PROFILE OF ECOLOGISTS

RESULTS OF A SURVEY OF THE MEMBERSHIP OF THE ECOLOGICAL SOCIETY OF AMERICA

Accepted by the Governing Board
of the Ecological Society of America
May 9, 2006

Project of the Education and Human Resources Committee

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INTRODUCTION

History

The Ecological Society of America (ESA) has a long history of interest in the characteristics and thoughts of its membership. In 1987, the society surveyed members to learn about satisfaction with the services of the Society to its members and to determine directions for the future of the ESA. Almost half of the membership responded (3089 respondents) to the mail-in questionnaire over the course of more than one year. Although the information was highly valuable, the numerous fill in the blank and essay questions were difficult to tabulate. In 1991, an ad hoc advisory committee worked with the ESA Office of Public Affairs to develop a survey with the intent of resurveying the membership. The new survey instrument was largely modeled on the 1987 survey, but questions were redesigned for easier tabulation. Additional questions were designed to focus on issues that were not addressed in the 1987 survey. The survey was open for three months, and again, more than half of the membership (3695 of 6838) responded to the mail-in survey.

The 1992 survey indicated low diversity in the membership. The typical respondent was a Caucasian male, married with at least one child, between the ages of 36 and 40. Women and minorities were underrepresented in the membership. In addition, male respondents tended to make $5000-$6000 a year more than female respondents. Most respondents were employed at colleges and universities doing basic research (31%) and teaching (28%). In response to these findings, the ESA implemented several programs with the ultimate goal of increasing diversity at many levels within the organization. After 13 years, the ESA determined another follow survey was necessary to track the effects of programs, as well as explore the natural changes in the membership over time.

Purpose of This Report

This report was the result of 2005 survey of the membership. The objectives for surveying the membership, outlined in the 1992 survey and consistent with the 2005 survey, were:

(1) to determine the pattern of graduate degrees in ecology earned;

(2) to determine ethnicity and gender composition in the field of ecologists for comparison with the demographic composition of the work force as a whole;

(3) to catalog the nation's environmental science capabilities according to problem area; and

(4) to analyze current patterns of employment of ecologists.

Additional objectives of the 2005 survey were:

(1) to compare information obtained to previous surveys;

(2) to assess changes in policy and practices within the ESA by examining members thoughts on and participation in new programs and policies initiated since the last survey; and

(3) to begin the process of assessing new directions for the society.

Development and Description of 2005 Survey

Conceptually, the 2005 survey was based on the 1992 survey, but the World-wide Web allowed an unprecedented opportunity to access the survey and reduce response time. Because a major goal was to assess changes and trends in the membership, most questions from the 1992 survey were retained. Questions were fitted with drop-down lists wherever possible, and an

"Other, please specify" field was added to account for the numerous alternatives that may have arisen since 1992. Several questions were modified and others were added to address goals and career outcomes specific to the 21st century. For example, wording of some questions no longer reflected current thinking about professional goals. In 1992, the standard career option for most ecology graduates was research or teaching (usually at the college/university level). Many more options and career paths are viable today as primary choices. In addition, demographic categories were expanded to reflect needs relative to the 21st century. Most importantly, many questions added to address evolving needs of members. The 2005 survey population also included non-members.

Analysis

The survey opened on 17 May 2005 and remained open until 8 September 2005. Several email requests were sent to the membership telling them about the importance of the survey and asking them to fill out the survey if they had not already done so. Unfortunately, the first mass response resulted in a number of errors with submission. The result was a number of records that were incomplete. Because we did not include an identification tag to allow respondents to return to the survey and continue from a previous point, members had to fill out the entire survey from the beginning if they encountered an error. Although most tried again to fill out the survey, apparently more successfully, a large proportion of records duplicated some part of responses from previous attempts to fill out the survey. Therefore, we matched records based on multiple fields, and discarded any duplicates as best we could (not all responses to questions were exactly the same). We used all the information available for records, whether they were complete records or not. As a result, sample sizes differed across analyses. Statistical analyses were conducted using SPSS (v. 10). The data were stored as a combination of Microsoft Excel and SPSS files and will be available from the ESA Office of Education upon completion of the summarization.

DEMOGRAPHIC CHARACTERISTICS

Gender and Age

As with previous surveys, the majority of members that included their gender was male (Table 1). A greater proportion of females responded than in previous surveys, but these proportions are below both the U.S. population (2000 census) and the proportion of females enrolled in the biological sciences (Damschen et al. 2005). The respondents were predominantly between 31 and 35 years of age, but a second peak occurred for the 46-50 year class (Figure 1).

The ages of respondents differed by gender (Figure 2). Most male members were between the ages of 26 and 55, six age classes in which they were broadly distributed (Table 2). Females, however, were predominantly younger than males. The modal age class was 26-30. Indeed, the younger age classes (21-25, 26-30, and 31-35) had more females than males (Figure 3), indicating that the disparity between the number of males and the number of females in the membership may, in fact, be disappearing due to recent programs initiated by the ESA to recruit a diversity of members. Older age classes (>36) still were progressively dominated by an increasing number of males. Alternatively, this distribution may reflect patterns in postgraduate careers; females may be more active in professional societies during early in their careers and then drop out of the distribution in their early thirties.

Table 1. Gender of ESA members responding to the survey.

Gender	**n**	**%**
females	882	39.9
males	1327	60.1
Total	**2209**	**100.0**

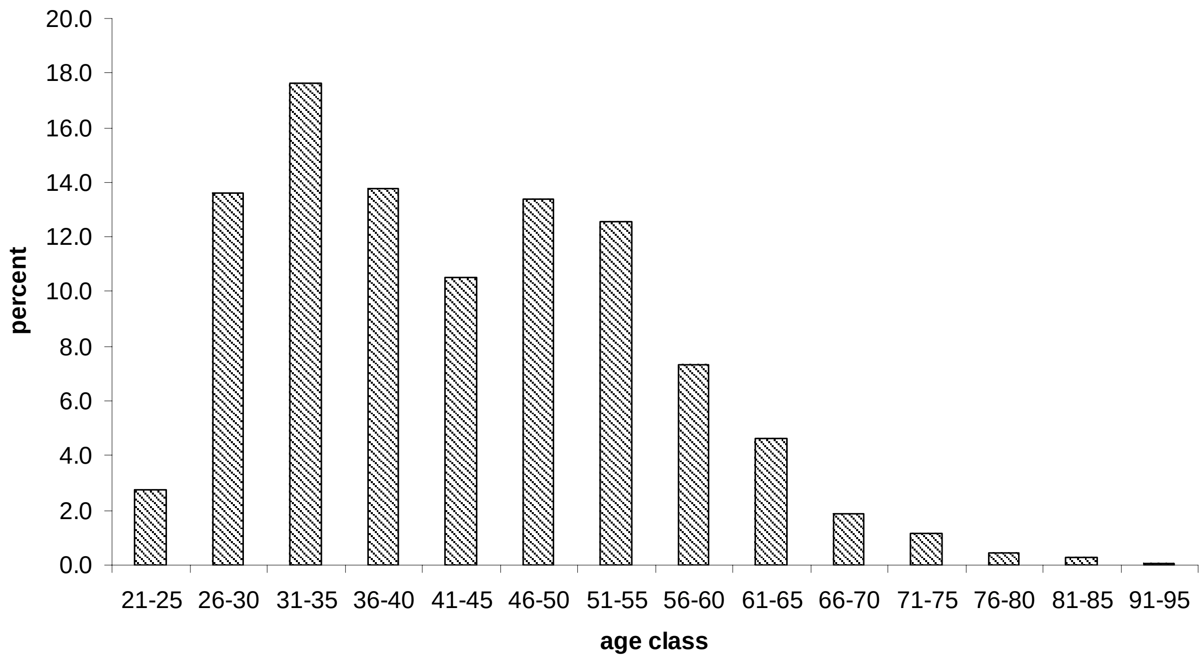

Figure 1. The distribution of member ages within 5-year age classes.

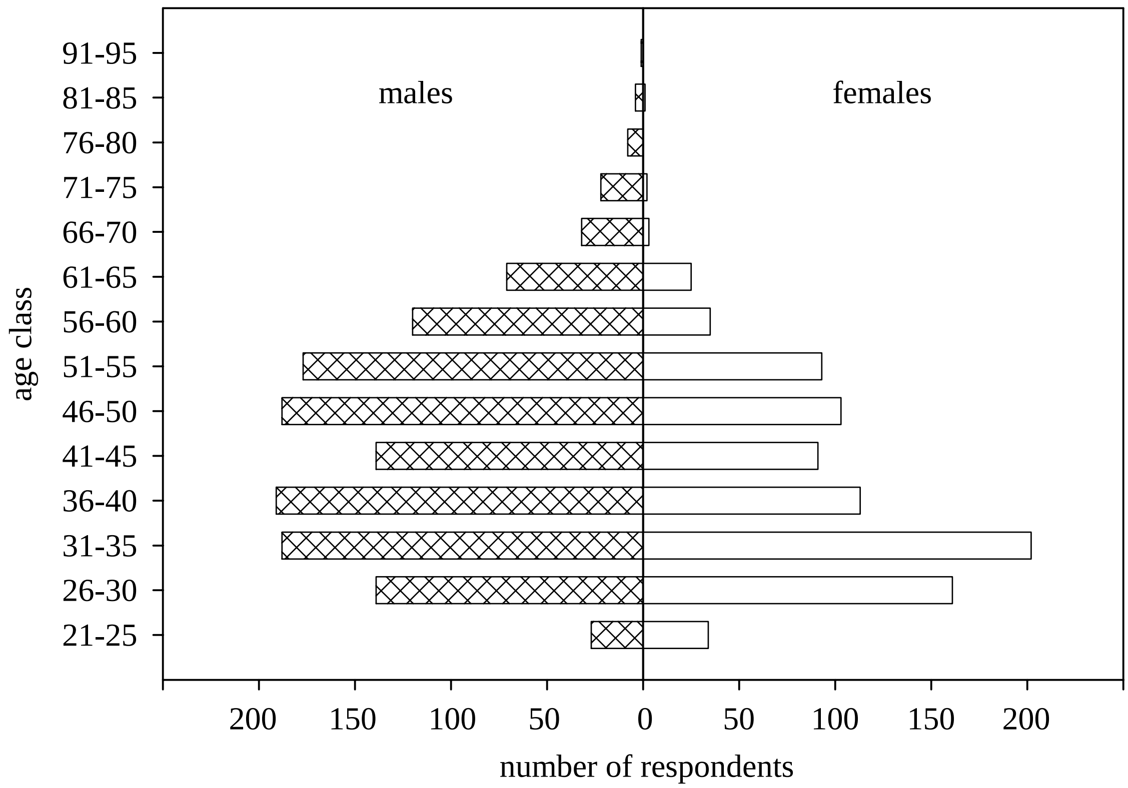

Figure 2. The distribution of member age classes by gender.

Table 2. Number and percentage of female and male members categorized by 5-year age groups.

Age Group	**n $_{females}$**	**%**	**n $_{males}$**	**%**
21-25	34	3.9	27	2.1
26-30	161	18.7	139	10.6
31-35	202	23.4	188	14.4
36-40	113	13.1	191	14.6
41-45	91	10.5	139	10.6

46-50	103	11.9	188	14.4
51-55	93	10.8	177	13.5
56-60	35	4.1	120	9.2
61-65	25	2.9	71	5.4
66-70	3	0.3	32	2.4
71-75	2	0.2	22	1.7
76-80	0	0.0	8	0.6
81-85	1	0.1	4	0.3
91-95	0	0.0	1	0.1
Total	**863**	**100.0**	**1307**	**100.0**

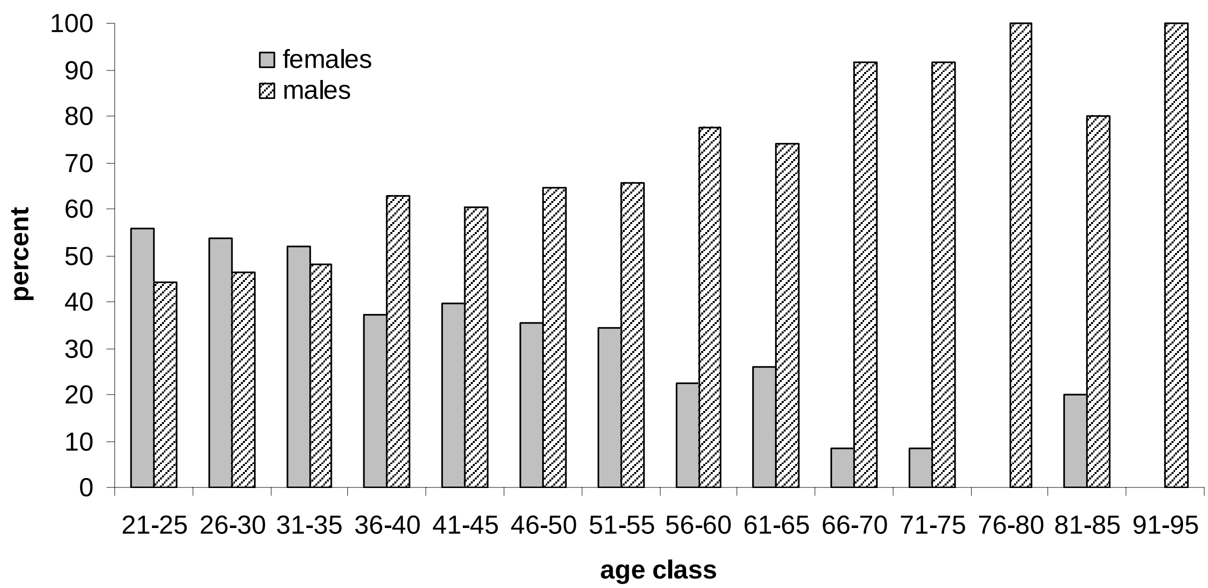

Figure 3. The distribution of female and male members within each 5-year age class.

Citizenship

Most members were U.S. citizens (Table 3), but ESA membership responding to the survey spans a variety of nations (Figure 4). In fact, 15.5% of the respondents were citizens of countries outside of the U.S. Although most of these members are from Canada, significant numbers of members are found in Europe, South America, and Australia.

Table 3. Citizenship of ESA member respondents.

Citizenship	# of Respondents	% of Total
U.S., native born	1811	80.7
U.S., naturalized	53	2.4
U.S., permanent Resident	28	1.2
U.S., temporary Resident	3	0.1
Canada	106	4.7
Australia	25	1.1
Germany	25	1.1
United Kingdom	18	0.8
Argentina	14	0.6
Mexico	13	0.6
Brazil	11	0.5
other	138	6.1
Total	**2245**	**100.0**

Figure 4. Countries of which ESA members are citizens.

World Map, Robinson Projection

Ethnicity

The respondents were mostly white or Caucasian (66.3%), Hispanic (2.6%), and Asian (1.8%). Racial diversity was even lower when only U.S. born respondents were examined. Over 90% of respondents were white/Caucasian.

Table 4. Ethnicity of all members and those U.S. native born.

	All Members		U.S. Born Members	
Ethnicity	**n**	**%**	**n**	**%**
Asian	56	2.6	17	0.9
Black/African American	15	0.7	12	0.6
Hispanic	71	3.2	30	1.6
multiracial	36	1.6	24	1.3
Native American	10	0.5	8	0.4
Native Hawaiian/Pacific Islander	2	0.1	2	0.1
white/Caucasian	1982	90.5	1752	94.2
other	19	0.9	14	0.8
Total	**2191**	**100.0**	**1859**	**100.0**

Marriage and Families

Most respondents were married (67%); few respondents were single (Table 5). In addition, over half of respondents did not have children (Table 6), but 42% reported having 1 or 2 children.

Table 5. Marital status of ESA members.

Marital Status	**n**	**%**
married	1513	67.8
single, living with partner	156	7.0
single, married previously	140	6.3
single, never married	422	18.9
Total	**2231**	**100.0**

Table 6. Number of children of ESA members.

