. The costs for all the 12 journals have been sorted as accurately as possible from the data supplied by the eight publishers according to the fixed and variable categories identified (see table 3). Note that there was a lack of complete information available from some of the publishers for

## Table 3

### 12 BioOne Journals—Total Fixed and Variable Costs

Cost category	Total cost in 2000 (9 Jrnls)	% of cost in 2000	Total cost in 2001 (11 Jrnls)	% of cost in 2001	Total cost in 2002 (12 Jrnls)	% of cost in 2002
Fixed -						
Content creation	364,254	20.17	442,944	21.58	583,999	24.47
Fixed - Selling, general and admin. costs (publishing support)	801,368	44.37	854,200	41.61	917,600	38.45
Variable -						
Manufacturing, paper, printing	516,927	28.62	585,887	28.54	704,600	29.52
Variable - Distribution and fulfillment	123,653	6.85	169,718	8.27	180,316	7.56
<b>Total all publishing costs</b>	<b>1,806,202</b>		<b>2,052,749</b>		<b>2,386,515</b>	

the successive three-year period; therefore 2000 refers to 9 journals, 2001 to 11 journals, and 2002 refers to the costs of 12 journals. Given the shortage of data, the percentage of costs in each year are the most relevant to consider.

To provide a point of comparison for how typical or representative these costs are, table 4 gives some data based on internal experience and a model developed by Carol Tenopir and Donald King, which has been adapted for this comparison.<sup>6</sup>

The exact allocation of these costs varies by publisher and by product type, but these average figures provide an independent sense of proportion to the major expenditures. Compared to the other journals, BioOne journals appear to have:

- Content creation costs that are lower than average
- Publishing support costs that are slightly higher than average
- Manufacturing costs that are slightly higher than average

We believe that publishers who participated in this study understated distribution and fulfillment costs—most of the publishers were not able to separate these costs from their manufacturing costs, both of which were often outsourced to one supplier. Costs of maintaining the societies' membership files may also not fall within the publication profit and loss statements provided and are another source of understatement in tables 3 and 4.

Publishing support costs are generally higher, because the BioOne publishers typically produce between one and five journals and, therefore, do not have the cost-effi-



## Table 4

### Typical Cost Ratios for Academic Journals

Cost category	Learned journal university press	Journal with advertising-commercial publisher*	Journal at large society publisher*	12 journals BioOne publishers (2002)	Average scholarly journal**
Content creation	30%	26%	31%	24%	37%
Publishing support (Sales, G&A)	28%	33%	16%	38%	30%
Manufacturing, paper and printing	25%	26%	25%	30%	19%
Distribution and Fulfillment	17%	15%	28%	7%	14%

\* Data drawn from industry experience of authors.

\*\* After Tenopir and King.

ciencies of larger publishers. Manufacturing costs may also be higher than industry averages because of the lack of buying power that small or single-title publishers have with printers. Clearly, there are several areas of cost control and increased buying power that would be to the advantage of small society publishers.

Print and electronic publications have distinctly different cost bases with some cost lines irrelevant to print, such as online hosting and site maintenance; some only related to print, such as print and mail costs; and some costs applying to both media, such as content creation and customer service. The cost base is also changing as the online version becomes the publication of record, and additional or supplementary information may be incorporated that potentially increases costs for electronic versions.

Content creation costs are incurred irrespective of whether the product is published in print or online or both. *All publishing activity incurs content creation costs.* The cost base here will clearly change if the print and online version become distinct—as they are in a number of STM disciplines. Publishing support activities will also be incurred for both types of product. As online increasingly becomes the medium of choice for end users, it is reasonable to presume that, like revenue, fixed and variable costs must naturally make a transition from a purely print cost base to a more balanced allocation.

### Trends in Cost Categories 2000 to 2002

The survey highlighted that:

- *Content creation* costs have increased for the titles as a percentage of total costs and ahead of increases in the other cost lines.

- *Publishing support costs*, although high, have fallen as a percentage over the three years.
- *Manufacturing costs* have risen the most, despite the fall in print copies published by the journals, as shown later in circulation data in table 6.

