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The Ecological Society of America

GOVERNING BOARD FOR 2006–2007

AIMS

The Ecological Society of America was founded in 1915 for the purpose of unifying the sciences of ecology, stimulating research in all aspects of the discipline, encouraging communication among ecologists, and promoting the responsible application of ecological data and principles to the solution of environmental problems. Ecology is the scientific discipline that is concerned with the relationships between organisms and their past, present, and future environments. These relationships include physiological responses of individuals, structure and dynamics of populations, interactions among species, organization of biological communities, and processing of energy and matter in ecosystems.

MEMBERSHIP

Membership is open to persons who are interested in the advancement of ecology or its applications, and to those who are engaged in any aspect of the study of organisms in relation to environment. The classes of membership and their annual dues for 2007 are as follows:

Regular member:		Student member:	$25.00
Income level	Dues	Life member:	Contact Member and Subscriber Services (see below)
<$40,000	$50.00	Emeritus member:	Free
$40,000–60,000	$75.00		
>$60,000	$95.00	Subscriptions to the journals are not included in the dues.	

Special membership rates are available for individuals in developing countries. Contact Member and Subscriber Services (address below) for details.

PUBLICATIONS

The Society publishes a bulletin, four print journals, and an electronic data archive. The Bulletin of the Ecological Society of America, issued quarterly, contains announcements of meetings of the Society and related organizations, programs, awards, articles, and items of current interest to members. The journal Ecology, issued monthly, publishes essays and articles that report and interpret the results of original scientific research in basic and applied ecology. Ecological Monographs is a quarterly journal for longer ecological research articles. Ecological Applications, published six times per year, contains ecological research and discussion papers that have specific relevance to environmental management and policy. Frontiers in Ecology and the Environment, with 10 issues each year, focuses on current ecological issues and environmental challenges; it is international in scope and interdisciplinary in approach. Ecological Archives is published on the Internet at ‹http://esapubs.org/Archive› and contains supplemental material to ESA journal articles and data papers.

No responsibility for the views expressed by the authors in ESA publications is assumed by the editors or the publisher, the Ecological Society of America.

Subscriptions for 2007 are available to ESA members as follows:

	Regular	Student		
Ecology	$65.00	$50.00	Frontiers in Ecology	Free to members
Ecological Monographs	$30.00	$25.00	Bulletin of the Ecological Society of America	Free to members
Ecological Applications	$50.00	$40.00	Ecological Archives	Free

Application blanks for membership may be obtained from the Ecological Society of America, Member and Subscriber Services, 1707 H Street, N.W., Suite 400, Washington, DC 20006, to which all correspondence concerning membership should be addressed. Checks accompanying membership applications should be made payable to the Ecological Society of America.

For additional information on the Society and its publications, visit ESA's home page on the World Wide Web ‹http://esa.org›.

Cover Photo: Herbivory on the species-rich tropical genus *Inga* is largely restricted to young leaves. On Barro Colorado Island, Panama (BCI), with 11 common species of *Inga*, many caterpillar species attack only 1–4 species of this genus. A single species of gelechiid caterpillar fed on 10 species of *Inga*. Observations of this caterpillar's feeding patterns showed that the availability of young leaves, competition from other herbivores, and to some extent parasitism rates determined preferences among the various species of *Inga*. Ants visit the leaves during the day to feed on the extrafloral nectaries of *Inga* leaves, but evidently do not deter use of the leaves by caterpillars. The authors found no correlation between the abundance of the gelechiid and the numbers of aggressive ants on the leaves. It appears that leaf rolling (not illustrated here) discourages parasitism and interference by ants to some degree. This photograph was taken in connection with the article, "Food quality, competition, and parasitism influence feeding preference in a neotropical lepidopteran" by Thomas A Kursar, Brett T. Wolfe, Mary Jane Epps, and Phyllis D. Coley, tentatively scheduled to appear in *Ecology* 87(12), December 2006.

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Announcements

Society Notices

Call for Nominations: ESA Awards

The Awards Committee of the Ecological Society of America solicits and encourages nominations from members of the ESA for each of the awards listed below. *ESA especially encourages nominations of candidates from traditionally underrepresented groups, including women and minorities*. In preparing a nomination, it would be helpful to consult with the Chair of the specific award subcommittee or the Awards Committee Chair. More information about the process is available on ESA's web page ‹http://www.esa.org› under ESA Awards.

Nomination schedule

To be given full consideration, nominations for awards should be completed by **30 November 2006**. They should be submitted directly to Chairs of the specific award subcommittees (e-mail addresses below).

Eminent Ecologist Award

The Eminent Ecologist Award is given to a senior ecologist in recognition of an outstanding body of ecological work or of sustained ecological contributions of extraordinary merit. Nominees may be from any country and need not be ESA members. Recipients receive lifetime active membership in the Society. Recent recipients include Richard Root, Sam McNaughton, Lawrence Slobodkin, and Daniel Simberloff. To submit a nomination, contact Paul Dayton, Chair, Eminent Ecologist Award Subcommittee ‹pdayton@ucsd.edu›.

Odum Education Award

The Eugene P. Odum Award recognizes an ecologist for outstanding work in ecology education. This award was generously endowed by, and named for, the distinguished ecologist Eugene P. Odum. Through teaching, outreach, and mentoring activities, recipients of this award have demonstrated their ability to relate basic ecological principles to human affairs. Nominations recognizing achievements in education at the university, K–12, and public levels are all encouraged. Recent recipients include Richard Root, James Porter, and Claudia Lewis. To submit a nomination, contact Charlene d'Avanzo, Chair, ESA Odum Education Award Subcommittee ‹cdavanzo@hampshire.edu›.

Honorary Member Award

Honorary Membership in the Society is given to a distinguished ecologist who has made exceptional contributions to ecology and whose principal residence and site of ecological research are outside of North America. Up to three awards may be made in any one year until a total of 20 is reached. Nominations of women and minority candidates, as well as those from developing countries, are especially encouraged. Recent honorees include Madhav Gadgil, Carlos Herrera, Erkki Haukioja, and Suzanne Milton. To submit a nomination, contact Sandra Tartowski, Chair, Honorary Member Award Subcommittee ‹slt2@cornell.edu›.

