

APPENDIX H.

AN ACTIVITY-BASED MODEL FOR ESTIMATING THE LABOR IMPLICATIONS OF ALTERNATIVE COLLECTIONS MANAGEMENT SCENARIOS IN SMITHSONIAN MUSEUMS

This appendix describes a model created by the OP&A study team that can be used to project staffing needs for different levels of collections management activity. The model recognizes that different unit directors will make different strategic and tactical choices about the relative priority of various collections management tasks. For example, one director may wish to increase outreach through increasing loans. Another may wish to reduce the size of the unit's collections through deaccessioning and disposal of some objects. Yet another may want to facilitate access to collections by increasing the number of objects with enhanced electronic records. Each choice will require assigning additional staff to the desired set of tasks. This model estimates how many additional staff will be needed to achieve the specific targets that a director sets — assuming no significant technological breakthroughs and staff productivity that remains constant in the short term.

The FY2000 OP&A collections survey asked responding museums to estimate the number of staff in various positions and the percentage of time that these staff invested in a range of collections management-related activities in FY2000. These activities included collections development; (ongoing) care and documentation; exhibition support; reference and research/study services for internal users; reference and research/study services for external users;

outgoing loans to affiliates; outgoing loans to others; incoming loans (other than for exhibitions); public program/education support; central reporting requirements/services; and other activities. The purpose in gathering this information was to estimate the amount of labor expended in collections management functions, broadly defined, across the Smithsonian.

In the course of analysis, this list of activities was considerably altered. In the survey, units were permitted to modify the list of collections management activities if another set of activities fit their situation better. As defined by the OP&A study team for the survey, one category — “collections care and documentation” — mixed functions generally performed by care staff and functions generally performed by research staff, and ended up accounting for the bulk of collections management labor. One museum (NMNH) chose to increase the number of categories, in part by disaggregating the category of “collections care and documentation,” and the OP&A study team judged these distinctions to be useful. The list of collections management functions, incorporating the changes proposed by NMNH, is as follows:

- Acquisitions
- Deaccessions and disposals
- Repatriation
- Registration/records (including inventory control/accountability, imaging, and digitization)
- Loans (including incoming loans other than for exhibitions; outgoing loans to affiliates; outgoing loans to others; and packing/shipping)
- Exhibition program support
- Research program support (including support for Smithsonian-affiliated federal agencies and external users)
- Education program support

- Central administration reporting
- Informatics (including Web development and database management)
- General care (including basic ongoing care; preservation/conservation; storage; and move logistics)
- Training
- Other.

In developing the base staff distributions for the model, the OP&A study team drew heavily on NMNH's detailed survey response, using these categories. The aggregated distribution of labor over activities reported by NMNH was similar to the distribution for all units, but NMNH's disaggregation of broad categories provided more detailed insight into this distribution than the responses provided by other units.

The OP&A study team constructed the model using MS Excel. With the model, it explored the staff requirements for alternative scenarios of collections management activities and performance targets. As noted in Chapter 6, activities are increasingly performed by a mix of staff. Research staff such as curators and scientists, as well as designated collections care staff, may be involved in conservation tasks. Likewise, staff with primary care responsibilities may participate in acquisitions and deaccessions. Thus, the exact distribution of responsibilities will vary between museums.

A key element in the model is the postulated relationship between the performance of a collections management activity at a given level (output) and the staff resources expended on that activity (inputs). With some activities where numerical information is recorded, it is relatively easy to quantify performance — such as the number of loan transactions or records enhanced to a certain level. With other activities, it may be difficult or even impossible to quantify performance with existing information because units currently do not

collect numerical performance measures — for example, for registration or conservation activities. In calibrating the model, the OP&A study team used quantitative data where available, even if the data were from different years. For nonquantified activities, the OP&A study team used the number of reported FTEs for those collections management activities. (In the future, directors should ideally seek quantitative performance measures for all collections management tasks.)