# of Children	**n**	**%**
none	1106	49.9
1	389	17.6
2	569	25.7
3	115	5.2
more than 3	36	1.6
Total	**2215**	**100.0**

Income

The median annual income of individual respondents was between $50,000 and $60,000 for members and between $20,000 and $30,000 for non-members (Table 7). The modal income was between $10,000 and $20,000 for both groups, however. As expected, the median household income was higher than for individuals, between $70,000 and $80,000 (Figure 5).

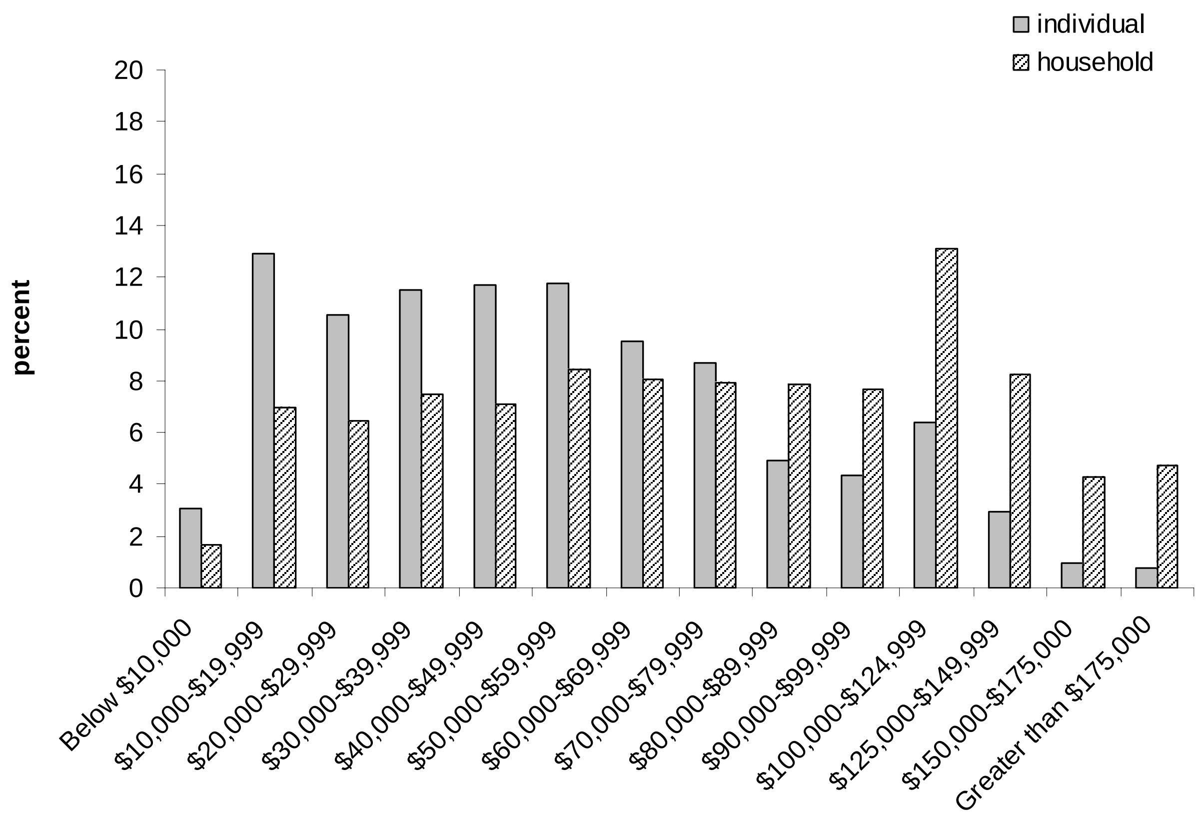

Figure 5. The distribution of individual incomes and total household incomes for ESA members.

Nearly half of the female respondents (49.4%) made less than $40,000, but only 31.3% of males made less than this amount (Figure 6). Additionally, of members making $30,000 or less, 54% are females, but of members making more than $30,000 only 36% are females. Because females are more common in the younger ages of the membership, this distribution may reflect the high proportion of women at the early stages of their careers.

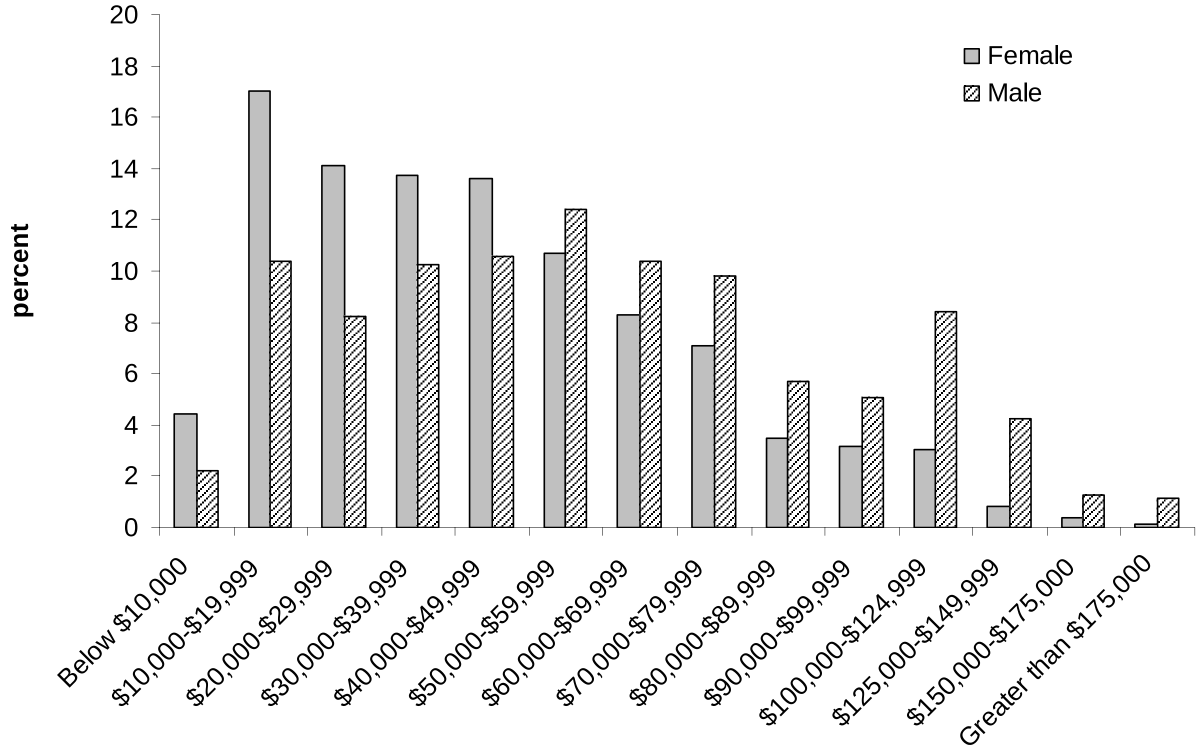

Figure 6. The distribution of gross annual individual incomes of female and male ESA members.

Table 7. Gross annual individual income of respondents.

Income Level	**n**	**%**
Below $10,000	66	3.1
$10,000-$19,999	277	12.9
$20,000-$29,999	226	10.5
$30,000-$39,999	247	11.5
$40,000-$49,999	251	11.7
$50,000-$59,999	253	11.8
$60,000-$69,999	205	9.5

$70,000-$79,999	187	8.7
$80,000-$89,999	106	4.9
$90,000-$99,999	93	4.3
$100,000-$124,999	138	6.4
$125,000-$149,999	63	2.9
$150,000-$175,000	20	0.9
greater than $175,000	17	0.8
Total	**2149**	**100.0**

We used analysis of covariance to control for the effects of age. We excluded all students and individuals older than 70, and used the midpoints of income ranges. These midpoints represented intervals of $10,000 except at income levels over $95,000 where they represented $12,500.

Both the covariates, age and the number of years since respondents' highest degree, and gender influenced members' income (in both cases $P < 0.0001$; Table 8). Moreover, the analyses indicated that gender had a significant influence on income. The models may not be valid, however. Tests for homogeneity of variances indicated significant differences (age + gender: $P = 0.003$; years since highest degree + gender: $P = 0.008$). Nor did either model explain much of the variance in income (age + gender: $r^2 = 0.33$; years since highest degree + gender: $r^2 = 0.37$). Nevertheless, the models do point toward a significant difference in incomes based on gender.

In fact, the predicted values of female and male incomes indicated a large gap in salaries based on gender (Table 9). The age + gender indicated that annual income for males was $9,726 more than the same age female respondents. These differences were not necessarily accounted for by the number of years since respondents' received their highest degree. The years since highest degree + gender model predicted higher incomes for males of more than $8,500 than females.

Table 8. Results of analysis of covariance tests of effects of gender on income while controlling for age or years since respondents' highest degree.

Test of effects of gender and age on income.

Error Source	**Sum of Squares**	**df**	**Mean Square**	**F-ratio**	***P***
gender	3.53E+10	1	3.5254E+10	47.08985	<0.001
age	4.82E+11	1	4.8224E+11	644.1396	<0.001
error	1.22E+12	1632	7.49E+08		

Test of effects of gender and the number of years since respondents' highest degree on income.

Error Source	**Sum of Squares**	**df**	**Mean square**	**F-ratio**	***P***
gender	2.67E+10	1	2.67E+10	38.6865	<0.001
years since degree	5.51E+11	1	5.51E+11	799.5785	<0.001
error	1.09E+12	1587	6.89E+08		

Table 9. Predicted incomes for male and female respondents based on the age + gender model and by the number of years since highest degree + gender model.

Age	**Female Income**	**Male Income**	**# Years Since Degree**	**Female Income**	**Male Income**
21-25	$20,515	$30,240	0-5	$39,172	$47,756
26-30	$29,086	$38,811	6-10	$48,598	$57,181
31-35	$37,656	$47,382	11-15	$58,024	$66,607
36-40	$46,227	$55,953	16-20	$67,449	$76,033
41-45	$54,798	$64,523	21-25	$76,875	$85,459

46-50	$63,368	$73,094	26-30	$86,301	$94,885
51-55	$71,939	$81,665	31-35	$95,727	$104,311
56-60	$80,510	$90,235	36-40	$105,153	$113,737
61-65	$89,080	$98,806	41-45	$114,579	$123,162
66-70	$97,651	$107,377			

Non-member Characteristics

Among non-member responding to the survey, slightly more were female (Table 10). Non-member respondents mostly were between the ages of 26 and 30 (Table 11), U.S. native born (Table 12), and white/Caucasian (Table 13). Unlike members, a much larger proportion of non-member respondents were single/never married (40.3% v. 18.9%; Table 14). Similarly, almost 70% reported they had no children (Table 15). Individual (Table 16) and household incomes (Table 17) were also quite low; mode $10,000-$19,999 for both (although a second peak occurred at $50,000-$59,999 for household incomes). Organizations other than the ESA to which more than 5 non-member respondents reported being members included Sigma Xi, American Fisheries Society, Society for Conservation Biology, The Wildlife Society, American Society of Ichthyologists and Herpetologists, and Society for Wetland Scientists.

Table 10. Gender of non-members responding to the ESA survey.

Gender	n	%
female	67	56.8
male	51	43.2
Total	**118**	**100.0**

Table 11. Number and percentage non-members categorized by gender and 5-year age groups.

Age Group	$n_{females}$	%	n_{males}	%
21-25	14	21.5	5	9.8
26-30	20	30.8	12	23.5
31-35	16	24.6	7	13.7
36-40	11	16.9	9	17.6
41-45	0	0.0	5	9.8
46-50	2	3.1	7	13.7
51-55	1	1.5	2	3.9
56-60	0	0.0	1	2.0
61-65	1	1.5	2	3.9
66-70	0	0.0	1	2.0
71-75	0	0.0	0	0.0
76-80	0	0.0	0	0.0
81-85	0	0.0	0	0.0
91-95	0	0.0	0	0.0
Total	**65**	**100.0**	**51**	**100.0**

Table 12. Citizenship of non-member responding to the ESA survey.

Citizenship	# of Respondents	% of Total
U.S., Native Born	89	74.2
U.S., Naturalized	2	1.7
U.S., Permanent Resident	2	1.7
U.S., Temporary Resident	0	0.0
Canada	13	10.8
Australia	2	1.7
Germany	1	0.8
United Kingdom	0	0.0
Argentina	1	0.8
Mexico	1	0.8
Brazil	3	2.5
other	6	5.0
Total	**120**	**100.0**

Table 13. Ethnicity of non-members responding to the ESA survey.

Ethnicity	n	%
Asian	1	0.8
Black/African American	2	1.7
Hispanic	10	8.3
multiracial	2	1.7
Native American	0	0.0
Native Hawaiian/Pacific Islander	0	0.0
white/Caucasian	104	86.7
other	1	0.8
Total	**120**	**100.0**

Table 14. Marital status of non-members responding to the ESA survey.

Marital Status	n	%
married	57	47.9
single, living with partner	11	9.2
single, married previously	3	2.5
single, never married	48	40.3
Total	**119**	**100.0**

Table 15. Number of children of non-members responding to the ESA survey.

# of Children	n	%
none	83	69.7
1	14	11.8
2	15	12.6
3	2	1.7
more than 3	5	4.2
Total	**119**	**100.0**

Table 16. Gross annual individual income of non-members responding to the ESA survey.

Income Level	n	%
Below $10,000	13	11.0
$10,000-$19,999	30	25.4
$20,000-$29,999	20	16.9
$30,000-$39,999	13	11.0
$40,000-$49,999	12	10.2
$50,000-$59,999	9	7.6

$60,000-$69,999	9	7.6
$70,000-$79,999	3	2.5
$80,000-$89,999	2	1.7
$90,000-$99,999	1	0.8
$100,000-$124,999	4	3.4
$125,000-$149,999	0	0.0
$150,000-$175,000	1	0.8
greater than $175,000	1	0.8
Total	**118**	**100.0**

Table 17. Gross household income of non-members responding to the ESA survey.

Income Level	**n**	**%**
Below $10,000	8	6.9
$10,000-$19,999	21	18.1
$20,000-$29,999	14	12.1
$30,000-$39,999	10	8.6
$40,000-$49,999	10	8.6
$50,000-$59,999	17	14.7
$60,000-$69,999	8	6.9
$70,000-$79,999	7	6.0
$80,000-$89,999	4	3.4
$90,000-$99,999	3	2.6
$100,000-$124,999	7	6.0
$125,000-$149,999	3	2.6
$150,000-$175,000	2	1.7
Greater than $175,000	2	1.7
Total	**116**	**100.0**

Initial Interest in Ecology

Most ESA members became interested in ecology during school (Table 18). The largest proportion became interested as undergraduates, but many discovered ecology in K-6 grades. Other respondents became interested as adults, after graduating, or in the course of their jobs. These trends were reflected in who or what inspired the interests of respondents (Table 19). College professors were instrumental in kindling interests in ecology; parents were also important in inspiring respondents. Other inspiration came from nature (camping, hunting, being in the outdoors) and the media (books, TV, magazines, movies).

Table 18. Major periods reported by ESA members when their interest in ecology developed.

When Respondents Became Interested	n	%
pre-kindergarten	202	8.8
K-6 grade	493	21.4
7-8 grade	188	8.2
9-12 grade	451	19.6
undergraduate	686	29.8
graduate	131	5.7
nature films/documentaries	61	2.6
summer camp	27	1.2
other	66	2.9
Total	**2305**	**100.0**

Table 19. The most critical influences inspiring ESA members' interest in ecology.

Person/Factor Inspiring Interest	n	%
college professor	667	29.5

Person/Factor Inspiring Interest	n	%
ecological literature	109	4.8
elementary teacher	38	1.7
environmental organization	84	3.7
friend	42	1.9
grandparent	63	2.8
growing up in a rural area	270	12.0
high school teacher	159	7.0
other relative	57	2.5
parent	408	18.1
scouting leader/program	56	2.5
other	305	13.5
Total	**2258**	**100.0**

EDUCATIONAL BACKGROUND

Undergraduate Degrees

Respondents provided a varied list of major fields of study that made examination difficult (e.g., Agriculture/Agronomy was listed in the drop-down box but Agricultural Chemistry, Agricultural Economics, Agricultural Management, and Agricultural Science were written in the "other" box). Therefore, majors were grouped similar to previous surveys. Biology was the most reported major for respondents' Bachelors degrees (nearly all were listed as "Biology"), followed by an assortment of majors relating to the environment and conservation, and then zoology (Table 20). A significant number of non-science majors (art, music, theater) also were reported.