George Mercer Award

The Mercer Award is given for an outstanding ecological research paper published by a younger researcher (the lead author must be 40 years of age or younger at the time of publication). If the award is given for a paper with multiple authors, all authors will receive a

plaque, and those 40 years of age or younger at the time of publication will share the monetary prize. The paper must have been published in 2006 or 2007 to be eligible for the 2007 award. Nominees may be from any country and need not be ESA members. Recent recipients include Jean L. Richardson, John Stachowitz, Daniel Bolnick, and Anurag Agrawal. Nominations should be sent to Alan Hastings, Acting Chair, Mercer Award Subcommittee ‹amhastings@ucdavis.edu›.

W. S. Cooper Award

The W. S. Cooper Award is given to honor an outstanding contributor to the fields of geobotany and/or physiographic ecology, the fields in which W. S. Cooper worked. This award is for a single contribution in a scientific publication (single or multiple authored). Nominees need not be ESA members and can be of any nationality. Recent recipients include Jack Williams and coauthors, Daniel Gavin and coauthors, and Stephen Hubbell.. Nominations should be sent to Miles Silman, Chair, Cooper Award Subcommittee ‹silmanmr@wfu.edu›.

Distinguished Service Citation

The Distinguished Service Citation is given to recognize long and distinguished service to the ESA, to the larger scientific community, and to the larger purpose of ecology in the public welfare. Recent recipients are Jim Reichman, Jim MacMahon, and Margaret Palmer. To submit a nomination, contact Paul Dayton, Chair, Distinguished Service Citation Subcommittee ‹pdayton@ucsd.edu›.

Sustainability Science Award

The Sustainability Science Award is given to the authors of a scholarly work that makes the greatest contribution to the emerging science of ecosystem and regional sustainability through the integration of ecological and social sciences. One of the most pressing challenges facing humanity is the sustainability of important ecological, social, and cultural processes in the face of changes in the forces that shape ecosystems and regions. This ESA award is for a single scholarly contribution (book, book chapter, or peer-reviewed journal article) published in the last 5 years. Nominees need not be ESA members and can be of any age, nationality, or place of residence. Recent recipients are Marten Scheffer and colleagues, Thomas Dietz and colleagues, and the Millenium Assessment Team. To submit a nomination, please contact Garry Peterson, Chair of the Sustainability Science Award Subcommittee ‹garry.peterson@mcgill.ca›.

Corporate Award

The Corporate Award is given to recognize a corporation, business, division, program, or an individual of a company for accomplishments in incorporating sound ecological concepts, knowledge, and practices into planning and operating procedures. This award was designed to encourage use of ecological concepts in business and private industry and to enhance communication among ecologists in the private sector. Educational institutions and government agencies are not eligible for this award. Recent recipients of the Corporate Award include Norm Thompson Outfitters, Taylor Guitars, Bon Appétit Management Company, and the Straus Family Dairy.

The award can be made each year in any one of the following six categories:

A) Environmental Education:

Organizations producing educational materials in print, film, video, software, or multimedia formats; conducting workshops or training sessions; or providing other types of educational products or services that are primarily concerned with environmental education.

B) Stewardship of Land Resources:

Organizations concerned with the use of land resources, land-use planning, multiple use of land resources, resource extraction, land development, and related activities.

C) Resource Recycling:

Organizations concerned with the recovery, reclamation, or recycling of natural resources such as wood and paper products, glass, metals, waste water, and related residuals.

D) Amelioration of Risks from Hazardous and Toxic Substances:

Organizations concerned with the safe manufacturing, distribution, and use of hazardous and toxic substances, those concerned with the identification and reduction of risks, as well as those in mitigative and restorative activities.

E) Sustainability of Biological Resources in Terrestrial Environments:

Organizations concerned with forestry, wildlife management, range management, and agroecosystems, including areas such as soil conservation, integrated pest management, fertilization, irrigation, hybridization, and genetic engineering.

F) Sustainability of Biological Resources in Aquatic Environments:

Organizations concerned with aquaculture and commercial fishing, including shellfishing and related industries; sports fishing, boating, and related recreational uses; lake management and restoration; wetlands protection and restoration; channelization; dredging; and related activities.

Nominations for the Corporate award may be made by industrial representatives, government officials, the general public, ESA members, or by members of the ESA Corporate Award Subcommittee. To submit a nomination or to obtain more information about the nomination procedure, please contact:

Laura Huenneke, Corporate Award Subcommittee ‹Laura.Huenzneke@nau.edu›.

STUDENT AWARDS FOR EXCELLENCE IN ECOLOGY

Murray F. Buell Award and E. Lucy Braun Award

Murray F. Buell had a long and distinguished record of service and accomplishment in the Ecological Society of America. Among other things, he ascribed great importance to the participation of students in meetings and to excellence in the presentation of papers. To honor his selfless dedication to the younger generation of ecologists, the Murray F. Buell Award for Excellence in Ecology is given to a student for the outstanding oral paper presented at the ESA Annual Meeting.

E. Lucy Braun, an eminent plant ecologist and one of the charter members of the Society, studied and mapped the deciduous forest regions of eastern North America and described them in her classic book, *The Deciduous Forests of Eastern North America*. To honor her, the E. Lucy Braun Award for Excellence in Ecology is given to a student for the outstanding poster presentation at the ESA Annual Meeting.

A candidate for these awards must be an undergraduate, a graduate student, or a recent doctorate not more than 9 months past graduation at the time of the meeting. The paper or poster must be presented as part of the program sponsored by the Ecological Society of America, but the student need not be an ESA member. To be eligible for these awards the student must be the sole or senior author of the oral paper (Note: symposium talks are ineligible) or poster. Papers and posters will be judged on the significance of ideas, creativity, quality of methodology, validity of conclusions drawn from results, and clarity of presentation. While all students are encouraged to participate, winning papers and posters typically describe fully completed projects. The students selected for these awards will be announced in the *ESA Bulletin* following the Annual Meeting. A certificate and a check for $500 will be presented to each recipient at the next ESA Annual Meeting.