During the three years covered in this survey, the overall costs to produce these journals have increased significantly. Between 2001 and 2002, costs increased by a total of \$333,766 or \$27,818 per journal—an average increase of 16 percent. This increase in cost has occurred simultaneously with the decrease in revenue described previously and has put significant pressure on the overall financial health of the societies surveyed.

In 2002 the average content creation cost per article for the 12 BioOne journals reviewed here was \$510, and the average revenue per article in the same year was \$2,681. Both of these figures are several hundreds of dollars below the benchmark numbers generated by the Association of Learned, Professional, and Society Publishers (ALPSP) benchmarking study published in September 2002, in which average “first copy” costs were \$750, and average revenue per article was \$4,000.<sup>7</sup> All the BioOne publishers are not-for-profit, and this may explain the difference—the ALPSP study covered a broad range of large and small commercial and not-for-profit publishers, a different sample from the group considered here. There is a wide difference on costs, even among the eight BioOne publishers and their 12 journals. Similarly, there was a significant range in revenue received by the journals per article.

There was little correlation between the frequency of publication and the ratio of fixed to variable costs. Publications published six times or more per year had a roughly two-thirds to one-third ratio of fixed to variable costs; while for quarterly publications, the variable costs were a more significant portion of the overall costs. One quarterly publication significantly skewed the data upward in this instance, and the results would likely be more in line with the other averages in a larger sample. As an illustration:

- Journals published 11–12 times per year: *fixed costs* = 64 percent, *variable costs* = 36 percent
- Journals published 6 times per year: *fixed costs* = 65 percent, *variable costs* = 35 percent
- Journals published 4 times per year: *fixed costs* = 52 percent, *variable costs* = 48 percent

Clearly, no two publishing operations are the same. Even two journals produced by the same publisher could have different production schedules, editorial operations, and cost bases. Some journals publish additional editorial content that is not peer-reviewed research material, such as reviews, commentary, or news reports concerning trends in the field. The editorial costs for these materials per page are usually considerably higher, because they are written and/or commissioned by in-house or freelance editorial staff. Within the 12 publications covered by stage one of the survey, in general, there is little correlation between the price of the journal and the revenue generated by its publication. However, these costs and revenue figures are considerably lower than benchmark figures for the industry as a whole.

The fixed costs of content creation and publishing support form the basis of the bare minimum income needs that must be covered to support publication. It is these



costs that support the generation of the material that is published. Regardless of the format of publication or the source of revenues to support publication, any sustainable model must generate enough revenue to cover these minimum costs, as well as the variable costs of distribution. While the variable costs of producing electronic content may be lower, these costs are by no means zero. (There is little concrete information that points specifically to how much lower these costs might be. For a more detailed analysis of this, see the 2004 report from The Wellcome Trust.<sup>8</sup>) It is important to note that these are the *minimum* revenue requirements to produce content and that some consideration of surplus must be added to support the parent organization producing the journal and enable ongoing investment. Any model that fails to cover the costs of publication—both fixed and variable—will not be able to continue operation. This is equally true in subscription-based models as it is in other publication models currently being considered, such as various open access models.

### How Can These Publishers Reduce Costs?

As revenues continue on a downward trend and costs increase, the group of publishers surveyed will need to act aggressively to restrain expenses. There are immediate tactics that not-for-profit publishers can adopt to control costs, and these became clear as a result of our survey. For example, of the nine publishers responding to a question regarding page budgets, only one of the publishers reported that they imposed a page budget on their journal. A page budget is usually set in advance by the publisher and is the total number of pages the journal will publish within a single year or longer period.

The page budget is normally based on recent trends in submission and acceptance of articles. Editors can balance their page budget from one issue to another in order to achieve and not exceed the total annual page budget. Since both fixed and variable costs increase as the amount of content published increases, controlling the number of pages effectively controls the costs to produce a journal. This is a fairly standard cost-control measure that publishers can implement since the number of pages published

drives both content creation and distribution costs. One possible reason publishers may not have implemented page budgets is editors might prefer not to be constrained by limits to the amount of material they can include in any particular issue or volume.

Our research indicated that the costs that publishers were paying for some services varied considerably, often exceeding industry average prices for similar services. Certainly, part of the reason for this variation from pricing norms was due to the fact that each of these publishers operated individually and lacked the buying power that a publisher with dozens or even hundreds of titles might have when negotiating with vendors. However, knowledge of these benchmarks and use of competitive bidding may help to bring these costs down. Forming a consolidated buying group to leverage the size of BioOne to negotiate for lower prices from vendors is one strategic option that BioOne is exploring.