Table 20. Major fields of study for respondents receiving Bachelors degrees.

Field	**n**	**%**
agriculture/agronomy	40	1.4
biology	1333	47.2
botany	128	4.5
chemistry	39	1.4
ecology	119	4.2
education	10	0.4
engineering	20	0.7
entomology	9	0.3
environmental/nature/conservation	228	8.1
evolutionary biology/genetics	14	0.5
forestry	90	3.2
geography/GIS/remote sensing	39	1.4
geology	40	1.4
limnology/oceanography/marine science	51	1.8
mathematics/statistics	36	1.3
microbiology	4	0.1
neurobiology/anatomy/physiology	4	0.1
physics	28	1.0
range management/science	12	0.4
soil science	12	0.4
wildlife/fisheries management	129	4.6
zoology	229	8.1
other	71	2.5

non-science	139	4.9
Total	**2824**	**100.0**

Schools where respondents received their Bachelors degrees were also varied (Table 21). Unfortunately, respondents did not always include the campus designation for their school. These universities were categorized under the most common campus (e.g., University of California was assumed to be Berkeley and University of Wisconsin, Madison). As a result, some satellite campuses may not have been properly represented in the frequency distribution. Nevertheless, large schools with large ecology and natural resource programs were well represented in respondents. For respondents reporting schools for which they received a Bachelors degree, however, nearly 600 U.S. schools are represented.

Table 21. The 20 most reported U.S. schools for respondents receiving Bachelors degrees.

School	**n**	**%**
Cornell University	62	2.6
University of Wisconsin	46	1.9
University of Michigan	45	1.9
University of California, Berkeley	44	1.8
University of Washington	32	1.3
Brown University	27	1.1
Pennsylvania State University	27	1.1
Carleton College	26	1.1
Oberlin College	26	1.1
Stanford University	26	1.1
Colorado State University	25	1.1

University of California, Davis	25	1.1
Humboldt State University	24	1.0
University of California, Santa Barbara	24	1.0
Michigan State University	22	0.9
Harvard University	21	0.9
University of Minnesota	21	0.9
Swarthmore College	19	0.8
University of Montana	19	0.8
Earlham College	18	0.8

Canadian Universities topped the list of non-U.S. schools granting Bachelors degrees (Table 22). Respondents receiving their Bachelors degrees represented 244 non-U.S. schools in 58 countries. In addition to Canada and Mexico, common countries included Australia, United Kingdom , People's Republic of China, Argentina, Brazil, Germany, Spain, and France, each represented by 10 or more respondents.

Table 22. The 5 most reported non-U.S. schools for respondents receiving Bachelors degrees.

School	**n**	**%**
University of British Columbia	16	3.6
University of Guelph	14	3.1
McGill University	10	2.2
University of Toronto	10	2.2
Universidad Nacional Autónoma de México (UNAM)	9	2.0

Most financial support for respondents during their Bachelors degrees came from their families or themselves (Table 23). Nearly half reported that their families were their primary form of support, 14.5% worked their way through school, and 12.2% relied on student loans.

Table 23. Primary form of financial support for respondents while they worked on their Bachelors degree.

Source of Financial Support	**n**	**%**
family	1184	48.5
fellowship	209	8.6
industry	1	0.0
National Aeronautics and Space Administration	2	0.1
National Institutes of Health	1	0.0
National Oceanic and Atmospheric Administration		0.0
National Science Foundation	3	0.1
National Government		0.0
scholarships		0.0
research assistantship	3	0.1
state agencies	34	1.4
student loans	299	12.2
other grants/aid		0.0
Teaching Assistantship	4	0.2
U.S. Agency for International Development		0.0
U.S. Dept. of Agriculture	2	0.1
U.S. Dept. of Defense	7	0.3
U.S. Dept. of Energy		0.0
U.S. Dept. of Interior		0.0
U.S. Environmental Protection Agency		0.0
U.S.D.A. Forest Service	3	0.1

university foundation grant	18	0.7
worked way through school	353	14.5
multiple sources		0.0
other	161	6.6
Total	**2284**	**100.0**

Masters Degrees and Post-undergraduate Diplomas

The major field of study for respondents' Masters degree was more diverse than for respondents' Bachelors degrees. As with Bachelors degrees, biology was the most common major for respondents receiving Masters degrees, but it was only slightly more popular than ecology (Table 24). Botany, zoology, environmental sciences, forestry and wildlife/fisheries sciences represented a larger portion of respondents' fields of study than for Bachelors degrees.

Schools granting Masters degrees to respondents were similar to those granting Bachelors degrees: large schools with large ecology and environmental sciences programs (Table 25). The predominant schools for respondents receiving these degrees were University of Wisconsin, Colorado State University, and University of Michigan (as with Bachelor's degrees, similar assumptions were made about campuses where no other information was provided).

The most common non-U.S. schools awarding respondents Masters degrees were all Canadian (Table 26). As with Bachelors degrees, the diversity of schools was high: 184 different schools from 47 countries. Germany, United Kingdom, France, Brazil, Mexico, and The Netherlands all had 10 or more respondents reporting post-undergraduate degrees.

To support themselves during their Masters degrees, most respondents required a diversity of sources (Table 27). In contrast to members' Bachelors degrees, Teaching

Assistantships, Research Assistantships, and Fellowships were the most common forms of support for students seeking Masters degrees.

Table 24. Major fields of study for respondents receiving Masters degrees.

Field	n	%
agriculture/agronomy	15	0.8
biology	417	20.9
botany	217	10.9
chemistry	8	0.4
ecology	313	15.7
education	23	1.2
engineering	14	0.7
entomology	41	2.1
environmental/nature/conservation	168	8.4
evolutionary biology/genetics	15	0.8
forestry	138	6.9
geography/GIS/remote sensing	39	2.0
geology	22	1.1
limnology/oceanography/marine science	65	3.3
mathematics/statistics	40	2.0
microbiology	5	0.3
neurobiology/anatomy/physiology	13	0.7
physics	7	0.4
range management/science	29	1.5
soil science	20	1.0
wildlife/fisheries management	140	7.0
zoology	177	8.9
other	34	1.7

non-science	31	1.6
Total	**1991**	**100.0**

Table 25. The 20 most reported U.S. schools for respondents receiving Masters degrees.

School	**n**	**%**
University of Wisconsin	58	3.4
Colorado State University	47	2.8
University of Michigan	41	2.4
University of Washington	39	2.3
Yale University	38	2.2
Oregon State University	37	2.2
Cornell University	31	1.8
University of Florida	30	1.8
University of California, Davis	29	1.7
University of Georgia	26	1.5
Utah State University	26	1.5
Duke University	25	1.5
University of Minnesota	25	1.5
University of Arizona	24	1.4
University of Illinois, Urbana-Champaign	24	1.4
Northern Arizona University	23	1.4
University of California, Santa Barbara	22	1.3
University of Tennessee	22	1.3
Ohio State University	21	1.2
University of California, Berkeley	21	1.2

Table 26. The 5 most reported non-U.S. schools for respondents receiving Masters degrees and post-undergraduate diplomas.

School	**n**	**%**
University of Toronto	16	5.1
University of Alberta	12	3.9
University of British Columbia	11	3.5
University of Calgary	7	2.3
University of Guelph	7	2.3

Table 27. Primary form of financial support for respondents while they worked on their Masters degree.

Source of Financial Support	**n**	**%**
family	98	6.0
fellowship	257	15.9
industry	5	0.3
National Aeronautics and Space Administration	13	0.8
National Institutes of Health	4	0.2
National Oceanic and Atmospheric Administration	2	0.1
National Science Foundation	49	3.0
research assistantship	402	24.8
state agencies	15	0.9
student loans	93	5.7
teaching assistantship	464	28.6
U.S. Agency for International Development	1	0.1
U.S. Dept. of Agriculture	11	0.7
U.S. Dept. of Defense	6	0.4
U.S. Dept. of Energy	4	0.2

U.S. Dept. of Interior	4	0.2
U.S. Environmental Protection Agency	7	0.4
U.S.D.A. Forest Service	10	0.6
university foundation grant	10	0.6
worked way through school	95	5.9
other	70	4.3
Total	**1620**	**100.0**

Doctoral Degree

Unlike other degrees, respondents receiving Doctoral degrees primarily majored in ecology (Table 28). Biology, botany, and zoology were the next most common fields of study. Most degrees were awarded from the University of California, Davis, followed closely by Cornell University, University of California, Berkeley, University of Wisconsin, Duke University, and University of Washington (Table 29). As with other degrees, many respondents did not include the full name of their universities.

At the Ph.D. level, universities in Canada were the most common degree-granting institutions of non-U.S. respondents: over 13% of respondents reported receiving degrees from University of British Columbia, University of Alberta, and University of Toronto (Table 30). Over 150 non-U.S. schools from 39 countries were represented by respondents. United Kingdom, Australia, Germany, France, and Spain had more than 10 respondents receiving Doctoral degrees from their universities.

Table 28. Major fields of study for respondents receiving Doctoral degrees.

Field	**n**	**%**

agriculture/agronomy	6	0.3
biology	348	16.9
botany	151	7.3
chemistry	8	0.4
ecology	686	33.3
education	1	0.0
engineering	10	0.5
entomology	53	2.6
environmental/nature/conservation	118	5.7
evolutionary biology/genetics	61	3.0
forestry	100	4.9
geography/GIS/remote sensing	27	1.3
geology	17	0.8
limnology/oceanography/marine science	77	3.7
mathematics/statistics	18	0.9
microbiology	6	0.3
neurobiology/anatomy/physiology	9	0.4
physics	8	0.4
range management/science	19	0.9
soil science	16	0.8
wildlife/fisheries management	73	3.5
zoology	229	11.1
other	14	0.7
non-science	5	0.2
Total	**2060**	**100.0**

Table 29. The 20 most reported U.S. schools for respondents receiving Doctoral degrees.

School	**n**	**%**

University of California, Davis	74	4.0
Cornell University	69	3.7
University of California, Berkeley	69	3.7
University of Wisconsin	68	3.6
Duke University	67	3.6
University of Washington	67	3.6
Colorado State University	61	3.3
University of Georgia	59	3.2
Oregon State University	51	2.7
University of Michigan	49	2.6
University of Minnesota	41	2.2
Michigan State University	33	1.8
University of Colorado	31	1.7
University of Arizona	30	1.6
Rutgers University	29	1.5
University of California, Santa Barbara	29	1.5
University of California, Los Angeles	25	1.3
Ohio State University	23	1.2
University of Florida	23	1.2
University of Illinois, Urbana-Champaign	23	1.2

Table 30. The 5 most reported non-U.S. schools for respondents receiving Doctoral degrees.

School	**n**	**%**
University of British Columbia	18	5.6
University of Alberta	15	4.7
University of Toronto	10	3.1
University of Melbourne	9	2.8
Oxford University	8	2.5

As with Masters degrees, financial support for Doctoral degrees was primarily through Fellowships, Teaching Assistantships, and Research Assistantships (Table 31). Granting agencies also were important sources of support during Doctoral degrees; National Science Foundation (7.2%), National Aeronautics and Space Administration (1.9%), and State agencies (1.5%). Outside of the U.S., national government agencies were important for students pursuing their Ph.D.s.

Table 31. Primary form of financial support for respondents while they worked on their Doctoral degree.

Source of Financial Support	**n**	**%**
family	12	0.7
fellowship	453	26.0
industry	9	0.5
National Aeronautics and Space Administration	34	1.9
National Institutes of Health	11	0.6
National Oceanic and Atmospheric Administration	6	0.3
National Science Foundation	126	7.2
national government	38	2.2
scholarships	4	0.2
research assistantship	405	23.2
state agencies	26	1.5
student loans	16	0.9
other grants/aid	5	0.3
teaching assistantship	408	23.4

U.S. Agency for International Development	7	0.4
U.S. Dept. of Agriculture	19	1.1
U.S. Dept. of Defense	3	0.2
U.S. Dept. of Energy	16	0.9
U.S. Dept. of Interior	11	0.6
U.S. Environmental Protection Agency	15	0.9
U.S.D.A. Forest Service	19	1.1
university foundation grant	9	0.5
worked way through school	54	3.1
multiple sources	24	1.4
other	15	0.9
Total	**1745**	**100.0**

Financial support was critical for the majority of respondents in both entering (Table 32) and progressing through post-graduate studies (Table 33). Over 80% of respondents replied support was critical.

Table 32. Was financial support critical for ESA members entering graduate studies?

Financial Support Was Critical	n	%
no	473	16.9
yes	2333	83.1
Total	**2806**	**100.0**

Table 33. Was financial support critical to the progress of ESA members' graduate studies?

Financial Support Was Critical	n	%

no	431	15.5
yes	2344	84.5
Total	**2775**	**100.0**

Current students had a variety of plans for after their graduation. Fill in the blank answers were reduced to general categories where possible. Thirty-nine percent of graduate student respondents planned to go into academia, and 16.1% intended to find a post-doctoral position or pursue an advanced degree. Research (10.1%) in any setting and teaching (8.3%) also were common plans for graduating respondents. The remaining respondents intended to find employment, generally with government agencies or in conservation, management, and policy, or they gave a variety of options which they intended to pursue.

Numerous respondents (188 or about 5%) reported that they did not complete a graduate degree they had started. Inadequate guidance by major professors was the primary reason for leaving a program (27.7% of all respondents; Table 34), followed closely by personal considerations (23.9%), and then finances (19.7%). Other reasons included major advisors moving to different institutions, changing interests, and major catastrophes. These reasons differed only slightly between males and females, however. A larger proportion of females leaving graduate school left because of inadequate support from their major professor. However, the proportion of individuals leaving because of inadequate support was fairly evenly divided between females and males (20 of 43 vs. 23 of 43).

Table 34. Reasons why respondents did not complete the graduate degree program they had begun.

	All		Females		Males	
Reason for Leaving Graduate School	**n**	**%**	**n**	**%**	**n**	**%**
major professor did not provide adequate guidance	52	27.7	20	33.3	23	25.0
personal considerations	45	23.9	14	23.3	20	21.7
finances prevented continuing	37	19.7	7	11.7	20	21.7
received job offer that paid much more than stipend	15	8.0	5	8.3	9	9.8
lost interest	10	5.3	3	5.0	6	6.5
other	29	15.4	11	18.3	14	15.2
Total	**188**	**100.0**	**60**	**100.0**	**92**	**100.0**

EMPLOYMENT

After Graduation

Most respondents considered themselves ecologists (Table 35). After receiving their highest degrees, most respondents held post-docs; just under 42% had taken at least 1 post-doctoral appointment. The question was not applicable for 25.6% (their highest degree was not a doctoral degree), and 32.6% did not take a post-doctoral appointment. The majority of respondents had taken 1 post-doc appointment (Table 36). The number of post-doc positions did not appear to vary by gender; slightly more males than females had taken more than 1 appointment. Because the question does not ask how many appointments were taken before a permanent position, the differences in gender could be related to a younger female population just entering the post-doc/career track position issue (female respondents tended to be younger than male respondents in this survey). When all respondents (including those that did not include their gender) were considered, the majority entered career-track positions shortly after receiving their highest degree. In addition, 42.5% of respondents took temporary positions, and just under 16.3% took volunteer positions.

Table 35. The proportion of respondents that considered themselves ecologists as of 15 February 2005.

Ecologist?	**n**	**%**
no	252	9.4
yes	2423	90.6
Total	**2675**	**100**

Table 36. The number of post-doc appointments taken after respondents received their highest degree.