If you wish to be considered for either of these awards at the 2006 Annual Meeting, you must send the following to the Chair of the Student Awards Subcommittee: (1) the application form below, (2) a copy of your abstract, and (3) a 250-word or less description of why/how the research presented will advance the field of ecology. Because of the large number of applications for the Buell and Braun awards in recent years, applicants may be pre-screened prior to the meeting, based on the quality of the abstract and this description of the significance of their research. The application form, abstract, and research justification must be sent by mail, fax, or **e-mail (e-mail is preferred; send e-mail to davelos@utpa.edu)** to the Chair of the Student Awards Subcommittee: Dr. Anita L. Davelos Baines, Dept. of Biology, The University of Texas–Pan American, 1201 W. University Drive, Edinburg, TX 78541-2999 USA. If you have questions, write, call (956) 380-8732, fax (956) 381-3657, or **e-mail: davelos@utpa.edu**. You will be provided with suggestions for enhancing a paper or poster. The deadline for submission of form and abstract is 1 March 2007; applications sent after 1 March 2007 will not be considered. **This submission is in addition to the regular abstract submission.** Buell/Braun participants who fail to notify the B/B Chair by 1 May of withdrawal from the meeting will be ineligible, barring exceptional circumstances, for consideration in the future. Electronic versions of the Application Form are available on the ESA web site, or you can send an e-mail to **davelos@utpa.edu** and request that an electronic version be sent to you as an attachment.

Application Form for Buell or Braun Award

Name _____

Current Mailing Address _____

Current Telephone _____

E-mail _____

College/University Affiliation _____

Title of Presentation _____

Presentation: Paper (Buell Award) _____ Poster (Braun Award) _____

At the time of presentation I will be (check one):
_____an undergraduate student _____a graduate student_____a recent doctorate not more than 9 months past graduation

I will be the sole ____ /senior ____ author (check one) of the paper/poster.

Signed (electronic signatures are OK)

Please attach a copy of your abstract and 250-word or less description of why/how the research presented will advance the field of ecology.

2006 Student Awards Judges

The 2006 Student Awards Selection Subcommittee, Christopher F. Sacchi (Chair), Nancy Eyster-Smith, David Holway, and Andy McCall, thank the following individuals for their time and expertise in evaluating student oral presentations and posters at the 2006 ESA Annual Meeting in Memphis, Tennessee.

David Ackerly
Paul Alaback
Isabel Willoughby Ashton
Sara Baer
Nicholas A. Baer
Hal Balbach
Randy Balice
Jennifer Baltzer
Jill Baron
Jayne Belnap
Uta Berger
Jan L. Beyers
Rick Black
P. Dee Boersma
Kimberly Bohn
Elizabeth Borer
Stuart Borrett
Jere Boudell
Richard L. Boyce
John M. Briggs
Laura Broughton
Thomas Bultman
Willodean D.S. Burton
Karen Carney
Elsa Cleland
Dean Cocking
Beverly Collins
Scott Collins
Jamie Cromartie
Todd A. Crowl
Patrick Crumrine
Charlene D'Avanzo
Fran Day
Justin Derner
Diane DeSteven
Martin Dovciak
Michael Drescher
Andy Dyer
Vince Eckhart
Jenny Edwards
Louise Egerton-Warburton
S.K. Morgan Ernest
Gary Ervin
Todd Esque
Stan Faeth
Joseph Fail
Kenneth J. Feeley
Ann-Marie Fortuna
Jeremy Fox
Janet Franklin
Tadashi Fukami
Hazel Gordon
Louis J. Gross
Daniel S. Gruner
Robert O. Hall
Jonathan Halvorson
Stephanie Hampton
Charles P. Hawkins
Scott A. Heckathorn
Brent Helliker
Jeff Herrick
Ben Holcomb
Ricardo Holdo
David Holway
Claus Holzapfel
David Humphrey
Gary R Huxel
Chris Ivey
Pierre-Andre Jacinthe
Mara Johnson
Derek Johnson
Shibu Jose
Alan K. Knapp
Troy A. Ladine
Mimi E. Lam
Tracy Langkilde
Erin Lehmer
Xuyong Li
Orie Loucks
Sarah Lovell
Barney Luttbeg
Daniel Magoulick
Kumar P. Mainali
Vikas Malik
Steven Matzner
Sasmita Mishra
Randy Mitchell
Kiyoko Miyanishi
Jack Morgan
Sherri Morris
Rebecca Mueller
Christa Mulder
Vince Nabholz
Elizabeth Newell
Nancy Eyster-Smith
Asko Noormets
Erin O'Brien
Kiona Ogle
Dennis Ojima
Robert A. Olexsey
Wendy Palen
Chris Paradise
Chris Picone
Jose Miguel Ponciano
Evan Preisser
S. Raghu
Uwe Rascher
Jennifer Rehage
Jessica E. Rettig
Jennifer Rhode
Paul Ringold
Jennifer Rudgers
Carl R. Ruetz
Christopher F. Sacchi
Cindy Sagers
Cindy Salo
Sam Scheiner
Paul Schmalzer
Stefan Schnitzer
Eugene Schupp
Jen Schweitzer
Eric Seabloom
Anna Sher
Colleen Sinclair
Doug Slack
Dave Smart
Peter C. Smiley
Melinda D. Smith
Robin Snyder
M.A. Sobrado
Jed Sparks
Martin Henry H. Stevens
Andrew Storfer
Deanna Stouder
Sharon Y. Strauss
Conrad Toepfer
Chris Tripler
Amy Uhrin
Astrid Volder
Kevina Vulinec
Linda Wallace
Yong Wang
Nicole Welch
William E. Williams
Susan Will-Wolf
Herb Wilson
Rachael Winfree
Scott Wissinger
Stan Wullschleger
Ruth Yanai
Bai Yang

NSF Student Travel Awards

National Science Foundation's Research Experiences for Undergraduates Program

Dr. Val Smith provided Undergraduate Mixer attendees with an overview of the National Science Foundation's Research Experiences for Undergraduates program, which encourages and funds research opportunities for undergraduates in the areas of ecology and evolutionary biology. The 13 participants at the 2006 ESA Annual Meeting were supported by $1000 ESA/REU travel awards made possible by his grant from NSF ‹http://www.esa.org/memphis/REUAwards.php›

Dr. Smith will make available more than 20 additional ESA/REU travel awards for the next Annual Meeting in San Jose, California, in August 2007, and further details about these competitive travel awards will be available on the San Jose Meeting web site later this year.