The OP&A study team constructed alternative scenarios by “allowing” hypothetical directors to choose to perform specific collections management tasks at the current level, or to raise or lower that level by a specified amount. Any change is specified as a given percentage of current performance — for example, 125 percent if performance is to be increased by 25 percent, or 50 percent if performance is to be cut in half.

Figure H-1 shows one illustrative scenario.¹ Column 1 lists the collections management activities. The second column shows the percentage distribution of reported staff FTEs across activities in the base scenario. The next three columns break down that total into three categories of personnel: SI employees; contractors and employees of affiliated federal agencies; and volunteers/interns.

The sixth column contains a new target level as a percentage of current performance for each collections management activity. (It might be assumed that these goals represent the collective choices of the unit directors, and have been approved by the central administration.) Finally, the last column shows how many staff need to be added (or subtracted) in each category to achieve these targets. In the scenario depicted in Appendix Table H-1, the Smithsonian needs an additional 223 collections FTEs to achieve the desired

¹The scenario presented in Appendix Table H-1 summarizes the more extensive MS Excel spreadsheet that was used to calculate staff requirements for the target level of each collections management activity in Appendix Table H-2.

targets.² Where the personnel are to be found for meeting these targets is, of course, at the discretion of unit directors and senior management — they may be hired as staff, contracted, recruited as volunteers, transferred from noncollections work, or some combination of these. (The model can indicate the distribution of additional staff among employees, contractors, and volunteers on the assumption that historically observed patterns hold.) Clearly, each of these alternative sources of staff has different implications for museum finances and operations in future years.

Appendix Table H-1. One Hypothetical Activity-based Collections Management Staffing Scenario

Collections Change management needed activities	Distribution of current staff (%)	Distribution of FTEs			Target level (% present)	in staff (FTEs) (%)
		Employees (%)	Contract (%)	Volunteer (%)		
Acquisitions transactions	4	88	7	5	100	0.0
Deaccessions transactions	1	95	5	0	150	6.6
Repatriation transactions	3	100	0	0	100	0.0
Inventory control/accountability	5	73	15	12	113	4.3
Imaging	*	25	75	0	200	1.8
Electronic records meeting basic cataloguing standards	22	80	20	0	150	70.1
Electronic records meeting enhanced cataloguing standards	6	78	10	12	125	8.9
Incoming loan transactions (Other than for exhibitions)	2	85	15	0	100	0.0
Outgoing loan transactions (Affiliates)	1	94	6	0	300	9.5
Outgoing loan transactions (Non-affiliate museums)	4	73	25	2	200	27.5
Packing/shipping	1	100	0	0	200	7.0
SI museum exhibition program	2	96	1	3	100	0.0
SI/affiliated agency research program	6	78	22	0	100	0.0
External user research	5	77	23	0	100	0.0
Education program support	4	66	2	32	100	0.0
Central administration reports	1	99	1	0	75	(3.8)

² This is a net figure, assuming collections personnel are transferred from activities with targets of less than 100 percent of current levels to those with targets greater than 100 percent of current levels.

Web development	1	6	0	94	200	24.5
Database management	1	95	5	0	150	6.5
Basic care	5	13	1	86	150	19.7
Preservation/conservation	18	26	18	56	125	34.5
Storage	5	60	6	34	100	0.0
Move logistics	1	100	0	0	75	(2.9)
Training	1	96	4	0	200	12.1
Other	*	100	0	0	50	(3.0)

Total staff resources applied (%) 100

Change in staff resources needed 223.4

* Less than 1 percent.

Alternative scenarios can be constructed by entering different targets for each collections management activity in the target column.³ For any scenario, the model projects the number of FTEs required, and indicates how these FTEs would be distributed among employees, contractors, and volunteers if reported historical patterns are maintained.