	All Respondents		**Females**		**Males**	
# of Appointments	**%**	**n**	**n**	**%**	**n**	**%**
0	479	29.0	127	26.2	269	30.4
1	811	49.1	262	54.0	408	46.2
2	281	17.0	81	16.7	154	17.4
3	62	3.8	12	2.5	38	4.3
More than 3	20	1.2	3	0.6	15	1.7
Total	**1653**	**100.0**	**485**	**100.0**	**884**	**100.0**

Over half of respondents, however, entered a career track position within a year of receiving their highest degree (Table 37). The time between highest degree and position did not seem to vary among gender, for those respondents that reported their gender, although after 3 years, males that had not found positions may have required slightly more time to find a career than females.

Table 37. The amount of time between when respondents received their highest degree and when they entered a career-track position.

Time Until	All Respondents		Females		Males	
Career Track	**n**	**%**	**n**	**%**	**n**	**%**
0-1 years	1064	52.1	274	48.0	488	48.7
1-2 years	265	13.0	79	13.8	143	14.3
2-3 years	236	11.5	78	13.7	126	12.6
3-4 years	174	8.5	62	10.9	69	6.9
4-5 years	108	5.3	28	4.9	61	6.1
5-6 years	74	3.6	15	2.6	46	4.6
6-7 years	42	2.1	12	2.1	26	2.6
7-8 years	21	1.0	7	1.2	12	1.2
8-9 years	10	0.5	1	0.2	8	0.8
9-10 years	12	0.6	5	0.9	4	0.4
> 10 years	38	1.9	10	1.8	20	2.0
Total	**2044**	**100.0**	**571**	**100.0**	**1003**	**100.0**

Skills and Research Interests

Respondents were skilled at various levels in many disciplines in the natural sciences. Most respondents reported their primary skill as Plant Ecology (Table 38); Plant Ecology also was the second most common secondary skill. Many respondents also were skilled in

Community Ecology, Aquatic Ecology, Forest Ecology, Population Biology, Conservation Biology, and Ecosystem Studies.

The disciplines in which respondents were actively engaged in research also were diverse (Table 39). Community Ecology was the most active area, although 5% or more of respondents were engaged in Conservation Biology, Plant Ecology, Aquatic Ecology, Population Biology, and Forest Ecology research.

Table 38. Fields in which respondents were most skilled.

Field	**Primary**		**Secondary**		**Tertiary**	
	n	**%**	**n**	**%**	**n**	**%**
plant ecology	274	10.2	207	7.8	106	4.2
aquatic ecology	244	9.1	104	3.9	65	2.6
community ecology	221	8.2	262	9.9	152	6.0
forest ecology	167	6.2	112	4.2	84	3.3
population biology	134	5.0	138	5.2	114	4.5
ecosystem studies	128	4.8	114	4.3	98	3.9
conservation biology	115	4.3	155	5.8	150	5.9
marine ecology	98	3.7	46	1.7	22	0.9
physiological ecology	96	3.6	61	2.3	51	2.0
behavioral ecology	81	3.0	61	2.3	47	1.9
wildlife biology	78	2.9	68	2.6	50	2.0
biogeochemistry	76	2.8	78	2.9	58	2.3
botany	72	2.7	103	3.9	115	4.5
landscape ecology	69	2.6	67	2.5	74	2.9
ecological modeling	68	2.5	73	2.8	94	3.7
environmental/resource management	67	2.5	95	3.6	72	2.8
wetlands ecology	58	2.2	48	1.8	58	2.3

entomology	52	1.9	51	1.9	49	1.9
restoration ecology	39	1.5	43	1.6	88	3.5
biology	37	1.4	35	1.3	62	2.5
biological diversity	34	1.3	66	2.5	68	2.7
fisheries biology	32	1.2	55	2.1	35	1.4
statistical ecology	30	1.1	63	2.4	98	3.9
paleoecology	23	0.9	8	0.3	10	0.4
remote sensing	23	0.9	17	0.6	18	0.7
soil science	23	0.9	42	1.6	60	2.4
global change	22	0.8	43	1.6	70	2.8
zoology	22	0.8	23	0.9	44	1.7
ecological education	21	0.8	20	0.8	23	0.9
environmental policy	21	0.8	23	0.9	31	1.2
geography	21	0.8	18	0.7	29	1.1
invertebrate biology	21	0.8	39	1.5	46	1.8
ecological complexity	20	0.7	19	0.7	21	0.8
microbiology	20	0.7	19	0.7	19	0.8
chemical ecology	17	0.6	19	0.7	29	1.1
impact assessment	17	0.6	20	0.8	31	1.2
vertebrate biology	17	0.6	28	1.1	23	0.9
oceanography	16	0.6	5	0.2	6	0.2
risk assessment	15	0.6	8	0.3	13	0.5
ecosystem sustainability	14	0.5	15	0.6	31	1.2
sustainable agriculture	11	0.4	15	0.6	20	0.8
ecological toxicology	9	0.3	20	0.8	13	0.5
mathematics	8	0.3	15	0.6	15	0.6
environmental education	7	0.3	23	0.9	47	1.9
nutrient fluxes	7	0.3	23	0.9	20	0.8
environmental engineering	6	0.2	6	0.2	8	0.3

anthropology	5	0.2	2	0.1	5	0.2
geology	4	0.1	9	0.3	4	0.2
hydrology	4	0.1	15	0.6	20	0.8
systematics/taxonomy	4	0.1	21	0.8	15	0.6
biotechnology	2	0.1	2	0.1	5	0.2
environmental law	2	0.1	6	0.2	11	0.4
physics	2	0.1	1	0.0		0.0
toxicology	2	0.1	4	0.2	3	0.1
trace gas fluxes	2	0.1		0.0	3	0.1
ecological economics	1	0.0	3	0.1	7	0.3
geomorphology	1	0.0	5	0.2	10	0.4
bioremediation		0.0	8	0.3	4	0.2
chemistry		0.0	2	0.1	6	0.2
Total	**2680**	**100.0**	**2651**	**100.0**	**2530**	**100.0**

Table 39. Area of ecological research within which respondents are actively engaged. Respondents were allowed to pick up to 3 areas.

Area of Active Research	**n**	**%**
community ecology	539	9.1
conservation biology	401	6.7
plant ecology	385	6.5
aquatic ecology	310	5.2
population biology	305	5.1
forest ecology	296	5.0
ecosystem studies	243	4.1
biological diversity	233	3.9
ecological modeling	230	3.9
landscape ecology	217	3.7
restoration ecology	199	3.3

biogeochemistry	187	3.1
environmental/resource management	168	2.8
global change	158	2.7
physiological ecology	145	2.4
behavioral ecology	141	2.4
marine ecology	126	2.1
wildlife biology	124	2.1
botany	105	1.8
entomology	97	1.6
wetlands ecology	95	1.6
fisheries biology	93	1.6
ecosystem sustainability	91	1.5
soil science	85	1.4
statistical ecology	77	1.3
ecological complexity	75	1.3
chemical ecology	56	0.9
impact assessment	50	0.8
invertebrate biology	49	0.8
nutrient fluxes	48	0.8
vertebrate biology	48	0.8
microbiology	44	0.7
sustainable agriculture	44	0.7
remote sensing	43	0.7
paleoecology	40	0.7
hydrology	38	0.6
geography	36	0.6
ecological toxicology	35	0.6
risk assessment	29	0.5
systematics/taxonomy	28	0.5

zoology	27	0.5
environmental policy	22	0.4
biology	21	0.4
ecological education	21	0.4
bioremediation	18	0.3
environmental education	18	0.3
oceanography	18	0.3
mathematics	12	0.2
geomorphology	11	0.2
anthropology	10	0.2
ecological economics	10	0.2
trace gas fluxes	10	0.2
environmental engineering	9	0.2
biotechnology	8	0.1
geology	5	0.1
toxicology	4	0.1
physics	2	0.0
chemistry	1	0.0
environmental law	1	0.0
Total	**5941**	**100.0**

Over 70% of respondents indicated they were engaged in applied research as defined by the Oversight Review Board of the National Acid Precipitation Program (Table 40), and a nearly equal proportion indicated an interest in doing more applied research (Table 41). These proportions primarily reflected respondents currently engaged in applied research, however. Of those respondents not currently engaged in applied research, 52.1% were not interested in doing applied research (Table 42).

Table 40. The proportion of ESA members currently engaged in applied research.

Engaged in Applied Research	n	%
no	609	25.2
yes	1803	74.8
Total	**2412**	**100.0**

Table 41. The proportion of ESA members stating a preference to do more applied research.

Preference for More Applied Research	n	%
no	640	27.3
yes	1703	72.7
Total	**2343**	**100.0**

Table 42. Percentage of respondents stating a desire to do more applied research given their current engagement in applied research.

	Those Not Doing Applied Research	Those Doing Applied Research
no	52.1	18.7
yes	47.9	81.3
Total	**100.0**	**100.0**

Current Employment

The vast majority of respondents described their principle employers as PhD granting colleges/universities (Table 43). Government/civilian employees, other degree granting institutions, consulting firms, and research centers and institutes were other major employers.

Table 43. Categories that best describe ESA members' current principal employers.

	total		**females**		**males**	
Employment category	**n**	**%**	**n**	**%**	**n**	**%**
PhD granting college/university	1247	49.9	411	50.1	613	48.9
local, state or federal government	257	10.3	93	11.3	129	10.3
4-year college	183	7.3	74	9.0	77	6.1
MS granting college/university	182	7.3	58	7.1	93	7.4
consulting firm	166	6.6	36	4.4	106	8.5
research center/institute	133	5.3	43	5.2	65	5.2
national government, civilian employee	131	5.2	38	4.6	74	5.9
nonprofit organization – environmental	66	2.6	24	2.9	35	2.8
national laboratory	29	1.2	12	1.5	14	1.1
business or industry	25	1.0	8	1.0	11	0.9
junior or community college	23	0.9	7	0.9	13	1.0
museum	10	0.4	3	0.4	5	0.4
nonprofit organization – other	9	0.4		0.0	3	0.2
K-12	7	0.3	3	0.4	4	0.3
private foundation	6	0.2	1	0.1	4	0.3
scientific society	6	0.2	4	0.5	2	0.2
medical school (including university affiliated hospital or medical center)	5	0.2	2	0.2		0.0
military service	4	0.2	1	0.1	1	0.1
historical organization	3	0.1	1	0.1	1	0.1
united nations organization	3	0.1		0.0	3	0.2

trade association/professional association	2	0.1	1	0.1		0.0
Total	**2497**	**100.0**	**820**	**100.0**	**1253**	**100.0**

Occupational levels were grouped according to the 1992 Profiles of Ecologists Survey (Table 44). Most members were either at the Senior Professional/Professor/Associate Professor/Middle Manager (34.6%) or the Professional/Assistant Professor/Assistant Superintendent (23.0%); males were more prevalent in the former, and females more prevalent in the latter. Almost 20% of respondents reported that they were students currently, surprising given that so few reported being Student Members of the ESA (see Membership Section).

Table 44. Occupational levels of ESA members as of 15 February 2005.

	Total		**Females**		**Males**	
Occupational Level	**n**	**%**	**n**	**%**	**n**	**%**
Senior Professional/Professor/ Associate Professor/Middle Manager	897	34.6	216	25.4	500	38.7
Professional/Assistant Professor/ Assistant Superintendent	595	23.0	227	26.7	290	22.5
Student	516	19.9	218	25.6	203	15.7
Senior Manager/Director/Dean/ Educational Department Head	213	8.2	38	4.5	132	10.2
Junior Professional/Instructor/ Supervisor/K-12 Teacher	66	2.5	33	3.9	23	1.8
Technician/Paraprofessional	48	1.9	21	2.5	19	1.5
Post Doc	255	9.8	97	11.4	124	9.6
Total	**2590**	**100.0**	**850**	**100.0**	**1291**	**100.0**

Employment Location

Most respondents indicated that their employers were located in urban metropolitan areas (Table 45), although the majority worked in areas outside of major urban areas. These employers were located predominantly in the U.S. (Table 46). Canada was the country most often listed employer address outside the U.S.

Table 45. Type of community in which ESA members' employers were located.

Type of Community	n	%
rural	507	21.1
suburban	734	30.6
urban metropolitan	1158	48.3
Total	**2399**	**100.0**

Table 46. Countries where ESA members' principal employers were located. Only countries for which there were 5 or more respondents were included.

Country	n	%
USA	1978	85.4
Canada	105	4.5
Australia	33	1.4
Mexico	19	0.8
United Kingdom	19	0.8
Brazil	13	0.6
France	12	0.5
Germany	11	0.5
Spain	11	0.5
New Zealand	10	0.4
Argentina	8	0.3
Chile	8	0.3
Sweden	7	0.3

Norway	6	0.3
Finland	5	0.2
PR China	5	0.2
South Africa	5	0.2

Work Activities

The primary and secondary work activities respondents reported included mostly Research and Teaching, Field work, and writing (Table 47). Almost 53% considered research their primary activity, and 23.7% listed Research as their secondary activity. Teaching K-8 was listed as the second largest primary work activity and the largest secondary work activity. The percentages attributed to this category probably were incorrect, however. Less than 1% of respondents listed their occupations as K-12 teachers (Table 44). Moreover, not a single respondent chose “Teaching at the university/college level” as a primary or secondary activity. Most likely, respondents chose “Teaching K-8” as the first visible teaching category in the drop-down list instead of “Teaching at the university/college level” 2 categories below. Therefore, the 3 teaching categories were grouped as Teaching K-16. As a result, teaching was the primary activity for 21.1% of respondents, and the secondary activity for 27.4%.

Respondents’ preferences for their primary activities were similar to those listed as their primary activities (Table 48). Indeed, proportions were comparable for Research and Teaching (K-16).

For those not conducting research as their primary activity, reasons were highly varied (Table 49). Of the options provided in the drop-down list, “More attractive career options” was selected by 14.3% of respondents, followed by “Change in career/professional interests” (12.7%)

and “Position in field of expertise not available” (10.3%). Over 38% of respondents listed an option in the box provide for other reasons. These reasons included interest in teaching (32.3%), and an additional 4.6% stated they were in split appointment positions that did not allow research to dominate activities. Administrative duties, finding funding for research, and positions that did not entail research were additional reasons supplied by respondents.

Table 47. Primary and secondary work activities within a typical year for ESA members' principal jobs.

Activities	Primary Activity n	Primary Activity %	Secondary Activity n	Secondary Activity %
research	1262	52.9	520	23.7
teaching k-16	503	21.1	600	27.4
consulting	118	4.9	46	2.1
field work	85	3.6	292	13.3
management/administration of R & D	80	3.4	86	3.9
management/administration of programs other than education or R & D	56	2.3	28	1.3
conservation policy development regulatory affairs	54	2.3	55	2.5
management/administration of education programs	47	2.0	40	1.8
writing	30	1.3	217	9.9
statistical analysis	20	0.8	84	3.8
computer applications	16	0.7	33	1.5
information management	11	0.5	36	1.6
operations – production, maintenance, construction	4	0.2	5	0.2
sales, marketing, public relations	4	0.2	10	0.5
development of equipment, products, and systems	3	0.1	14	0.6
editing	2	0.1	22	1.0
survey/forecasting work	1	0.0	4	0.2
institutional fundraising		0.0	12	0.5
other	89	3.7	86	3.9
Total	**2385**	**100.0**	**2190**	**100.0**

Table 48. Preferred primary activities for ESA members' typical year.

Primary Activity Preference	n	%
research	985	53.4
teaching K-16	362	19.6
field work	167	9.1
conservation policy development regulatory affairs	60	3.3
writing	43	2.3
consulting	37	2.0
management/administration of R & D	27	1.5
management/administration of education programs	22	1.2
statistical analysis	18	1.0
management/administration of programs other than education or R & D	14	0.8
computer applications	5	0.3
survey/forecasting work	5	0.3
editing	4	0.2
information management	3	0.2
sales, marketing, public relations	3	0.2
development of equipment, products, and systems	2	0.1
institutional fundraising	1	0.1
operations – production, maintenance, construction	1	0.1
other	86	4.7
Total	**1845**	**100.0**

Table 49. Reasons why research was not the primary activity of ESA members.