ESA members are very strongly encouraged to alert qualified undergraduates to apply for these exceptional awards! All applicants for ESA/REU travel awards must have performed their undergraduate research either through an REU Site, or through an REU supplement to a regular NSF grant. Please look for and click on the special new "Students" button, which will be added to next year's web page!

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Resolution of Respect

Professor Syunro Utida (1913–2005)

On 2 November 2005, Syunro Utida, honorary member of the Ecological Society of America, died at the age of 92 after a long illness. He was an unusual ecologist who applied elegant laboratory experiments to elucidate ecological principles.

He was born 5 July 1913 in Gifu Prefecture, Japan, as the second son of a chemist, Tokiji Utida, in the delta area where the Kiso, Nagara, and Ibi Rivers join. Each village is surrounded by dikes to protect it from high tides, and also from flooding by the rivers. Prof. Utida chose entomology as his major, although he once mentioned that he had originally wanted to be an archaeologist.

He graduated from Kyoto Imperial University in 1936, and entered the Graduate School of Kyoto Imperial University. During his undergraduate period he was taught by Prof. Hachiro Yuasa. Prof. Yuasa, the founding professor of the Entomological Laboratory of Kyoto Imperial University, went to the USA when he was young, and was educated at Kansas State Agricultural College, and the University of Illinois, where he obtained his Ph.D in Entomology. He was famous as a liberalist, and his guidance reflected his idealism. Dr. Utida's colleagues include K. Imanishi, the founder of Japanese primatology, and M. Morisita, known for his I index in ecology, among others. During his graduate school period, Dr. Utida was guided by Professor Chukichi Harukawa, who had also studied at the University of Illinois under Professor V. E. Shelford.

Dr. Utida was strongly influenced by these two mentors. He was very independent, and he guided his students to be independent in their research. During his lifetime, he published 120 scientific papers, among which only 19 are coauthored. Following the example of Prof. Yuasa, he never coauthored the papers that his students wrote, although he constantly gave suggestions and guidance during the research and manuscript preparation phase. His teaching policy was to carefully avoid providing excessively close supervision. He strongly believed that the whole responsibility of any research lies in the hand of those who conducted the research. Despite all his accomplishments, Dr. Utida was an unassuming and gentle man. However, behind his amicable smile, he had a firm faith in the importance of rigorous experimental research. This belief later brought unfortunate incidents.

In 1939, he presented his work on the density effect and equilibrium at the Japanese Entomological Society. This was his debut presentation at a scientific meeting. It was well received and commended by colleagues. He was forced to treat them to tea and cake. But he later wrote in his memoir that the presentation was more valuable than the cost of the treat. The presentation was a part of his dissertation research, which was later published in a series of nine papers in the Memoirs of the College of Agronomy, Kyoto Imperial University, from 1941 to 1943. It was a comprehensive work on density effects on the dynamics of animal populations, illustrated by experimental work with the adzuki bean weevil (*Callosobruchus chinensis*). It is rather amazing, considering Japanese–United States relationships and poor communications at that time, that his work was extensively cited as early as 1949 in the now classic ecology textbook, *Principles of Animal Ecology*, by Allee et al. (1949).

In 1948 he became the professor of Entomology at Kyoto University, succeeding Professor Harukawa, a post he held for 30 years until his retirement in 1977.

Soon after the end of the Second World War, his interest extended to the dynamics of hosts and parasitoid wasps, using the bean weevils and their larval parasitic wasps as subjects. He published his experimental results in the journal *Ecology* in a series of papers from 1950 to 1957. In 1957 he was invited to the Cold Spring Harbor Symposium on Quantitative Biology. After that time, his work on host and parasitoid dynamics was known worldwide. His work was extensively cited in several ecology textbooks published in the early 1970s, (e.g., Krebs 1972, Colinvaux 1973, Ricklefs 1973). His work on host and parasitoid dynamics is now a classic in ecology, and even recent textbooks cite his work (e.g., Begon et al. 1996). Because of his exceptional contribution to ecological science, he was elected an honorary member of the British Ecological Society, and was also awarded honorary membership by the Ecological Society of America in 1992. In addition, he was made an honorary member of the Society of Population Ecology, Japanese Society of Ecology, and Japanese Society of Applied Entomology and Zoology.

His research on host–parasitoid dynamics ended abruptly after a successful presentation at the International Congress of Entomology in Vienna, Austria in 1961. At that time, he was planning to extend the scope of his experiments, first by increasing the number of bean weevil species to more than two, and then increasing the number of species of parasitic wasps. He already had the candidate organisms in hand. He had demonstrated experimentally that the two bean weevil species (*C. chinensis*, and the cowpea weevil, *C. maculatus*) could not coexist in a small Petri dish for long, but introduction of parasitic wasp species made it possible for the two bean weevil species to coexist. In his experiments, the interspecific competition always ended in the extinction of *C. chinensis*. However, when another researcher later repeated the same experiment with the same materials, he obtained the reverse result, namely, the extinction of *C. maculatus*. Dr. Utida also repeated the experiment, resulting in the extinction of *C. maculatus*. He could not comprehend the results, and his own confidence in his entire set of experiments was greatly shaken. He unfortunately abandoned all future experiments on that subject. If he had continued, the plan was obviously very far advanced for that period, and he would have performed pioneering work on the stability–complexity relationship in biotic communities. We had to wait until his students began experimental studies using similar materials along the lines he planned to understand the problem he encountered.

The strain of *C. maculatus* Dr. Utida used was established from a specimen accidentally imported with beans sent by the U.S. government as food aid just after the war. When he began rearing *C. maculatus*, many of the adults were of an odd active form, but over many generations, the adults increasingly were of the normal form. It seems very likely that some change in ecological character(s) in *C. maculatus* occurred during the laboratory breeding, especially in the early period just after their introduction to laboratory conditions. It also turned out that the interactions of these two bean weevil species were very delicate. When four geographical strains of each species were employed, the interspecific competition resulted in the extinction of *C. maculatus* in 10 combinations out of 16, and the rest of the combinations ended in the extinction of *C. chinensis* (Fujii 1969), similar to the experiment with *Tribolium castaneum* and *T. confusum* by Park et al. (1964).