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**Since both fixed and variable costs increase as the amount of content published increases, controlling the number of pages effectively controls the costs to produce a journal.**

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Given the relatively small circulation levels of these titles, even the complete reduction of institutional print, which represents roughly one third of total circulation, would not significantly reduce the total cost of producing print copies should the membership wish to retain print subscriptions. Only if members were to also forego print copies of the journals would the publishers realize significant cost savings. The primary reason for this is that the first copy printing costs are such a high proportion of the overall manufacturing costs that the marginal savings from reducing print runs on relatively small circulation journals is quite modest. Potential changes in printing technology, such as implementation of print on demand, should change the economics of this system.

Data collected from this survey also indicated that those societies that allocate a percentage of member dues to cover subscription costs are providing those member

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**In the future, society members may have to shoulder an increasing burden of publication costs as institutions move to online-only access if members are not also willing to move simultaneously to online delivery.**

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print subscriptions at a loss to the publishing operation. In the future, society members may have to shoulder an increasing burden of publication costs as institutions move to online-only access if members are not also willing to move simultaneously to online delivery. Receipt of a printed journal may become a premium service for which members can opt and pay for beyond their basic membership fee. Active exploration of

the feasibility of print-on-demand services and online-only versions for members would be prudent steps for societies at this time.

### Surplus or Loss

The journals participating in BioOne generally operate on a cost-recovery or modest surplus basis. Total surplus generated by any one journal in one year ranged from \$221,376 to \$6,887. Total losses ranged from \$36,883 to \$3,140. It is important to note that it was not always the same journal that ran into the red each year. While many of these journals generally operate at as close to break-even as possible, it is not unusual for them to generate a small surplus one year and a modest deficit the next. However, this makes any significant loss in revenue or increase in expenses during a year a difficult experience to manage, especially since societies typically plan and project for a single budget year only. A significant loss, or persistent moderate losses, could actually mean the demise or sale of a publication, particularly for smaller journals.

For some of the societies that do generate a surplus, those funds are rolled back into the publishing program, allowing the publishers to enhance their publishing programs by producing additional pages, among other things. Other societies generating surpluses from publication allocate those funds to other programs of the society that are aimed at promoting science—grants, educational programs, scientific meetings, and the like—uses that are in keeping with the mission of academe.

## Table 5

### Surplus or Loss – 12 journals

2000 (10 journals)		2001 (12 journals)		2002 (12 journals)	
Surplus:	Loss:	Surplus:	Loss:	Surplus:	Loss:
8	2	11	1	10	2

Note: Profit & loss statements for 2 of the journals were not available for year 2000

### Circulation Analysis

One of the major concerns for BioOne and our publishers was the perception that print circulation levels were dropping at a more rapid pace in recent years. One of the main goals for this research was, therefore, to quantify the pace of institutional print attrition since it plays such a crucial role in the health of these publications. Subscriptions (including member copies) to the 11 journals, for which the complete three years of circulation data were available, fell by 5,319 or 15 percent between the end of 2000 and 2002. As table 6 shows, the sharpest drop was from the end of 2000 to the end of 2001.

### Institutions

Institutional subscriptions have seen a drop of 11.9 percent over the three years of this survey. The entire drop during this period occurred from 2000 to 2001, with a very modest 1 percent increase during 2001 to 2002. The trend of falling print circulation reflected here is similar across all of STM publishing, although the especially sharp drop from 2000 to 2001 is noticeably ahead of the norm. In addition there are often particular variations by publication type, by discipline, by customer served, and by geographical location that are not shown here. Additional data are being compiled for 2003.

### Members

Numbers of member subscriptions were not available for all the journals across the three years reviewed; but for those journals where member print subscription numbers were available, changes are identified in table 6. Member print copies fell by 4,551 or 27 percent over the three years, but some of this drop is attributable to one publisher, in particular, who reduced the number of print copies published by offering members online access as part of member dues with additional charges for print. The impact has been a reduction in print subscriptions but also a reduction in costs.