Reason	n	%
better pay	35	4.4
change in career/professional interests	102	12.7
constraints due to family circumstances	71	8.8

more attractive career options	115	14.3
never wanted to conduct research	51	6.4
position in field of expertise not available	83	10.3
preferred geographic location	34	4.2
other	312	38.9
Total	**803**	**100.0**

Respondents whose primary work activity was teaching, however, predominantly were satisfied with the amount of teaching in their positions (Table 50). Nevertheless, a large portion (37.5%) indicated the level of teaching was too much.

Table 50. ESA members' evaluations of the amount of teaching, given that teaching was their primary work activity.

Amount of Teaching	**n**	**%**
about right	341	59.0
too little	20	3.5
too much	217	37.5
Total	**578**	**100.0**

Teaching

Respondents taught a variety of subjects (Table 51). Despite the wording of the question asking to list up to 5 subjects, the web site did not limit their responses and a large number of respondents included more than 5 subjects (Table 52). Using all the information, respondents taught an average of 1.5 subjects; the minimum number of subjects taught was 1 and the maximum number taught was 12. These numbers are likely biased low based on the frequency of responses that included up to the 5 subjects (as opposed to more than 5) as requested in the wording of the question.

Table 51. Subjects taught by ESA members. Respondents were allowed to list up to 5 subjects.

Subject	n	%
biology	475	10.7
community ecology	351	7.9
conservation biology	253	5.7
plant ecology	240	5.4
population biology	235	5.3
botany	208	4.7
ecosystem studies	181	4.1
aquatic ecology	165	3.7
biological diversity	164	3.7
environmental/resource management	145	3.3
statistical ecology	145	3.3
forest ecology	123	2.8
global change	98	2.2
zoology	92	2.1
ecological modeling	91	2.1
landscape ecology	85	1.9
behavioral ecology	84	1.9
physiological ecology	83	1.9
marine ecology	76	1.7
entomology	70	1.6
environmental education	69	1.6
vertebrate biology	65	1.5

biogeochemistry	64	1.4
ecological complexity	59	1.3
invertebrate biology	59	1.3
wildlife biology	56	1.3
wetlands ecology	52	1.2
restoration ecology	51	1.1
soil science	47	1.1
geography	46	1.0
ecosystem sustainability	45	1.0
systematics/taxonomy	42	0.9
fisheries biology	41	0.9
ecological education	38	0.9
environmental policy	34	0.8
microbiology	33	0.7
sustainable agriculture	32	0.7
impact assessment	27	0.6
remote sensing	23	0.5
nutrient fluxes	22	0.5
hydrology	19	0.4
mathematics	16	0.4
geology	15	0.3
risk assessment	15	0.3
oceanography	14	0.3
chemical ecology	13	0.3
paleoecology	11	0.2
toxicology	8	0.2
ecological toxicology	7	0.2
environmental engineering	6	0.1
physics	6	0.1

anthropology	5	0.1
bioremediation	5	0.1
chemistry	5	0.1
ecological economics	5	0.1
environmental law	5	0.1
trace gas fluxes	5	0.1
geomorphology	4	0.1
biotechnology	2	0.0
Total	**4435**	**100.0**

Table 52. Frequency distribution of the number of subjects taught in the past 2 years. Respondents were asked to list up to 5, but the web site did not limit responses.

Number of Subjects Taught	n	%
1	545	34.8
2	240	15.3
3	227	14.5
4	194	12.4
5	281	17.9
6	46	2.9
7	16	1.0
8	6	0.4
9	5	0.3
10	1	0.1
11	3	0.2
12	2	0.1
Total	**1566**	**100.0**

Undergraduates were the primary audience for most respondents during the past 2 years (Table 53). Graduate level audiences represented about 1/3 of the audiences respondents listed. Non-college audiences represented very small proportions of the audiences which respondents had taught.

Table 53. Audiences taught by ESA members. Respondents were allowed to list up to 5 audiences.

Audiences	n	%
undergraduate	1263	58.5
graduate	697	32.3
professional group	85	3.9
general public	74	3.4
pre-college	41	1.9
Total	**2160**	**100.0**

Institutional Issues

For those respondents employed at institutions of higher education, just over one third had attained tenure (Table 54). Another third reported that tenure was not applicable in their current position. Of those receiving tenure, most attained it within the last 15 years (65.0%); 32.2% within the last 5 years (Table 55).

Table 54. Tenure status of ESA members employed by institutions of higher education.

Tenure Status	n	%

tenured	642	39.0
tenure not applicable	540	32.8
not tenured, in tenure track	255	15.5
not tenured, not in tenure track	210	12.8
Total	**1647**	**100.0**

Table 55. Decade tenure was granted to ESA members responding to the survey.

Decade of Tenure	n	%
1950s	2	0.3
1960s	17	2.7
1970s	68	10.8
1980s	134	21.2
1990s	207	32.8
2000s	203	32.2
Total	**631**	**100.0**

A large proportion of respondents indicated that their department or program intended to create a position in ecology (36.3%; Table 56). Less than 5% of respondents indicated their department or program intended to eliminate a position, but nearly 35% indicated they did not know the intentions for the next 5 years.

Table 56. Respondents' understanding of whether their departments/programs intend to create or eliminate ecological positions in the next 5 years.

Position Status	n	%

create a position	856	36.3
don't know	813	34.5
eliminate a position	106	4.5
neither	581	24.7
Total	**2356**	**100.0**

Funding

Over half or the respondents had applied for grants during the past 2 years. Most had applied for1 or 2 grants (51.6%), but quite a large percentage of members had applied for more than 3 grants (Table 57). Although the largest proportion of grants was in the $10,000-$49,999 range (Table 58), a significant proportion of respondents indicated grant applications for $100,000 up to $5,000,000 (44.1%). Grants were requested to address a variety of ecological topics, most often Community Ecology and Conservation Biology, followed closely by Aquatic Ecology, Forest Ecology, and Ecosystem Studies. The National Science Foundation (NSF) was the primary funding agency targeted by respondents; 23.5% of applications were sent to NSF (Table 59). The drop-down list on the web form represented major funding sources in the U.S. only, however, and a large proportion of respondents listed funding sources outside the U.S. in the “Other (please specify)” box provided on the form. Generally, these were agencies equivalent to the NSF in other countries or other institutes supporting research (59.1%). Overall, 49.9% of the grant applications reported were funded; 36.5% went unfunded according to respondents (Table 60).

Table 57. Number of ESA members who reported having applied for grants to support ecological research during the last 2 years.

# Grants Applied	**# of Respondents**	**%**
1	390	26.7
2	364	24.9
3	258	17.7
4	181	12.4
5	114	7.8
6	73	5.0
7	35	2.4
8	28	1.9
9	7	0.5
10	9	0.6
Total	**1459**	**100.0**

Table 58. The number of grants ESA members applied for by research area.

Research Area	Less than $1,000	$1,000-$9,999	$10,000-$49,999	$50,000-$99,999	$100,000-$249,000	$250,000-$499,999	$500,000-$1,000,000	$1,000,000-$5,000,000	Greater than $5,000,000
community ecology	10	67	73	34	54	68	25	10	1
conservation biology	18	62	107	53	53	22	7	9	
aquatic ecology	11	55	77	45	44	26	16	7	
forest ecology	19	40	62	51	43	28	20	3	1
ecosystem studies	11	24	52	24	40	44	35	28	3
plant ecology	18	50	42	24	26	37	4	2	
population biology	9	30	31	20	24	62	6	2	1
environmental/resource management	1	10	39	34	36	29	8	6	
marine ecology	5	39	32	27	22	12	5	4	2
biological diversity	3	27	32	16	22	22	13	4	
restoration ecology	8	20	41	15	21	19	12	1	1
global change		12	19	11	23	21	20	24	
biogeochemistry	3	17	14	14	14	20	16	7	
landscape ecology	1	14	23	16	25	12	7	1	
fisheries biology		8	22	24	24	9	1	3	
ecological modeling		10	17	14	17	17	9	1	2
wildlife biology	5	15	32	14	15	3	1	2	
physiological ecology	4	23	14	4	15	18	7	1	

behavioral ecology	3	13	14	10	19	18	1	2	1
wetlands ecology	3	14	18	9	12	6	5	1	
education	1	6	11	12	9	8	6	9	
sustainable agriculture		5	18	10	9	9	6	3	
ecological complexity		3	5	5	14	6	8	16	2
ecosystem sustainability		1	7	11	10	11	5	5	1
remote sensing		3	10	5	13	6	11	2	
entomology	1	11	11	6	10	9			
paleoecology	2	10	9	2	7	11	4		
chemical ecology	4	6	8	3	5	11	2	3	
soil science		6	4	6	10	11	4	1	
botany	5	16	9	1	3	4	3		
biology	6	7	7	1	3	9	1	5	
environmental education		11	7	3	7	6	3	2	
ecological toxicology		2	12	4	5	8	7		
microbiology		3	4	1	7	8	5	4	
risk assessment	1	2	2	3	7	3	1	3	
impact assessment		2	3	7	1	3	4	1	
nutrient fluxes		2	4	3	7	4		1	
statistical ecology		6	3	2	7		1	2	
geography		5	5	3	2	3	1		

invertebrate biology	1	7	4	4		1			
systematics/taxonomy	2	7	1	1	3			1	
hydrology			4	1	3	2	1	1	1
oceanography		1	1	1	3	1	2	4	
vertebrate biology		3	6	1		2			
zoology			3	3	2	4			
bioremediation			4		3		2		
biotechnology				2		4	1		
trace gas fluxes		1	2			1	1	1	
environmental policy		1	1	2					1
anthropology		3						1	
environmental engineering			1	1	1		1		
toxicology		1	3						
chemistry	1		1		1				
ecological economics			1		1	1			
geology			1		2				
mathematics						1	1		
geomorphology			1						
physics					1				
Total	**156**	**681**	**934**	**563**	**705**	**640**	**299**	**183**	**17**
%	**3.7**	**16.3**	**22.4**	**13.5**	**16.9**	**15.3**	**7.2**	**4.4**	**0.4**

Table 59. The number of grants ESA members applied for by funding agency.

Funding Source	Less than $1,000	$1,000-$9,999	$10,000-$49,999	$50,000-$99,999	$100,000-$249,000	$250,000-$499,999	$500,000-$1,000,000	$1,000,000-$5,000,000	Greater than $5,000,000
industry		22	28	28	11	7	2	1	
National Aeronautics and Space Administration		4	5	4	28	17	26	7	
National Institutes of Health		1	2	3	3	5	3	5	1
National Oceanic and Atmospheric Administration		4	24	33	42	14	3	7	1
National Science Foundation	2	57	112	65	173	307	159	108	9
state agencies	9	62	136	78	66	18	12	7	
U.S. Agency for International Development			2	2	1	2	2	2	
U.S. Dept. of Agriculture		6	35	35	72	122	28	1	
U.S. Dept. of Defense		1	10	7	14	10	14	6	
U.S. Dept. of Energy		2	7	6	4	19	7	17	
U.S. Dept. of Interior		19	81	54	47	18	5	5	
U.S. Environmental Protection Agency		4	42	45	47	23	6	2	1
U.S.D.A. Forest Service	1	4	57	33	38	22	7		2

university foundation grant	60	231	96	20	16	2	1		
other	84	264	300	153	150	64	28	22	4
Total	156	681	937	566	712	650	303	190	18

Table 60. Proportion of grants that were funded by application amount.

	Funded		Not Funded		Undecided	
Grant Amount	**n**	**%**	**n**	**%**	**n**	**%**
$1,000-$9,999	84	4.1	51	3.4	6	1.1
$1,000,000-$5,000,000	458	22.5	162	10.9	44	8.0
$10,000-$49,999	507	24.9	319	21.6	80	14.5
$100,000-$249,000	283	13.9	188	12.7	79	14.3
$250,000-$499,999	310	15.2	255	17.2	114	20.7
$50,000-$99,999	202	9.9	317	21.4	113	20.5
$500,000-$1,000,000	107	5.2	115	7.8	73	13.2
Less than $1,000	76	3.7	68	4.6	42	7.6
Greater than $5,000,000	12	0.6	5	0.3	1	0.2
Total	**2039**	**100.0**	**1480**	**100.0**	**552**	**100.0**

Most respondents indicated that they tried to fulfill education requirements of granting agencies by providing undergraduate research opportunities (Table 61). Developing interdisciplinary research groups and collaborating with educators were also popular means by which respondents fulfilled these requirements. Community outreach and public education opportunities, for example web site development and collaborations with museum personnel, were commonly listed under “Other.” When providing undergraduate research opportunities, over 65% of respondents indicated that all students were the targets for these opportunities (Table 62). Minorities and women and Honors Students also were frequent targets in grant applications.

Table 61. The means by which respondents fulfilled education requirements for grants from agencies such as the National Science Foundation. Respondents were allowed to select more than one per grant.

Ways in which respondents fulfilled education requirements	n	%
provided research opportunities for undergraduates	657	37.3
developed interdisciplinary group research	278	15.8
collaborated with educators to create program/materials	251	14
adapted materials that were already developed	124	7.0
integrated problem-based instruction	101	5.7
developed inquiry-driven laboratory courses	85	4.8
developed seminars on faculty research	71	4.0
developed interactive experiments on the world wide web	45	2.6
other	136	7.7
did not fulfill requirements	12	0.7
Total	**1760**	**100.0**

Table 62. The types of undergraduates targeted in grants providing undergraduate research opportunities. Respondents were allowed to select more than one per grant.

Undergraduate students targeted in grants	n	%
all students	978	66.7
minority/women students	222	15.1
honors students	177	12.1
pre-service teachers	27	1.8
at-risk students	17	1.2
non-science majors	16	1.1
other	29	2.0

Total	**1466**	**100.0**

Values

Respondents were asked to rate the value they attached to research, teaching, service, and outreach. Although each generally was rated above average (greater than 2 on a scale of 0 = no value to 4 = high value), research was assigned the highest value most consistently (Table 63). Teaching was not as highly valued as research, but was more valued than service or outreach. Outreach had the largest proportion of respondents that attached values less than 2 (20.5%). In addition, the values respondents attached on behalf of their employers generally mirrored their own values for research, members indicated their employers valued placed less value on teaching and outreach (Table 64). To illustrate the differences between a respondent's values those that respondent assigned to their employers, the values respondents claimed their employers had were graphed as a function of the respondents own value ranking. A high proportion of individuals that ranked research as highly valued (value=4) also ranked their employers values as 4 (almost 80%; Figure 7). For respondents who did not value teaching as part of their job satisfaction (value=0; Figure 8), less than 50% indicated their employers had a similar value ranking. For those indicating a higher value ranking for teaching in their personal job satisfaction (value >2), less than half indicated their employers felt similarly. Service (Figure 9) and outreach (Figure 10) graphs also indicated a general lack of correlation between respondents' indication of value and their perceptions of their employers' value rankings.

Table 63. The value level respondents attributed to research, teaching, service, and outreach as part of their job satisfaction.

	Research		Teaching		Service		Outreach	
Value	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
0 (not at all)	35	1.5	109	4.7	79	3.4	132	5.7
1	64	2.7	185	7.9	316	13.5	343	14.8
2	194	8.2	361	15.5	787	33.6	716	30.8
3	405	17.0	687	29.5	739	31.6	708	30.5
4 (high value)	1678	70.6	989	42.4	418	17.9	422	18.2
Total	**2376**	**100.0**	**2331**	**100.0**	**2339**	**100.0**	**2321**	**100.0**

Table 64. The value level respondents believed their employers attributed to research, teaching, service, and outreach.