His major interest shifted to the investigation of the mechanisms of dimorphism seen in *C. maculatus*, which became his pet research topic; he published many papers on this topic, and continued his research even after his retirement.

Although his published research was mostly confined to the dynamics of laboratory populations, he was a good naturalist, and enjoyed field study, too. In the 1950s and early 1960s, he often led a team consist-

ing of laboratory colleagues and students to conduct field surveys on the spatial distributions of the lady beetles *Henosepilachna vigintioctopunctata* and *H. vigintioctomaculata* and the larvae of the cabbage butterfly, *Pieris rapae*. Several multiauthored papers were published. These papers stimulated other researchers to become aware of the importance of spatial distribution of organisms in the field, and many studies on spatial distributions of various insects followed.

He was instrumental in launching the Society of Population Ecology, and kicking off the publication in 1952 of *Researches on Population Ecology* (now *Population Ecology*). It is probably the best-known ecological journal published in Japan promoting research on population ecology. In 1966 the Society of Population Ecology was launched, and Prof. Utida was elected as the first President of the Society.

His last 10 years at Kyoto University were rather sad and lonely. Around 1968, campus riots prevailed in many universities in Japan by students demanding university reforms. Soon, younger faculty members joined the students, and the antagonism between professors and younger faculty and students intensified. He strongly believed in order and the integrity of research in universities, and often refused easy compromise at the collective meetings. Around that period, he always carried his resignation letter with him. Even after the turmoil subsided, his human relationships never recovered fully. After his retirement in 1977, he left Kyoto and started a new life at Hayama, near Tokyo. He once lamented that he was interested in the effect of over-crowding in his research, but ironically experienced the loneliness of under-crowding.

When young scientists complained about the lack of research funds, Professor Utida often said that it was not because of the lack of money that they could not conduct good research; rather, it was because of the lack of good research that they did not get research funds. This only serves to illustrate how confident and proud he was of his scientific work. However, when he heard of plans by the state to honor him, he declined the honor, as he believed absolutely in a meritocracy.

His wife, Shizuko Suga, whom he married in 1942, a devout Christian, attended her husband devotedly during his long illness. Four years before his death, he converted to Christianity. He is survived by his adored wife Shizuko, three children, six grandchildren, and three great-grandchildren.

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Society Actions

ESA Awards for 2006

Murray F. Buell Award
Carolyn Kurle
University of California,
Santa Cruz

Murray F. Buell ascribed great importance to the participation of students at meetings and to excellence in the presentation of papers. To honor his dedication to the Ecological Society of America and to the younger generation of ecologists, this award is presented to a student for the outstanding oral paper presented at the Society's annual meeting.

The winner of the **Murray F. Buell Award** in 2006 is Carolyn Kurle for her paper "Introduced rats indirectly alter marine communities," which is based on her doctoral research at the University of California, Santa Cruz under the supervision of Don Croll and Bernie Tershy. The Buell judges noted that Carolyn clearly presented the rationale for her study of the indirect effects of introduced rats on marine algal abundance in the rocky intertidal via a cross-community trophic interaction. Judges commented that the design of the study was elegantly simple, conducted on an impressive spatial scale, and that the results were surprisingly clear and convincing. One judge noted that Carolyn's study could well become a textbook example of the concept of trophic cascades. Judges noted that Carolyn was at ease during her presentation and that she handled at least

eight questions with poise, clarity, and interesting detail that showed the depth of her familiarity with this system. Judges commented that this work represents significant science that was well presented; the research was novel and successfully detailed a link between terrestrial and marine systems. In her presentation, Carolyn showed familiarity with ecological theory and with the applications of her research to conserving island ecosystems. The research showed that marine bird abundance differed on rat-infested and rat-free islands, and that this resulted in significant differences in intertidal invertebrate abundance and algal cover on the two island types. Her study illustrated the unexpected consequences of invasive animals and their potential to initiate indirect trophic cascades that can lead to large-scale influence on community structure. Carolyn received her M.S. from Texas A & M University in Wildlife and Fisheries Sciences in 1998, and a B.S. in Zoology and a B.A. in German Language and Literature from the University of Washington in 1994.

The Buell-Braun Award Selection Committee also selected three students for Honorable Mention for the Buell Award. This recognition was given to: (1) Meghan Duffy of the University of Wisconsin at Madison for her presentation entitled "Is the enemy of my enemy really my friend? The combined effects of selective predators and virulent parasites on *Daphnia* populations"; (2) Volker H. W. Rudolf of the University of Virginia for his presentation entitled, "Indirect asymmetrical interactions in stage-structured predator–prey systems; cannibalism, trait-mediated interaction and trophic cascades"; and (3) Jennifer L. Williams for her presentation entitled, "An experimental approach to exotic plant success: houndstongue in its native and introduced ranges."

Christopher F. Sacchi, Buell-Braun subcommittee Chair
Buell-Braun subcommittee members:
David Holway, Andrew McCall, Nancy Eyster-Smith

E. Lucy Braun Award
Daniel Laughlin
Northern Arizona University

E. Lucy Braun was an eminent plant ecologist and the first woman president of the Ecological Society of America. Besides describing and mapping the deciduous forest regions of eastern North America, Lucy Braun served as a dedicated teacher and role model to her students. To honor her, this award is presented to a student for the outstanding poster presentation at the Society's annual meeting.

The 2006 winner of the **E. Lucy Braun Award** is Daniel Laughlin for his poster "Climate-induced temporal variation in diversity –productivity relationships." This work is based on Daniel's doctoral research at Northern Arizona University under the supervision of Margaret Moore of the School of Forestry. Judges commented that Daniel's research focusing on temporal variation on the plant productivity–diversity relationship was outstanding, and that the research was pursued in a very creative way. One judge noted that Daniel seized the opportunity to use existing data on plant productivity and diversity, collected over 14 years, to evaluate the importance of temporally variable environments. Judges who spoke to Daniel commented that he answered questions with knowledge and authority, and that they were impressed by Daniel's recognition of the limitations of his data and his forthrightness in discussing them.