## Table 6

### Trends in Subscriptions- 11 BioOne Journals

Compiled data for 11 journals over three years			
	2000(11 jnls)	2001(11 jnls)	2002(11 jnls)
Member	16,907	13,238	12,356
Non-member	543	524	492
Institution	8,773	7,679	7,728
<b>Total</b>	<b>26,223</b>	<b>21,441</b>	<b>20,576</b>
Change	2000/2001	2001/2002	Total '00-02
Member	-3,669	-882	-4,551
Non-member	-19	-32	-51
Institution	-1,094	49	-1,045
<b>Total</b>	<b>-4,782</b>	<b>-865</b>	<b>-5,647</b>
Change %	2000/2001	2001/2002	Total '00-02
Member	-22%	-7%	-26.90%
Non-member	-3%	-6%	-9.40%
Institution	-12%	1%	-11.90%
<b>Total</b>	<b>-18%</b>	<b>-4%</b>	<b>-21.50%</b>

### Industry Trends Affecting Library Subscriptions

There is a great deal of trend data on the stated shifts in librarians' attitudes toward electronic delivery of information. Below are just three recent examples of reports that cite the increasing acceptance of electronic formats and how this delivery method is rapidly affecting librarians' purchase decisions.

#### Library Journal Survey 2001

The survey states, "In all, 86 percent of librarians surveyed by *Library Journal* said that last year [2000] they cut serials subscriptions. And 42 percent said they would cut further in the coming years. 'For the titles that are full-text in our databases, we no longer receive the paper,' notes Western Connecticut's librarian Furtick. Instead, she notes, her library will use the savings from print serials cancellations to increase access to aggregated databases."<sup>9</sup>



## **ARL Statistics on Electronic Resources and Library Materials Expenditures 1992–2001**

According to data from ARL, the average electronic serials expenditure in member libraries in 1994–1995 was \$188,057, and the median was \$156,754 (data from 63 libraries). By 2001 this rose to an average of \$1,118,244 and a median of \$992,067 (data from 105 libraries). Average library materials expenditure for this group rose to \$7,818,668—of which the average expenditure on electronic resources was some 16.25 percent of that. On average, in 2001 an ARL library spent \$1,270,533 on electronic library resources, a budget item that 15 years ago barely existed.<sup>10</sup>

## **ARL Licensing and Electronic Journals Survey (July 2003)**

From the ARL survey, two key questions are of relevance to BioOne. One question asked: In general, do you subscribe only to electronic versions when both print and electronic exist? Of the respondents, 25 answered yes and 32 answered no. Of the yes's, four respondents indicated this is a recent development. Two respondents indicated that this is being done primarily in the sciences. Of the no's, six respondents indicated that they did seem to be moving in the direction of canceling print.

A second question asked: Are you canceling print versions when you also subscribe to the electronic versions? Of the respondents, 43 answered yes and 14 answered no. Of the yes's, 11 respondents qualified their answer by noting that not everything was being canceled although this was a definite trend. Three respondents stated that this practice was being emphasized for 2004 subscriptions. One indicated that they were canceling in the sciences but not the humanities and social sciences.<sup>11</sup>

## **Implications of Continued Print Subscription Erosion**

Administrators of societies are each facing their own specific challenges. Each publishing program has its own particular editorial constraints, financial needs, and publishing goals. When examining their journal's financial and circulation performance individually, each must balance the needs of their membership and organization with the publishing realities facing them. Some potential reactions to these changes and their likely effects include:

- Acceptance of smaller surplus contribution from the journal(s), which may lead to the inability of societies to continue providing the current level of services or programs
- Movement or sale of the publication to a commercial publisher, which may in turn lead to an increased journal price, as detailed in McCabe's research on mergers and acquisitions<sup>12</sup>
- Cessation of publication, which equates to the decrease of scholarly output
- Merger with other publications, which could lead to a decrease in scholarly output or loss of the publication's independence (However, in some fields where "twigging" has become so narrow that it is unsustainable, it may improve overall editorial quality.)