	Research		Teaching		Service		Outreach	
Value	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
0 (not at all)	126	5.5	361	15.9	198	8.7	317	14.1
1	169	7.4	332	14.7	465	20.5	570	25.3
2	257	11.2	456	20.1	704	31.1	658	29.3
3	315	13.7	476	21.0	545	24.1	427	19.0
4 (high value)	1427	62.2	640	28.3	353	15.6	277	12.3
Total	**2294**	**100.0**	**2265**	**100.0**	**2265**	**100.0**	**2249**	**100.0**

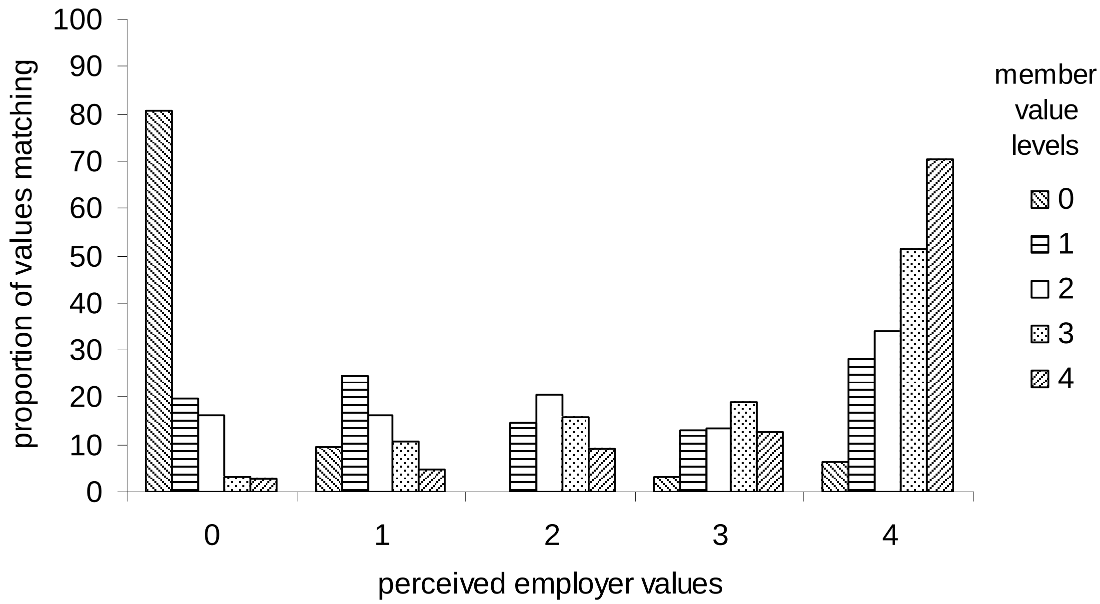

Figure 7. ESA members' assessment of the value of **research** as part of job satisfaction compared with their perceptions of their employers' value of research. 0 = no value, 4 = high value.

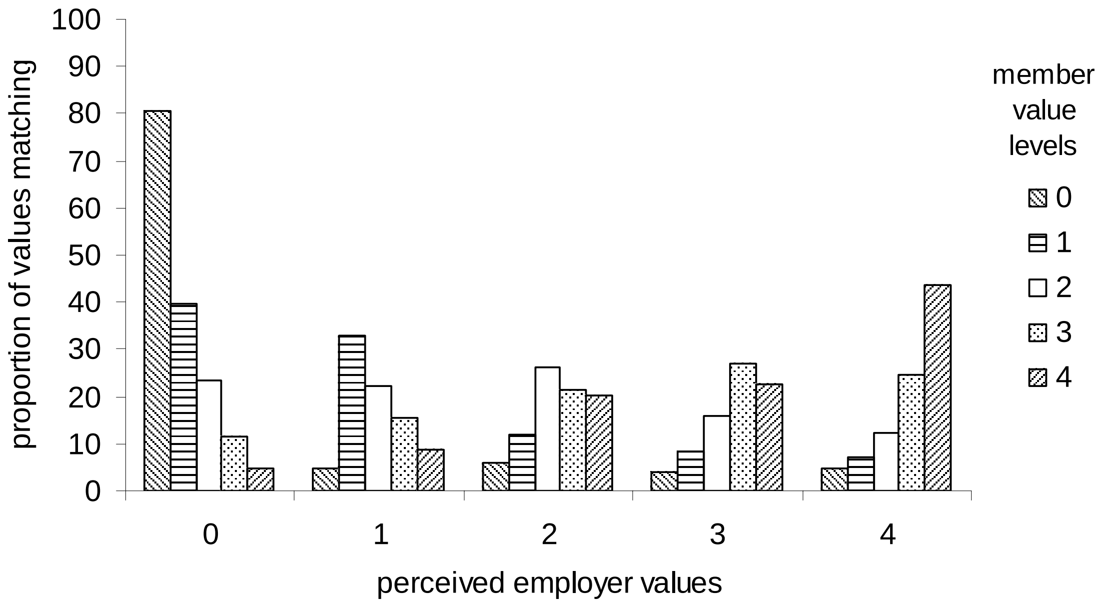

Figure 8. ESA members' assessment of the value of **teaching** as part of job satisfaction compared with their perceptions of their employers' value of teaching. 0 = no value, 4 = high value.

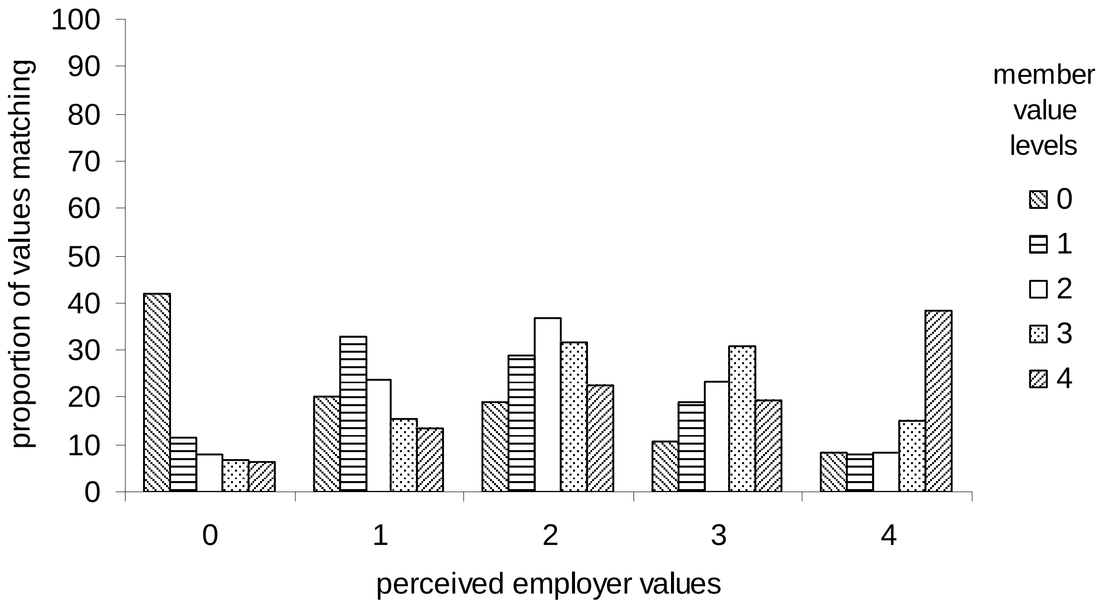

Figure 9. ESA members' assessment of the value of **service** as part of job satisfaction compared with their perceptions of their employers' value of service. 0 = no value, 4 = high value.

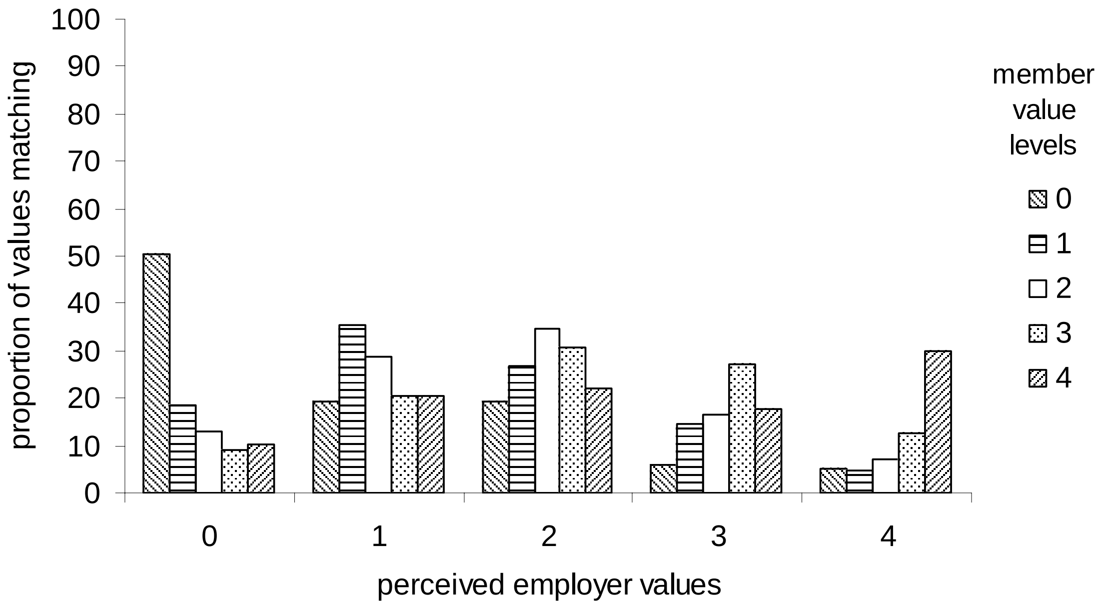

Figure 10. ESA members' assessment of the value of **outreach** as part of job satisfaction compared with their perceptions of their employers' value of outreach. 0 = no value, 4 = high value.

Employment History

Work history of respondents reflected a shift in the proportion of individuals employed in several positions. For example, the proportion of respondents employed in K-12 education decreased in the last 50 years while the proportion of respondents in PhD granting universities generally increased (Table 65). The proportion of individuals employed by local or state governments and consulting firms also appeared to have increased; however, the proportion of respondents in the military decreased according to this broad assessment of work history.

Table 65. The proportion of ESA members within general categories of employment over the past 50 or more years.

Employment Category	2001 - 2005	1996 - 2000	1991 - 1995	1986 - 1990	1981 - 1985	1976 - 1980	1971 - 1975	1966 - 1970	1961 - 1965	1956 - 1960	1951 - 1955	pre-1951
PhD granting college/university	46.7	41.1	41.1	42.2	43.0	44.2	45.9	42.4	31.5	24.6	14.6	26.3
MS granting college/university	7.7	7.7	8.0	7.4	6.7	6.9	5.9	6.8	3.6	1.5	0.0	0.0
4-year college	7.6	8.9	8.2	7.3	8.3	8.2	11.2	12.0	9.9	13.8	7.3	15.8
junior or community college	0.9	0.9	1.1	0.7	0.9	2.6	1.8	2.6	4.5	0.0	0.0	5.3
K-12	0.4	0.9	2.2	5.2	6.0	5.8	7.4	15.2	23.4	38.5	41.5	42.1
medical school	0.0	0.2	0.2	0.3	0.3	0.4	0.6	0.5	2.7	3.1	2.4	5.3
research center/institute	5.7	6.2	4.8	5.8	5.0	4.9	2.7	0.5	3.6	4.6	2.4	0.0
nat'l government, civilian employee	4.8	4.8	5.5	4.5	4.6	4.3	4.4	4.2	3.6	3.1	2.4	0.0
national laboratory	1.0	1.5	1.9	2.7	2.5	2.6	1.2	0.5	0.9	1.5	2.4	0.0
local, state, federal government	12.5	13.0	12.7	11.5	9.4	8.8	6.8	2.1	5.4	4.6	4.9	0.0
United Nations organization	0.2	0.1	0.0	0.0	0.1	0.2	0.6	0.0	0.0	0.0	0.0	0.0
military service	0.1	0.0	0.2	0.9	1.3	1.3	1.8	5.8	3.6	3.1	14.6	0.0
historical organization	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
museum	0.4	0.4	0.4	0.7	0.7	0.6	1.2	1.6	2.7	0.0	4.9	0.0
nonprofit – environmental	3.3	3.2	2.6	2.0	1.9	1.3	1.2	0.5	0.0	0.0	0.0	0.0
nonprofit – other	0.3	0.3	0.6	0.5	0.8	1.3	0.9	1.0	0.0	0.0	0.0	0.0

scientific society	0.3	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
private foundation	0.1	0.3	0.2	0.2	0.5	0.2	0.3	0.0	0.0	0.0	0.0	0.0
consulting firm	6.7	8.7	7.7	5.3	4.8	3.9	3.6	0.0	0.0	0.0	0.0	0.0
business or industry	1.1	1.4	2.3	2.7	3.1	2.6	2.7	3.7	3.6	1.5	2.4	5.3
trade/ professional assoc.	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.9	0.0	0.0	0.0

Barriers to Ecological Careers

A new question posed during the 2005 survey asked respondents to list barriers that needed to be overcome in a career. The list of barriers respondents provided was quite varied (Table 66). Because the question was open-ended, responses were pooled based on general similarities. Family constraints (e.g., marital/parental commitments) were the greatest barrier to respondents' careers, but many cited the lack of job opportunities either in general or within some geographic location, the lack of role models or mentors, funding barriers, and support for research interests.

Table 66. The top 25 barriers to be overcome in an ecological career listed by ESA members. Respondents could list up to 3 barriers.

Barrier	n	%
family constraints	594	15.2
job opportunities	356	9.1
lack of role models/mentors	348	8.9
funding	327	8.3

support for research goals/interests	316	8.1
dual careers	245	6.3
gender issues	130	3.3
salary	128	3.3
financial	119	3.0
cultural support	114	2.9
public support/interest	107	2.7
social issues/activism not valued	93	2.4
institutional support	87	2.2
mentor quality	83	2.1
geographic issues	67	1.7
teaching not valued	64	1.6
collegiality	58	1.5
workload	55	1.4
applied research not valued	51	1.3
training	51	1.3
miscellaneous	45	1.1
desire for a balanced life	43	1.1
support from family	42	1.1
national political climate	39	1.0
administrative demands	38	1.0

THE FUTURE OF ECOLOGY

Most respondents indicated a good to excellent chance that they would be involved in the field of ecology in the next 5 years given their current circumstances, but a surprising large number ranked their probability as only "fair" (Table 67). Those leaving the field of ecology pointed toward changes in career interests predominantly, but lack of job opportunities, more attractive career options, and pay also were selected at high rates (Table 68). Although most respondents indicated they would prefer to be working as ecologists if they did not consider themselves ecologists as of February 2005 (64.2%), over one third indicated they would not (Table 69).

Table 67. The probability respondents will be in the field of ecology in 5 years given their current circumstances.

Probability	n	%
excellent	1410	58.0
good	220	9.0
fair	683	28.1
poor	118	4.9
Total	**2431**	**100.0**

Table 68. Factors contributing to respondents leaving the field of "ecology" for those that did not consider themselves ecologists as of 15 February 2005.

Factors Contributing to Leaving "Ecology"	n	%
change in career/professional interests	30	22.1
position in field of expertise not available	20	14.7
more attractive career options	17	12.5
better pay	17	12.5
constraints due to family circumstances	9	6.6
retired	8	5.9
preferred geographic location	6	4.4
never wanted to teach or conduct research	1	0.7

other	28	20.6
Total	**136**	**100.0**

Table 69. ESA members' preferences to be working as ecologists, if they did not consider themselves ecologists as of 15 February 2005.

Preference	**n**	**%**
no	101	35.8
yes	181	64.2
Total	**282**	**100**

Communication

Over 75% of 2451 respondents had published in an ecologically related field in the past 2 years. The majority of these publications were articles in refereed journals (Table 70). Respondents that had published had an average of 2.2 publications during the past 2 years. Although over 45% of respondents indicated 1 publication, 18.1% had 4 or more (up to 10) publications.

Table 70. The types of publications respondents prepared on ecologically related fields in the past 2 years. Respondents listed all relevant publications.

Type of Publication	n	%
article in a refereed journal	1679	40.4
technical report	511	12.3
chapter in scholarly book	500	12.0
paper in non-refereed proceedings other than book or journal	336	8.1
paper in refereed proceedings other than book or journal	311	7.5
article in a newspaper/magazine	274	6.6
book or monograph (author or coauthor)	199	4.8
book review in a refereed journal	190	4.6
book or monograph (editor or coeditor)	102	2.5
other	51	1.2
Total	**4153**	**100.0**

Respondents were very interested in communication with the public about ecology. These interests ranged from speaking with reporters and journalists about issues, to working in formal education environments and presenting ecological issues to government bodies (Table 71). Respondents included a variety of other communication opportunities. Outreach activities were important types of communication to respondents; 43.9% suggested a variety of different outreach activities. In addition, 26.0% were interested in public education and another 27.2% in writing, and other informal science education opportunities.