The goal of the project was to evaluate the influence of precipitation in different years on the nature of the productivity–diversity relationship . Daniel established clear predictions of his expectations for the nature of the relationship in wet years and in dry years. Specifically, he predicted that competitive exclusion and recruitment limitation would only be detected in productive (i.e., wet) years. The results suggested that climatic variation can affect species interactions in semi-arid plant communities, and that climate-induced changes to the productivity–diversity relationship can change the interpretation of diversity models from year to year. Daniel received his M.S. in Ecology from Pennsylvania State University in 2002, and his B.S. in Biology from Calvin College in 1999.

Christopher F. Sacchi, Buell-Braun subcommittee Chair
Buell-Braun subcommittee members:
David Holway, Andrew McCall, Nancy Eyster-Smith

MacArthur Award
Alan Hastings
University of California at Davis

The **Robert H. MacArthur Award** is given biannually to an established ecologist in mid-career for meritorious contributions to ecology, in the expectation of continued outstanding ecological research. Nominees may be from any country and need not be ESA members. The recipient is invited to prpare an address for presentation at the annual meeting of the society and for publication in *Ecology.*

Alan Hastings of the University of California at Davis is one of the most respected theoretical ecologists working today. He has been a leading force in this field for two decades. He is distinguished both for his research and for his commitment to advancing the basic ecological sciences and their management implications. He has published fundamental papers in population genetics and ecology, made important contributions in metapopulation theory and conservation biology, and brought the full power of sophisticated advances to bear on the solution of applied problems.

His work, from the start, has sought to integrate ecology and evolutionary biology. His contributions to making space and time explicit in metapopulation and dispersal models have launched new research subfields, not only in theoretical ecology but in conservation biology and resource management. Dr. Hastings is distinguished not only for the breadth, quality, and impact of his work, but for his productivity, with more some 170 peer-reviewed papers, many of which have become classics. Alan has also written a successful textbook (Population Biology: Concepts and Models). Indeed, his nominators describe his writing in research papers as "both rigorous and pedagogical."

After receiving his Ph.D. from Cornell in 1977, Alan Hastings began his professorial career in Washington State University in the Department of Pure and Applied Mathematics. Since 1979, he has been at U. C. Davis, where he is now Distinguished Professor of Environmental Science and Policy, a department he chaired from 1992 to 1998.

As a mentor, Dr. Hastings has trained 16 doctoral students and 22 postdocs, and is beloved by those who have worked with him. His contributions to the wider community include service to the Society for Mathematical Biology as President and to the ESA as Chair of the Theoretical Ecology Section. Currently, he is Editor-in-Chief of the Theoretical Ecology Series for Academic Press, Co-Editor-in-Chief of the Journal of Mathematical Biology, Associate Editor of Theoretical Population Biology, and serves on the Editorial Board of Mathematical Biosciences. In the past, he has served on the Board of Editors for Ecology and Ecological Monographs and as Associate Editor for Evolution and Oecologia.

William S. Cooper Award
Stephen P. Hubbell

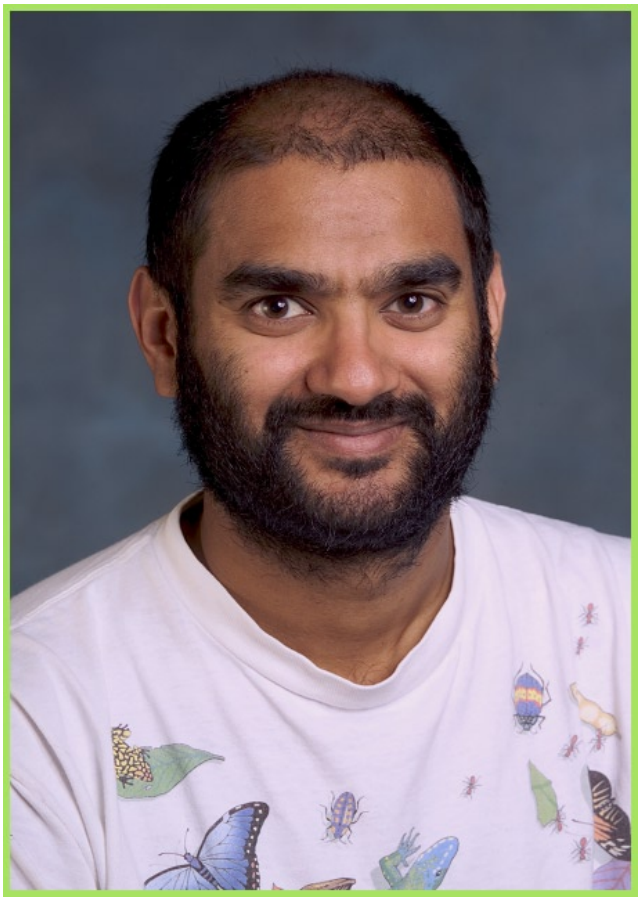
Stephen P. Hubbell. 2001.
The Unified Neutral Theory of
Biodiversity and Biogeography.
Princeton University Press.

The **William S. Cooper Award** is given by the Society in honor of one of the founders of modern plant ecology, in recognition of an outstanding contribution in geobotany, physiographic ecology, plant succession, or the distribution of organisms along environmental gradients.

One of the central questions in ecology concerns the diversity and relative abundance of species in ecological communities. How do demographic processes, life history traits, and species interactions influence species richness? How do local ecological processes scale up to determine biodiversity patterns at biogeographic scales? For the past thirty-five years, Stephen Hubbell of the University of Georgia has focused on these questions with a series of empirical studies of tropical forests and accompanying theoretical studies. These studies reached a culmination in his provocative 2001 book, which presented a novel theoretical framework for understanding biodiversity in a biogeographical setting.

Hubbell's theory builds on classical island biogeography theory and explores its implications for community structure, incorporating elements of recent metapopulation theory, evolutionary biology, and paleobiology. Hubbell's book has reinvigorated the debate on plant diversity patterns and the mechanisms that govern them at local, regional, and global scales. His derivation of expected patterns of species diversity and abundance from simple assumptions and first principles has forced ecologists to reconsider long-held beliefs about the mechanisms governing species patterns. Hubbell's book is generating vigorous debate and led to a large number of papers in prominent journals during the past five years that either test its predictions or examine its conceptual underpinnings. Hubbell's book has had enormous impact not only on plant ecology, the root discipline that inspired the work, but throughout community ecology and biogeography.