As it is based on the relationships between outputs and staff at one museum (NMNH) at a given point in time, the OP&A model cannot be considered a completely accurate representation of collections management needs across Smithsonian units. Rather, it is an illustrative example of a basic decision-making model that might be adapted for collections management program planning at individual units on the basis of data appropriate to those units.

The OP&A study team developed and used this model to understand the implications of changing targets for Smithsonian collections management at a very general level. The team used the model as a rough check on whether the aggregate staffing needs that the units reported in the OP&A survey were reasonable, given certain broadly defensible assumptions about modest increases in loans (to the levels of the mid-1990s), collections care, imaging, and documentation.

³ Assuming that no activity can be completely neglected, a value of zero is precluded in the target column for any individual category.

To this end, the OP&A study team used the model to do some “what if?” forecasting. Staffing implications are shown below for three target scenarios.⁴ The results are given in FTE person-years required to accomplish scenario targets; assuming no technological changes in the relationship between labor and output, these will be the same whether the work is accomplished in 1 year, 5 years, or 20 years. Note that these are not estimates of additional staff needed for basic collections management tasks; actual personnel needs depend on the time period used to do the work.

Scenario I. Complete basic cataloguing for 1,000,000 electronic records and enhanced cataloguing for 500,000 electronic records.⁵

Scenario II. Deaccession 1,000,000 items in 2,000 transactions, including basic cataloguing of 100,000 items prior to deaccessioning (so the unit and purchaser are fully aware of what is being deaccessioned)

Scenario III. Process 100 loans to affiliate museums and 3,000 loans to other users (perhaps including enhancement or conservation loans).

Scenario I would require 2,084 FTE person-years to complete, involving primarily collections research staff. If historical patterns were to hold, the breakdown by employment status would be 1,672 FTE person-years performed by Smithsonian employees, 334 FTE person-years by contract staff, and 76 FTE person-years by volunteers if current practices are followed. An alternative approach might be to treat cataloguing as a one-time activity, particularly in the case of processing backlogs, and make greater use of contractors and employees hired for fixed terms. A completely different

⁴ Bear in mind that the results of this model most closely reflect the experience of NMNH and have been scaled up to approximate the Institution-wide situation.

⁵ In most cases, one record encompasses the information on one object. However, in other cases, especially for biology collections, a single record may encompass more than one specimen or object.

approach would be to loan items to other qualified organizations that agreed to do the cataloguing as part of their use of the collections.

Scenario II would require 246 FTE person-years, including 93 by collections care staff (72 by employees, 13 by contract staff, and 8 by volunteers, following current patterns) and 153 by collections research staff (120 by employees, 21 by contract staff, and 13 by volunteers). On the other side of the coin, a 1 percent reduction in collections size would save nearly 3 FTE person-years of care and inventory work annually. Thus, continuing savings on the cost of care would eventually offset the one-time cost of the disposal effort. Note, too, that in those cases where cataloguing has already been completed on the items to be disposed of, the disposal requires collections *care* staff almost exclusively. Nevertheless, it would take many years of savings to cover the one-time cost.

Scenario III would require 98 collections care FTE person-years (82 by employees, 16 by contract staff, and 1 by volunteers). No additional collections research personnel would be required for this scenario. The loans to non-affiliates would consume more resources than loans to affiliates, although the difference is relatively small — 47 FTE person years for affiliate museum loans and 51 FTE person-years for loans to other borrowers.

Assuming continuance of historical patterns of work, all three scenarios would involve a mix of employees, contract staff, and volunteers. Whatever the actual targets, the OP&A study team does not believe it is possible to accomplish desirable improvements in collections management while maintaining the emphasis on using federal employees. As collecting units develop their mission statements and more clearly identify the role and scope of collections needed to accomplish their missions, unit managers will need to prepare plans that procure and allocate human capital differently.