Table 71. Types of communication that interested ESA members. Respondents could select more than 1 type of communication.

Types of Communication	n	%
responding to reporters/journalist queries about ecological issues	863	22.4
working with K-12 teachers to develop curricula	775	20.1
presenting ecological issues to legislature/governments	700	18.2
developing policy or management plans	642	16.7
contacting reporters/journalists queries about ecological issues	447	11.6
participation in the Aldo Leopold Leadership Program	273	7.1
other	153	4.0
Total	**3853**	**100.0**

State and Local Government Involvement

Approximately 15% of ESA members were active in the government (Table 72). This involvement was varied, however, but most respondents were active on conservation committees (Table 73).

Table 72. Involvement by members of the ESA in state or local governments.

Involvement	n	%
no	1850	85.0
yes	327	15.0
Total	**2177**	**100.0**

Table 73. Ways in which ESA members were involved in state and local governments. Respondents were allowed to provide more than 1 response.

Government Involvement	n	%
Conservation Commission	68	17.9
Advisory Committee	47	12.4
Regional Watershed Council	37	9.7
Environmental Political Action Committee	26	6.8
Planning Board	27	7.1
Regional Planning Commission	17	4.5
Zoning Commission	10	2.6
School Board	10	2.6
Weed Board	7	1.8
Federal Advisory Committee	2	0.5
Government Advisory Board	1	0.3
Other	128	33.7
Total	**380**	**100.0**

Innovations in Ecology

Respondents suggested that future directions for ecological research and advancing ecological issues were largely dependent on increasing monies available. Certainly the measure most often selected by respondents by far was increasing funding opportunities (Table 74). Secondary and tertiary measures were more evenly divided, although promoting standardized data and international partnerships tended to have more support than other measures. Nevertheless, respondents supported all of the issues defined by ESA as critical and emerging

(Table 75). More members supported Community Outreach more strongly than Educational Partnerships and Environmental Justice, however.

Table 74. ESA members' beliefs about measures that would advance innovation/progress in ecological research.

	Primary		**Secondary**		**Tertiary**	
Innovation	**n**	**%**	**n**	**%**	**n**	**%**
increase funding opportunities	1277	59.3	396	19.4	210	11.4
a national environmental observatory network	212	9.9	273	13.4	275	14.9
promote standardization of data and data sharing	204	9.5	366	17.9	365	19.8
create incentives	154	7.2	290	14.2	239	12.9
international partnerships	116	5.4	298	14.6	362	19.6
increasing human diversity in ecology	108	5.0	194	9.5	168	9.1
enhance infrastructure	81	3.8	225	11.0	229	12.4
Total	**2152**	**100.0**	**2042**	**100.0**	**1848**	**100.0**

Table 75. The level of support from ESA members for issues defined by ESA as critical and emerging.

	Community Outreach		**Environmental Justice**		**Educational Partnerships**	
Level of Support	**n**	**%**	**n**	**%**	**n**	**%**
0 (do not support)	43	2.0	97	4.6	40	1.9
1	81	3.8	162	7.6	79	3.7
2	315	14.7	401	18.8	341	16.1
3	629	29.4	604	28.4	745	35.1
4 (strongly support)	1069	50.0	864	40.6	917	43.2

Total	**2137**	**100.0**	**2128**	**100.0**	**2122**	**100.0**

REASONS FOR MEMBERSHIP IN THE ESA

Over ninety percent of the respondents considered themselves ecologists as of 15 February 2005. The proportion of non-member respondents was slightly lower, however; 81% of these respondents considered themselves ecologists.

The primary reason that individuals are members of the ESA was, by far, the need keep up to date with advances made in ecology (Table 76). When the rankings were pooled, receiving the journals, networking, and academic development were also important reasons for membership.

Table 76. Primary, secondary, and tertiary reasons why respondents are members of the Ecological Society of America.

	Primary		**Secondary**		**Tertiary**	
Reason	**n**	**%**	**n**	**%**	**n**	**%**
academic training/professional development	421	18.3	262	12.2	214	11.5
keep up to date with advances made in ecology	946	41.1	551	25.8	229	12.3
multidisciplinary research includes collaboration with ecologists	77	3.3	80	3.7	81	4.4
networking with ecological professionals	266	11.5	374	17.5	342	18.4
opportunities to educate others about ecology	11	0.5	56	2.6	109	5.9
opportunity for career advancement/change	31	1.3	68	3.2	129	7.0
personal commitment to environmental stewardship	117	5.1	158	7.4	258	13.9
receive a discount on meeting registration	126	5.5	103	4.8	166	8.9

receive ESA Journals	265	11.5	476	22.3	294	15.8
other	44	1.9	11	0.5	33	1.8
Total	**2304**	**100.0**	**2139**	**100.0**	**1855**	**100.0**

Respondents received 2.4 ESA journals, on average (Table 77). Most respondents reported they received *Frontiers in Ecology and the Environment*. An additional 23% indicated they received 2 journals, mostly (65%) *Bulletin of the Ecological Society of America*. This question likely does not reflect the true distribution of ESA journals, however. For example, every member should have received *Frontiers*, but 35% of respondents reported they received just the 1 publication despite less than 33% indicating they did receive *Frontiers*. Likewise, every member should have had access to the *Bulletin of the Ecological Society of America* via the website.

Table 77. ESA journals received by respondents. Respondents were allowed to pick as many journals as they received.

Journals Received	**n**	**%**
Frontiers in Ecology and the Environment	1295	32.7
Ecology	1013	25.6
Bulletin of the Ecological Society of America	750	18.9
Ecological Applications	543	13.7
Ecological Monographs	359	9.1
Total	**3960**	**100.0**

Most members belonged to the ESA at 1-2 levels. Generally, these were Regular Member and Section Member (Table 78). Few respondents reported they were Student Members, but over 900 respondents did not include any membership status. More over, these proportions do not reflect the membership database. Most likely, students (and others) selected “Regular Member” instead of the more accurate “Student Member” in their responses.

Table 78. Membership levels to which respondents reported belonging. Respondents were allowed to provide more than 1 response.

Membership Level	**n**	**%**
Regular Member	1019	39.3
Section Member	608	23.4
Chapter Member	358	13.8
Certified Ecologist	145	5.6
Committee Member	135	5.2
Editorial Board	95	3.7
Life Member	63	2.4
Seed's Mentor or volunteer	56	2.2
Governing Board	45	1.7
Aldo Leopold Leadership Fellow	18	0.7
Student Member	18	0.7
Rapid Response Team Member	13	0.5
Other	23	0.9
Total	**2596**	**100.0**

The membership boasts a significant portion of life-long members (Table 79). Over 18% of the membership has been members for more than 20 years.

Table 79. Number of years of membership in the ESA.

Years of Membership	n	%
5 or fewer	1047	44.7
5-10	458	19.6
10-15	235	10.0
15-20	165	7.0
20-25	158	6.7
25-30	128	5.5
30-35	67	2.9
35-40	46	2.0
45-50	21	0.9
50-55	14	0.6
55-60	1	0.0
60-65	2	0.1
Total	**2342**	**100.0**

Respondents used the ESA website primarily to access meeting information (Table 80), although accessing journals was also important. Other reasons respondents included were to access information about manuscripts and submission, to access member addresses, and to renew membership.

Table 80. Reasons ESA members use the website.

Website Use	**n**	**%**
to find meeting information	1329	27.3
to access journals	1171	24.0
to learn about the ESA and its activities	715	14.7
for teaching resources	443	9.1
to look for employment	362	7.4
to contact the ESA office	284	5.8
to access membership expertise	169	3.5
other	39	0.8
I do not use the ESA website	362	7.4
Total	**4874**	**100.00**

MEMBERSHIP IN OTHER ORGANIZATIONS

In addition to the ESA, respondents were members in a number of professional organizations (Table 81). On average, ESA members belonged to 2.4 other organizations, primarily Sigma Xi and the Society for Conservation Biology. More than 60% of respondents devoted 1 or more days per year to these organizations (Table 82).

Table 81. Professional societies to which 50 or more ESA members belonged. Respondents were allowed to provide more than 1 response.

Professional Society	**n**	**%**
Sigma Xi	391	6.9

Society for Conservation Biology	373	6.6
American Association for the Advancement of Science	318	5.6
American Institute of Biological Sciences	227	4.0
American Geophysical Union	156	2.8
The Wildlife Society	155	2.7
Society for Wetland Scientists	148	2.6
British Ecological Society	142	2.5
American Society of Naturalists	141	2.5
American Society of Limnology and Oceanography	138	2.4
Botanical Society of America	138	2.4
North American Benthological Society	122	2.2
Society for the Study of Evolution	118	2.1
American Fisheries Society	113	2.0
Association for Tropical Biology	102	1.8
American Ornithologists' Union	99	1.8
Soil Science Society of America	89	1.6
Entomological Society of America	80	1.4
American Society of Mammalogists	75	1.3
Society of American Foresters	73	1.3
Organization for Tropical Studies	70	1.2
Society for Ecological Restoration	65	1.2
American Society of Ichthyologists and Herpetologists	64	1.1
Animal Behavior Society	57	1.0
International Association for Landscape Ecology	57	1.0
INTECOL	54	1.0
Society for Range Management	52	0.9
International Association for Vegetation Science	51	0.9

Table 82. Number of days per year ESA members devoted to organizations other than the ESA.

# of Days	n	%
none	712	34.1
1	161	7.7
2-5	561	26.8
6-10	329	15.7
11-15	147	7.0
more than 15	181	8.7
Total	**2091**	**100.0**

DISCUSSION

Comparisons with the 1992 Survey

Diversity

Diversity in the membership seems to have increased since both the 1987 and 1992 surveys. Females represented a larger proportion of the respondents in 2005 than in 1992, but this proportion was still well below U.S. population estimates and the proportion of females enrolled in the biosciences (Figure 11). A large portion of the females were in younger age classes in the 2005 survey, a trend also apparent in the 1992 data. Fewer males in the younger age classes responded in 2005 than in 1992, however (Figure 12). A large number of individuals declined to indicate a gender in the 2005 survey, so definitive statements about gender diversity and trajectories in the society were difficult to make. For example, analyses of covariance indicated that females were paid between $8500 and $9700 per year *less* than males in 2005, an *increase* in disparity of nearly $4000 from 1992. If males were absent from the survey, this salary difference should be even greater cause for concern: females are either being paid less in equivalent careers or are choosing careers that do not pay as well as others. Gross annual individual incomes were higher in 2005 than in 1992 indicating the wage disparity also may have resulted because females did not advance at the same pace as males. Although the trend was quite alarming, more complete information would be required before taking action as a society.

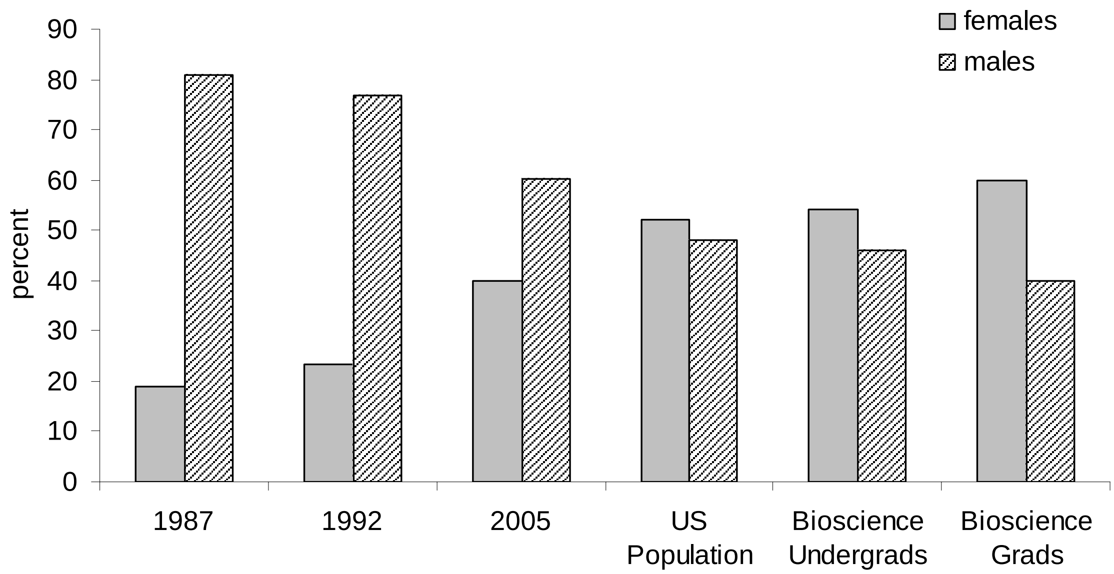

Figure 11. Proportion of females and males in the 3 ESA surveys of ecologists compared with other relevant measures of gender.

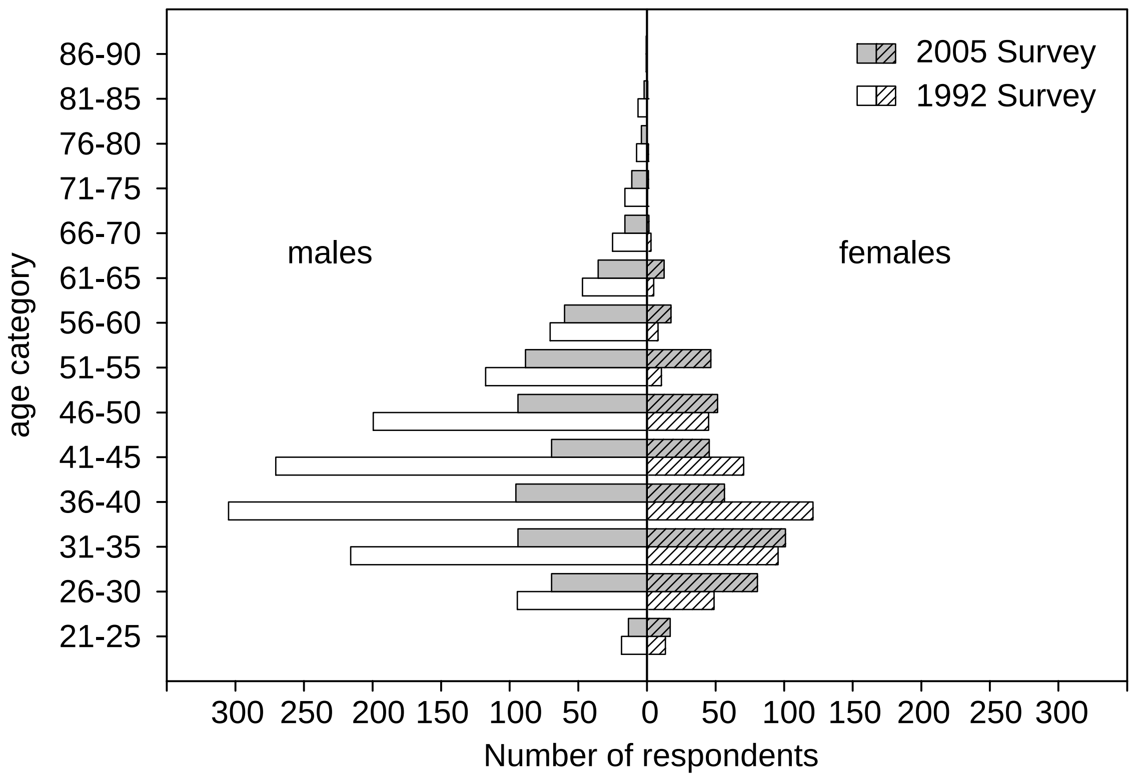

Figure 12. The number of males and females responding to the ESA Profiles of Ecologists Survey in 2005 and 1992.