George Mercer Award
Anurag Agrawal



Agrawal, A.A. (2004)
Resistance and susceptibility of milkweed: competition, root herbivory and plant genetic variation. *Ecology* 82(8): 2118-2133.

The **Mercer Award** is given for an outstanding ecological research paper published by a younger researcher (the lead author must be 40 years of age or younger at the time of publication). The paper must have been published in 2004 or 2005 to be eligible for the 2005 award. Nominees may be from any country and need not be ESA members. The winner of this year's Mercer Award is Anurag Agrawal of Cornell University, for his 2004 paper, "Resistance and susceptibility of milkweed: competition, root herbivory and plant genetic variation," published in *Ecology*.

A major controversy in community ecology from the middle of the last century has revolved around whether plant productivity is controlled by competition for resources or consumption by herbivores. As with many contentious dichotomies, the answer has proven to be more complex, which has demanded greater ingenuity from researchers seeking to understand the distribution and abundance of organisms. Anurag Agrawal's Mercer Award winning paper is exemplary in the thoroughness with which it tackles this complexity. It strongly deserves recognition.

The experiments carefully teased apart the complex interactive effects of herbivory, plant competition, and plant genotype on milkweed performance and fitness. The non-additive effects of competition by grasses and beetle herbivory on milkweed growth was a particularly novel aspect of the results. With a quantitative genetic experiment, Agrawal showed that milkweeds growing near grass experienced more herbivory from adult *Tetraopes* beetles, and that this effect was directly due to beetles being attracted to grass, which serves as their oviposition site. In a manipulative experiment with beetle larvae, Agrawal also found that grass competition interacted with larval feeding on roots to negatively impact milkweed. The grass, meanwhile, enjoyed competitive release by facilitating its neighbor's herbivore. Finally, Agrawal presented a general model to predict the conditions under which plant–plant interactions can result in net competition or facilitation via indirect effects.

This paper represents the kind of holistic studies that will take our understanding of plant–herbivore interactions to a new level. Overall, Anurag Agrawal's growing body of work, exemplified by but not restricted to this paper, is having a significant impact in the areas of plant–animal interactions and community ecology.

Eugene P. Odum Award
Claudia Lewis

Claudia Lewis, this year's winner of the **Odum Education Award**, is Director of Education for Pinellas County, Florida. Ms. Lewis is a multi-lingual conservationist with a long and successful career in environmental education. Her unique set of professional skills has allowed her to effectively reach a wide audience with outstanding education programs and initiatives in sustainable development, conservation and education techniques. During her 20-year career she has developed a multitude of environmental education projects aimed at protecting a variety of species and ecosystems focusing primarily on wetlands and also on wading birds and shorebirds. Her latest focus has also included upland protection and restoration in Central Florida. A variety of innovative materials and approaches have included working with ecotourism operators and recreational wildland users.

Claudia Lewis is a brilliant educator, able to reach all levels of audiences, from small children to professional educators. Her professional work spans the range of the fields of social marketing, environmental education, interpretive program design and development and exhibits design. She has excelled in all of these fields. Much of her work has focused on reaching out to audiences typically not reached by traditional environmental education programs. Major target audiences have included African-American and Latino teenagers, as well as teenagers in the juvenile justice system; entire neighborhoods; realtors and newcomers to the state; and decision-makers and politicians. Ms. Lewis works in a variety of ways. These include networking (one of her main foci has been to get a variety of interest groups to the table); knowledge transfer (she brings to her colleagues the latest and most innovative science and techniques in the environmental education field); and conservation work.

One recommender said of her: "Claudia is blessed with the gift of being a truly inspirational speaker, who motivates people to get involved and take action within their communities and local environment. Claudia exudes professional dedication and is highly motivated if not driven. She gives to others, unselfishly, of her time, heart and soul in order to make this a safer, healthier, and more beautiful world to live in. Claudia Lewis is an outstanding environmental educator and leader, deserving of this recognition."

Sustainability Science Award
Millennium Assessment Team
Dr. Walter V. Reid
Director of Conservation and Science, Packard Foundation

Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-Being: Synthesis*. Island Press, Washington.

The Sustainability Science Award is given annually to the authors of work published in the past five years that makes the greatest contribution to the emerging science of ecosystem and regional sustainability through the integration of ecological and social sciences. Unprecedented directional changes in climate, human population, technology and social and economic institutions are altering the structure and functioning of current ecological and social systems. The Sustainability Science Award recognizes the role that science can contribute to addressing these challenges.

This year's Sustainability Science Award is given to the Millennium Assessment Team, directed by Dr. Walter V. Reid. Twenty-eight authors made up the core writing team; in addition, there were about 200 coordinating lead authors.

This book summarizes the achievements of the Millennium Ecosystem Assessment, the first comprehensive analysis of recent trends in the world's ecosystems and the services they provide to society. The book demonstrates that, over the past 50 years, humans have changed the world's ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water and other ecosystem services. This transformation of the planet has contributed to net gains in human well-being and economic development. However, this has occurred at the cost of substantial degradation in the capacity of ecosystems to sustain these services in the future. The book describes the risks of continued degradation of ecosystem services and identifies opportunities to reverse these trends. This comprehensive analysis provides the information and intellectual framework necessary to implement a global program to enhance sustainability.

Corporate Award
Straus Family Creamery
Albert Straus

The Straus Family Creamery of California has been recognized with the 2006 **Corporate Award** in its sustainability and land stewardship categories. This long-standing family farm has sustained a commitment to both local and landscape-scale stewardship of resources within a region of rapid change and enormous social pressures. Bill Straus founded the dairy in 1941, sixty miles north of San Francisco. In the years after, Bill and Ellen Straus participated actively in the Marin Conservation League, the efforts to preserve the national seashore, and the creation of the Marin Agricultural Land Trust (MALT) in 1980. The latter organization has enabled the preservation of working agricultural landscapes in the face of intense pressures for development.