To consider the reasonableness of the estimated aggregate number derived from the units' requests in Chapter 6, the OP&A study team also applied the

forecasting model to project staffing needs for hypothetical — but broadly defensible, in the study team’s judgment — targets for collections management tasks. Among the collection management targets were: (1) decreasing acquisition and increasing deaccession transactions slightly compared to actual performance in FY2002⁶; (2) increasing inventory control and the number of records with basic cataloguing information, images, and enhanced information; (3) increasing outgoing loans to affiliate museums and other users (and increasing packing and shipping work commensurately); (4) increasing website development and database management; (5) increasing basic care and conservation, but decreasing move logistic efforts; and (6) increasing collections care training. With these assumptions, the OP&A study team projects an immediate need for a total of 77 additional collections care FTEs, consisting of 57 employees, 11 contract staff, and 9 volunteers. Further, there is a need for 32 collections research FTEs (24 employees, 5 contract staff, and 4 volunteers) and 12 informatics FTEs (9 employees, 2 contract staff, and 1 volunteer). These numbers are not dramatically out of line with the staffing needs expressed by the units in the OP&A survey.

As a final caveat, it should be noted that the OP&A model most likely projects NMNH collections management staffing needs better than that of other collecting units with a significantly different balance among research, exhibitions, and public programs — for example, those that expend a larger portion of staff time on exhibitions, or a smaller portion of staff time on

⁶ The study team used FY2002 performance because FY2002 was the first and most recent year for which NCP had published data on electronic collections management. Since the OP&A survey gathered FY2000 data, the study team used data from two different years as an approximation of the relationship between collections management tasks and labor applied. The specific collections management targets used in the scenario were: decreasing acquisition transactions from 1,618 to 1,500; increasing deaccession transactions from 283 to 500; increasing inventory control by 25 percent; increasing the number of objects imaged from 212,944 to 500,000; increasing the number of records with basic cataloguing from 91,483 to 100,000; increasing the number of records with enhanced data from 32,489 to 50,000; increasing outgoing loans to affiliate museums from 10 to 30; increasing outgoing loan transactions to other users from 1,623 to 2,000; increasing packing and *fn. 6 (cont):* shipping work by 25 percent; increasing web development and database management by 25 percent each; increasing basic care and conservation by 25 percent each; decreasing move logistic efforts by 25 percent; and increasing collections care training by 50 percent.

collections documentation. However, with appropriate modifications to fit the specific conditions and with unit-specific data, directors of all units can use a model of this type to estimate how much increasing loans, changing the level of basic conservation, or setting any other specific collections management targets will change staffing requirements.