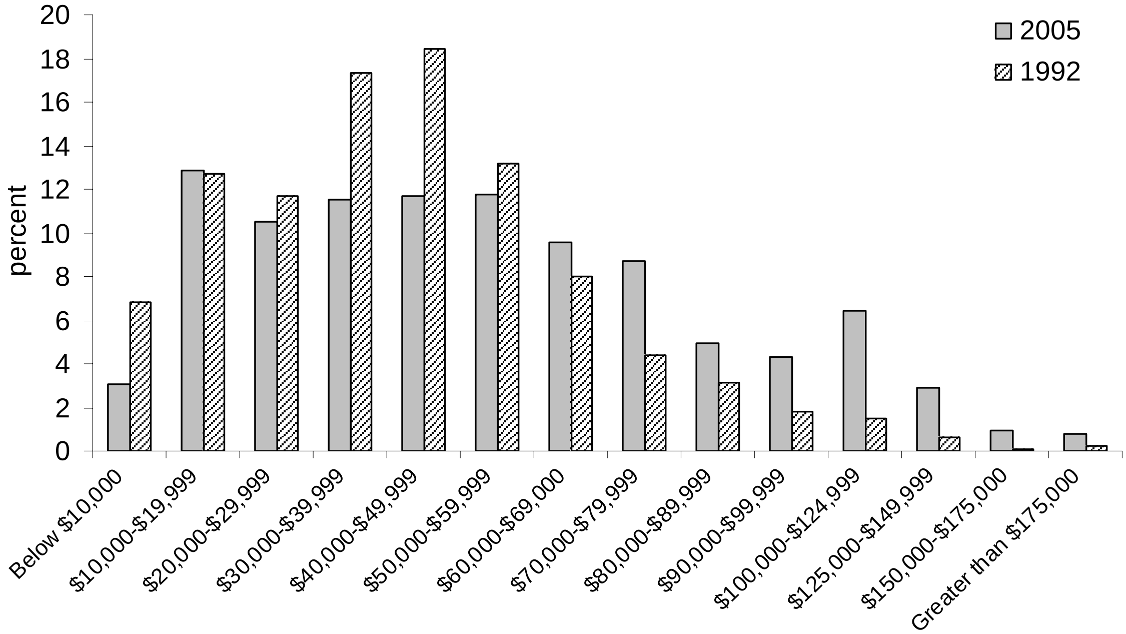

Figure 13. Proportion of individuals within in each salary range category in 2005 and 1992.

Racial and ethnic diversity also increased, although issues with survey data similar to gender data collection probably affected the results (Figure 14). The substantial majority of the membership remained white/Caucasian, but Hispanic members increased by 30% since 1992. Native American members decreased slightly, but the change may have been a result of different categorizations of Native Hawaiians across surveys. Part of this increase in diversity was due to a greater diversity of citizenship of members. In fact, when only U.S. born members were considered, the proportion of members reporting to be Asian/Pacific Islanders and Hispanics decreased from 1992 by 1.3% (to 1.0%) and 0.7% (to 1.6%), respectively. According to the U.S. Census, 12.5% or the population was Hispanic American, 12.3% African American, 3.6% Asian American, and 1% Native American in 2000.

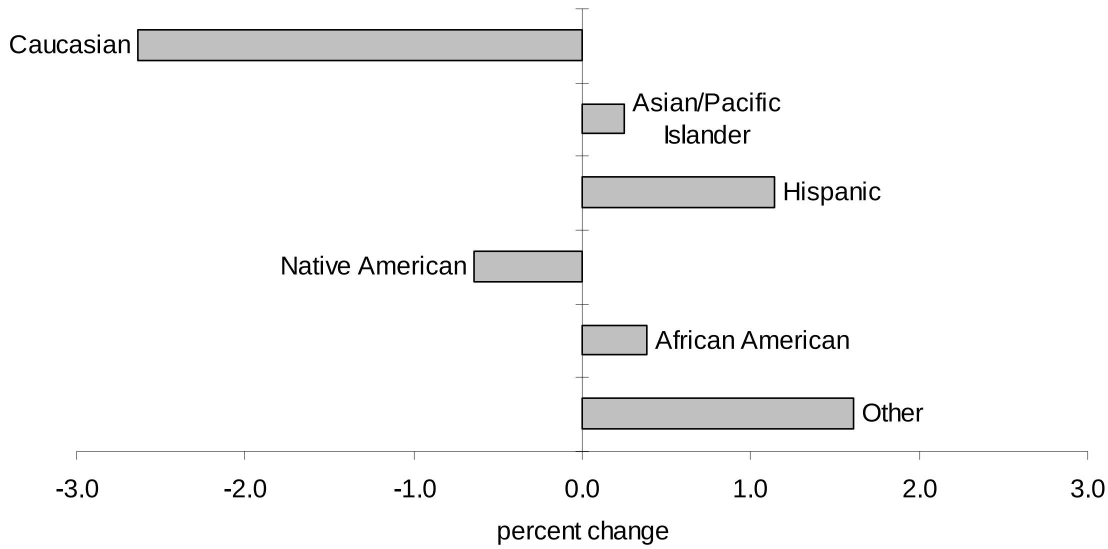

Figure 14. The percent change in the proportion of members stating their racial background between 1992 and 2005.

The 1992 Profiles of Ecologists Survey first reported the serious under-representation of women and minorities within the membership of the ESA. In 1993, the Women and Minorities in Ecology (WAMIE) Committee developed a vision for the Ecological Society of America (ESA) "to achieve a population of ecologists that reflects the gender and cultural diversity of the general population of the United States." If indeed the diversity of the ESA membership has declined, then current efforts by the society to

- create a scientific environment that embraces diversity and allows all professionals to flourish regardless of gender, racial or cultural background,
- reduce or remove barriers to entry and advancement in the profession,
- assure that the teaching and research agendas in ecology address the relevance of ecological knowledge to our diverse society, and

- promote and encourage increased participation of all members of society in the application of ecological principles (WAMIE I 1993)

had been either unsuccessful or the results were not showing up in these types of surveys.

Certainly the volunteer nature of the 2005 Profiles of Ecologists Survey did not lend to an accurate assessment of racial diversity in the ESA or ecology. Part of the problem assessing racial diversity comes from respondents unwilling to include their racial background in surveys such as this. Of nearly 2300 respondents, 4% did not include their race intentionally. Clearly efforts need to be made to communicate with the membership about the need for accurate demographic data if programs aimed at increasing diversity and diversity awareness are to be assessed.

Education

Little changed between 1992 and 2005 with regard to the characteristics of members' education, the role of financial support, or how they entered ecological careers. The major institutes granting members' doctoral degrees continued to be large universities with large ecological science programs including the University of California-Davis, Cornell University, University of California-Berkeley, University of Wisconsin, and Duke University. As in 1992, support was critical to both entering and progressing through a degree program. The questions regarding reasons students left graduate degree programs differed slightly between surveys; in 2005, the responses included "finances prevented continuing," "lost interest," and "other" in addition to "personal considerations," "major professor did not provide adequate guidance," and "received job offer that paid much more than graduate stipend." Nevertheless, the proportion of respondents indicating issues with their major professor declined from 39.4% in 1992 to 27.7%

in 2005. In addition, fewer respondents received job offers that paid more than graduate stipends in 2005 (8.0%) than in 1992 (16.2%). These trends also were reflected in differences between genders. The % of respondents that were male reporting problems with major professors declined from 65.7% to 53.5 in 2005; % of respondents that were female increased from 34.3 to 46.5%. Similarly, % of respondents that were male receiving better job offers also declined from 78.6% to 64.3% in 2005. The number of post-doc appointments respondents held also was surprisingly consistent between the 2 surveys. Most respondents held 1 post-doc (70.3% in 1992 and 69.1% in 2005); few held 3 or more (8.3% in 1992 and 7.0% in 2005).

Interests and Activities

Employment diversity was similar between the two surveys; PhD granting universities employed the most respondents (49.9% in 2005 and 53.6% in 1992) followed distantly by local, state, and national governments (15.5% in 2005 and 17.0% in 1992). Research appeared to have increased as a primary work activity (from 45.9% in 1992 to 52.9% in 2005) and decreased as a secondary activity (35.9% in 1992 to 23.7% in 2005) (Table 83). Teaching, however, decreased as a primary work activity but increased as a secondary work activity in 2005.

Table 83. Research, teaching (K-16), consulting, and field work as the primary and secondary work activities reported by respondents in 1992 and 2005.

Primary Work Activity

	1992		**2005**	
	n	**%**	**n**	**%**
research	1656	45.9	1262	52.9
teaching K-16	1005	27.8	503	21.1

consulting	222	6.2	118	4.9
field work	61	1.7	85	3.6

Secondary Work Activity

	1992		**2005**	
	n	**%**	**n**	**%**
research	1257	35.9	520	23.7
teaching K-16	757	21.6	600	27.4
consulting	95	2.7	46	2.1
field work	300	8.6	292	13.3

Reasons for those not conducting research as a primary activity also changed between surveys. The question was altered slightly in 2005 to reflect different values placed on teaching and other activities in ecology from 1992. Therefore, instead of asking why respondents had jobs entailing something other than research or teaching, the question in 2005 only asked about research. Better pay, more attractive career options, and position availability all declined as reasons for not doing research as a primary activity; the "other" category increased from 20.5% in 1992 to 38.9% in 2005, however (Table 84). As noted earlier in this report, these "other" reasons included interest in teaching, split appointments that did not allow research to dominate activities, and increased administrative duties.

Table 84. Research, teaching (K-16), consulting, and field work as the primary and secondary work activities reported by respondents in 1992 and 2005.

Reason for Not Doing Research	**1992**	**2005**
better pay	9.4	4.4

change in career/professional interests	12.8	12.7
constraints due to family circumstances	8.2	8.8
more attractive career options	22.3	14.3
never wanted to conduct research	5.6	6.4
position in field of expertise not available	17.8	10.3
preferred geographic location	3.5	4.2
other	20.5	38.9

The 3 areas of primary research importance according to The Sustainable Biosphere Initiative: An ecological research agenda (SBI; Lubchenco et al. 1991) included global change, biological diversity, and sustainable ecological systems. Looking at just those skill areas and areas of active investigation indicated a slight decrease in respondents' interests from 1992: respondents conducting research in global change declined from 4.0% to 2.6%, biodiversity research remained at 4.0%, and sustainable ecological systems (both sustainable agriculture and ecological sustainability) research was nearly identical to the previous survey (2.2% v. 2.0% in 1992). Respondents did not rate themselves as highly skilled in these areas of research either; the highest proportion of respondents listing 1 of these as their primary skill was only 1.2% (biodiversity). Current areas of active research and grant proposals suggested that ESA members had changed in accordance with the SBI's suggestions.

Members' interests and areas of active research seem to have shifted from the previous survey to include larger scale systems and studies in 2005. Based on rankings of current research areas, research in biological diversity, ecological modeling, and landscape ecology has increased greatly (Table 85).

Table 85. Ranks for areas of active ecological research in 1992 and 2005.

Area of Active Research	Rank in 1992	Rank in 2005
community ecology	2	1
conservation biology	5	2
plant ecology	4	3
aquatic ecology	1	4
population biology	3	5
forest ecology	6	6
ecosystem studies	9	7
biological diversity	21	8
ecological modeling	12	9
landscape ecology	16	10

Grant amounts increased greatly from 1992 to 2005. Large grants, greater than $250,000 dollars, were over twice as common in 2005 than in 1992 whereas applications for smaller grants ($1,000-$49,999) were fewer (Table 86). These large grants also reflected areas of research in keeping with the SBI recommendations. Indeed, the greatest proportions of large grants were in the fields of ecosystem studies, community ecology, population biology, and global change (Table 87).

Table 86. Proportion of grants applied for by dollar amounts in 1992 and 2005.

Grant Amount	% in 1992	% in 2005
less than $1,000	6.6	4.1
$1,000-$49,999	50.9	39.1
$50,000-$99,999	15.6	13.4

$100,000-$249,999	16.0	16.6
greater then $250,000	10.9	26.8

Table 87. The top 10 fields of research where respondents applied for grants greater than $250,000 in 2005 compared with the number of grants in those areas in 1992.

	1992		**2005**	
Field	**n**	**%**	**n**	**%**
ecosystem studies	66	18.1	110	9.5
community ecology	19	5.2	104	9.0
population biology	21	5.8	72	6.2
global change	24	6.6	65	5.6
forest ecology	6	1.6	53	4.6
aquatic ecology	14	3.8	49	4.2
plant ecology	5	1.4	43	3.7
environmental/resource management	14	3.8	43	3.7
biogeochemistry	7	1.9	43	3.7
biological diversity	5	1.4	41	3.6

Survey Representation

As with most other surveys, the results may not have truly reflected the membership. Humans are very difficult subjects to sample. In addition, response to the Profiles of Ecologists Survey was voluntary. Many members may have been too busy to take the 20 minutes necessary to fill out the survey. Indeed, many respondents commented that they did not have time to complete the survey once they had started. Moreover, the timing of the survey may not have been advantageous for many respondents. The survey opened in May, when many members may have been busy preparing for finals (those associated with universities) and/or field work (those in research). As a result, the survey may have reflected the most vocal faction of the membership.

In fact, when basic demographic information from the survey was compared to the ESA membership database, white/Caucasians were overrepresented (86% vs. 74%) and other races, such as Asians, were underrepresented (2% vs. 4%).

The vast majority of the errors with the ESA survey were a result of the survey “timing out” before it was completed. If the survey sat idle for more than an hour, the user’s session timed, out and they were unable to continue with the survey. Any data entered up to that point was saved. A large number of surveys timed out during the first 2 days it was online. On the second day, the timeout time was increased resulting in fewer timeout errors. A few users reported difficulty selecting multiple items from list boxes on the survey. This error could not be reproduced this error on any browser or operating system, however, and it must be attributed to user error. One still unidentified error affected a small percentage of the surveys: users whose sessions had not timed out were unable to proceed through the whole survey.

RECOMMENDATIONS FOR FUTURE SURVEYS

Future ESA surveys need to recognize that a complete census of the membership is unlikely no matter the technique or accessibility. The survey should be based on statistical sampling, if the results are to be used with authority. Although issues with website security and anonymity would have to be overcome, the surveyors could work more closely with a sample ensuring accurate and complete information is collected. Currently, the ESA represents a broad section of the global community in small numbers; small numbers of individuals that cannot be entirely accounted for in a sampling scheme. Some of this demographic information is already included in the membership application, however, and this information could easily be used to supplement the Profiles of Ecologists Survey.

ECOLOGICAL SCIENCE AND SUSTAINABILITY

In 2004, the Ecological Visions Project Committee of the ESA developed a plan of action to strengthen research capabilities and enhance the impact of ecological sciences. The plan outlined 3 inter-related courses of action: (1) increasing the extent to which ecological knowledge informs decision that influence global sustainability, (2) advancing innovative and anticipatory research that contributes to ecological sustainability, and (3) stimulating cultural change towards a forward-looking, international ecology.

The faction of the membership responding to this survey clearly indicates a reasonable expectation of moving towards the goals of the Visions Plan. In addition to strong basic and applied research backgrounds, skills, and grant writing capabilities, members' interests in education, communication, and government involvement all point to a society ready to move toward these goals. Teaching also is more accepted as a primary activity in the ecological sciences now than previously, and ESA members' interests in teaching span a broad range of topics. Moreover, members actively publish; more than 75% of respondents had published at least one article in peer-reviewed publications in the past 2 years. Other types of communication respondents are willing to participate in include working with the press and other media on ecological issues, working with K-12 teachers to develop curricula, and presenting ecological issues to legislature/governments. Currently, only 15% actively participate in local and state governments, and this involvement is highly varied from advisory to weed control boards. The increased role respondents are willing to play in communication with government bodies may affect government participation rates in the future, however. In addition, about 3/4 of the membership supported or strongly supported the 3 issues defined by the ESA as critical and emerging: Community Outreach, Environmental Justice, and Educational Partnerships. And although most respondents believed increasing funding opportunities is the primary measure to advance innovation/progress in ecology, they also believed strongly in the promotion of standardized data and data sharing, a national environmental observatory network, and international partnerships.

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