- Movement of the publication to university presses, which might lead to slightly higher journal prices, albeit at significantly lower prices than would result from partnership with commercial publishers

### Implications of a Shift to E-Only Subscriptions

Publishers and libraries should be in the process of adjusting their operational strategies to address these changes. The net royalty for participating in BioOne averaged approximately \$24 per institutional subscriber to the service. This is only 12.9 percent of the average print list price per journal. These figures are comparable to royalty payments by other similar not-for-profit aggregation services that pay publishers royalties. As shown in the BioOne commissioned survey, this amount does not cover even the fixed content creation costs needed to generate the scholarship published. If print subscription revenue were to disappear en masse, the electronic royalty revenue generated by BioOne would not be enough to support continued publication unless there were a significant increase in the revenue stream.

### The BioOne Response

The fundamental conclusion from this survey is that the current model for recovering costs and generating revenue to support BioOne and the partner publishers is simply not substantial enough given the transition to online-only purchasing patterns and access. BioOne was originally established to provide smaller societies and not-for-profit publishers with a vehicle for converting their journals to electronic format and to host and sell them online, in order to provide an incremental revenue stream to support print-based publication. In the first three years of operation, BioOne is succeeding in this mission. The rapid shift toward acceptance, or even reliance on, the electronic version of publications is causing a fundamental shift in the revenue streams that pay for publication. In endeavoring to help participating publishers manage the transition, BioOne royalties to publishers must become a higher percentage of total publisher revenue. Providing moderate incremental revenue will quickly become inadequate if these current circulation trends continue. The royalties from electronic publication with BioOne will need to begin to *replace* declines in print-based subscriptions revenue. The result of

this will be shifts in how electronic products must be priced and an increase in the net price that institutions must pay for online access to these resources.

Unlike other information providers, we are not proposing that libraries pay significantly more for the information that they are currently receiving in both print and electronic

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formats. Rather, the strategic moves that we are contemplating for BioOne should be viewed as a transitional move toward a reallocation of print-based and electronic-based spending.



In an era of tight budget constraints for libraries, this is a difficult message to deliver. We believe it is critical for the health of scholarly communications that the smaller, independent, not-for-profit publishers, typical of BioOne participants, have an opportunity to survive and flourish and that they develop strategies to maintain their independence through the transition to online-only or online as the dominant format for distribution. Managing the transition away from print-based subscription models toward electronic-delivery publishing will be the fundamental challenge facing these organizations and BioOne in the next several years. We are working with libraries and librarians to fashion a multi-year transition model that simultaneously supports our publishers but can fit within the budget realities that libraries face.

In this survey we set out to establish what the fixed costs of journal publishing were for a sample of our publishers in order to lay the groundwork for developing a business model that can support the publishing activities of societies partnering with BioOne. We are making public the results of this survey; because we believe that it is critical that each of our constituencies—the publishers, the societies, the library community, and faculty using these resources—understand the dynamics that are behind these shifts and the rationale behind changes in our business model that are required in response. We believe that if not-for-profit publishers, such as those in the BioOne group, are to successfully negotiate this transition, the acceptance of the conclusions drawn in this paper among the library community and among scholars and academe, as a whole, will be critical. In addition, it is vital for publishers to understand trends in their costs and revenues in order to manage their publishing business effectively.

## Conclusion

The data we collected has indicated that there has been a shift in overall circulation. Institutional print subscriptions and membership levels are in a downward trend. Revenue that is based primarily on print subscriptions—the majority of which are from institutional libraries—has dropped by 5.5 percent (and at a pace that is accelerating) if BioOne royalties are excluded and 0.5 percent if they are included. In addition to the declines in revenue, these publishers have experienced a significant increase in costs over the past three years; however, there are some strategies that publishers can undertake to reduce costs. Because fixed costs account for approximately 63 percent of publication costs over the three years in which data were collected, unless print were to disappear completely, there would not be a significant drop in the overall revenue needed to support these publications. Since some 68 percent of overall revenue is derived from institutional sales, if the drop in print institutional sales continues, other sources of revenue will need to rise to compensate for these losses. Because librarians' purchasing behavior is changing in favor of electronic-only subscriptions, and at present the royalty revenues from BioOne—the only electronic outlet for the vast majority of our publishing partners—is only 4.7 percent, the revenues from electronic publishing will need to become a larger proportion of overall revenue. Our hope is that this report sheds some light on the financial needs that BioOne publishing partners face and the scale of the revenue needed to support continued publication.

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