Figure H-2. Full MS Excel Worksheet for Collections Management Scenario

	B	C	D	E	F	G	H	I	J	K	L	M	N	O
			FY 2001 Ending	Added FY 2002	FY 2002 Ending	Resources Applied* (FTE)	Standardized Items/units per FTE	Hypothetical Annual Goal	Annual target processing std. units	Required FTE to meet annual target	FTE Increment to meet annual target	FTE Staff Resources Needed to Complete Activity Level		
												SI	Contract	Volunteer
3														
4	Collections Management Activities													
5	Items	Items, objects, & specimens	142,417,741	1,121,183	143,538,924									
6	Acquisitions	Acquisitions**	315,656		1,136,333									
7		Acquisition transactions**	1,785		1,618	5	300	1,500 acquisition transactions	100%	5.4	0.0	4.9	0.4	0.1
8	Deaccessions	Deaccessions**	6,452		13,499									
9		Deaccessions-Transactions**	500		283	2	179	500 deaccession transactions	150%	2.4	0.8	2.3	0.1	0.0
10	Repatriation	Repatriations**	19		81									
11		Repatriations-Transactions**	4		4	3	1.1	4 Repatriation transactions	100%	3.5	0.0	3.5	0.0	0.0
12	Registrarial & records													
13		Inventory control/Accountability				4		Increase current inventory activity FTE level by one-fourth	150%	6.2	2.1	5.2	0.7	0.2
14		Total electronic records**	7,948,790	358,907	8,307,697									
15		Total images**	1,029,227	212,944	1,242,171	0	997,562	Specimens imaged	250%	0.5	0.3	0.1	0.4	0.0
16		Specimens without electronic records**	134,468,951	762,276	135,231,227									
17		registration & inventory standards**	1,228,554	78,304	1,306,858									
18		meeting basic cataloging standards**	5,050,788	91,483	5,142,271	17	5,427	Specimens catalogued	150%	25.3	8.4	20.3	5.0	0.0
19		Electronic records meeting enhanced cataloging standards**	263,428	32,489	295,917	4	7,540	75,000 Specimens with enhanced records	150%	6.5	2.2	5.6	0.6	0.2
20	Loans	Items-Incoming loans (Non exhibition)**	134,707		10,459,382									
21		Transactions-Incoming loans (Non exhibition)**	1,432		1,024	2	666	1,000 Incoming non-exhibition loan transactions	100%	1.5	0.0	1.3	0.2	0.0
22		Items-Outgoing loans (Affiliates)**	168		273									
23		Transactions-Outgoing loans (Affiliates)**	10		10	1	18	50 Outgoing loan transactions to non-Affiliates	300%	1.7	1.1	1.6	0.1	0.0
24		Items-Outgoing loans (Non Affiliate museums)**	271,665		131,229									
25		Transactions-Outgoing loans (Non Affiliate museums)**	131,492		1,623	3	490	2,000 Outgoing loan transaction to non-Affiliates	200%	6.6	3.3	4.8	1.7	0.1
26		Packing/Shipping				1		Maintain current packing and shipping activity FTE level	200%	1.7	0.8	1.7	0.0	0.0
27	Exhibition program	SI museum program				10	10	Increase current exhibition activity FTE level by one quarter	100%	9.8	0.0	9.6	0.1	0.1
28		Traveling exhibition program												
29		Items-Incoming loans (Exhibition)**	3,334		3,533									
30		Transactions-Incoming loans (Exhibition)**	552		377									
31	Research program	SI/Affiliated agency program				5	5	Maintain current internal research support activity FTE level	100%	5.3	0.0	4.1	1.2	0.0
32		External users				5	5	Maintain current external research support activity FTE level	100%	4.7	0.0	3.6	1.1	0.0
33	Education program support					8	8	Maintain current education support activity FTE level	100%	7.7	0.0	6.5	0.3	0.8
34	Central administration reports					2	2	Maintain central reporting activity FTE level	75%	1.4	(0.5)	1.3	0.0	0.0
35	Informatics													
36		Web development				3	3	Increase current web development activity FTE level by one-half	200%	5.9	2.9	1.2	0.0	4.7
37		Database management				2	2	Increase current database management activity FTE level by one-half	250%	3.9	2.3	3.7	0.2	0.0
38	General care					5	5	Increase current basic care activity FTE level by one-quarter	200%	9.5	4.7	3.5	0.2	5.8
39		Basic care												
40		Preservation/Conservation				17	17	Increase current conservation activity FTE level by one-quarter	200%	33.2	16.6	15.3	10.0	8.0
41		Storage				5	5	Maintain current storage activity FTE level	150%	7.2	2.4	5.7	0.6	0.9
42		Move Logistics				1	1	Increase current move activity FTE level by one-quarter	75%	1.0	(0.3)	1.0	0.0	0.0
43	Training					1	1	Double current training activity FTE level	200%	2.9	1.5	2.8	0.1	0.0
44	Other					1	1	Increase current other activity FTE level by one-half	50%	0.4	(0.4)	0.4	0.0	0.0
45	Estimated Staff Resources Applied					105,610				154.0	48.4	110	23	21
46	Care & other activities					74				105.7	31.5	76	16	14
47	Primarily research activities					26.7				38.0	11.2	27	6	5
48	Informatics activities					5				10.3	5.6	7	2	1