In the second generation, Albert Straus (son of Bill and Ellen) converted the farm to organic operation. Albert credits the conversion to organic with preserving the farm as an economic success, while neighboring conventional dairies have been fading away. Beyond typical organic practices, Albert has been applying innovative technology in every aspect of dairy and farm operations. The Straus Family Creamery now creates electricity from a methane Straus digester. The digester captures naturally occurring gas from manure and converts it into electricity. With this new system, Straus expects to generate up to 600,000 kWh per year, saving about $6,000 in monthly energy costs. This process also eliminates methane, a natural by-product of manure. The Straus generation is connected to the local electrical grid, allowing them to run their meter "backwards" and contribute to the regional power supply. Finally, the farm has now converted a diesel back-up generator to run on straight vegetable oil, and is in the process of converting farm vehicles to vegetable oil as well. Finally, the creamery washes its glass milk bottles with a less toxic method than the typical one.

The Ecological Society of America is delighted to recognize this second-generation family farm for its sustained commitment to sound agricultural practice, technological innovation in reducing environmental impact, and contributions to regional-scale conservation of working landscapes.

Honorary Member Award
Suzanne Milton

Dr. Suzanne Milton of the University of Stellenbosch, South Africa, is a leader in the ecology and management of arid and semi-arid ecosystems. Her work has focused on the conservation, sustainable utilization and rehabilitation of natural vegetation, especially in southern African environments. Milton's research interests are in plant population and community responses to harvesting, grazing and disturbance, in the causes and effects of invasive plants and animals, and in the processes leading to re-establishment of self-perpetuating indigenous plant assemblages in overgrazed or denuded areas.

Dr. Milton's research combines observational studies, field experiments and spatially explicit models to reveal how the influences of these factors vary with site, temporal variation and management. Her collaborations with ecological modelers have been especially important in testing ideas about long-term vegetation change and rangeland management. She has a special knack for comparative ecological analysis and is able to use her deep understanding of southern African ecosystems to generate and inform broader ecological theory. She has participated in a wide variety of policy debates concerning international and national grazing, land management and rehabilitation. She is especially talented at translating her ecological understanding into easily understood, practical management options for land managers. Through direct involvement with ranchers, farmers and government agencies, her research results have been applied to the protection and sustainable management of rangelands and to recent efforts to restore degraded ecosystems.

She has many international collaborators and is sought after for her ecological insights, effectiveness, enthusiasm, cooperation, and uplifting attitude. She is a generous and informative host of international visitors, imparting a South African perspective that sticks in the mind and permanently alters perspective. She has become an essential conduit for the two-way exchange of information between South African scientists and the international scientific community. Furthermore, she is a creative and passionate teacher, stimulating enthusiastic curiosity in undergraduate students.

Suzanne Milton has managed to remain an effective researcher and educator under the most challenging conditions. Her career has spanned the days of resistance to apartheid, conflict and upheaval, the wholesale reorganization of society and the current period of rapid development in the midst of new social priorities. Her extraordinary research and publication record has been achieved without the funds and other resources available in more stable and developed countries, and in spite of the disruption and disturbances of rapid social change in South Africa. She has done so much, with such limited resources, under such difficult circumstances, that she is a fitting and inspiring choice for the ESA Honorary Member Award.

Distinguished Service Citation
Margaret Palmer

Dr. Margaret Palmer of the University of Maryland is recognized with the **Distinguished Service Citation** based on her extensive service to the Ecological Society of America and to the discipline of ecology as a whole.

Margaret Palmer's service comes in many forms, most of which involve working on the inside – actually getting into the middle of the issues at hand and working tirelessly to ensure that results are forthcoming. Three significant efforts in recent years characterize the type of professional service she has provided. In 2000-2001 Margaret served as a Program Officer in the Ecology Program at the National Science Foundation. While there, she effectively pushed for important programs and initiated and oversaw a symposium jointly supported by NIH and NSF on mathematical-biological linkages. From 2002-2004 Margaret chaired the Visions Committee for the ESA. This was a monumental undertaking involving people and organizations from many realms. She did an excellent job that led to effective results and a high-profile outcome for ESA. Currently, Margaret chairs the hydrology subcommittee for the NEON. This is a major effort on her part, serving the broader interests of ESA and allied disciplines.

The impact of Margaret's service has extended beyond ESA and professional scientists. For example, she has aggressively engineered a collaboration among many organizations and individuals in the National River Restoration Science Synthesis project. Carrying this much farther than the scientific domain, she worked with the public in Virginia to develop broad conservation plans for the banks of important streams in the area. In a clear indication that public service is important to her, Margaret was a participant in the Aldo Leopold Leadership Program, designed to prepare prominent scientists for roles in the public sphere.

Palmer has also been an outstanding mentor for students at all levels. In particular, she has guided many young women as they have moved through the pipeline to become knowledgeable citizens or professional scientists. In all of her service, she has made particular efforts to ensure that women and other underrepresented groups are fully represented.

Her knowledge, insights, and hard work, coupled with her natural leadership skills, make it clear why Margaret Palmer has been so effective serving ESA, ecology, and the public.

Eminent Ecologist Award
Daniel Simberloff

Daniel Simberloff is not only eminent in ecology today: for many years, he has been the quintessential ecological iconoclast.

Any undergraduate student who has ever had an ecology class is familiar with Dan Simberloff's work. His experimental island biogeography papers with E.O. Wilson are textbook classics, elegant experimental studies that appeared to beautifully confirm the emerging theory of island biogeography. Simberloff rigorously tested a nascent body of theory, which won him the Mercer Award with Wilson in 1971. If he had done nothing else, this work would have assured him lasting prominence. But many ecologists were dismayed by his 1976 *Science* paper, in which he threw stones at his own glass house, arguing that most of the insect turnover in this assemblage was ephemeral and did not therefore confirm the predictions of the theory. Few ecologists among us have the courage to publicly challenge our own paradigm in this way, particularly once it has become widely accepted. As society began to embrace island biogeography and extend it to designing nature reserves, Simberloff was further cast as a *bete noire* when he argued (backed by plenty of empirical data) that large reserves are not always the best conservation option.

In the late 1970's and early 1980's, Dan Simberloff took on the MacArthurian paradigm of competitively structured communities, championing the null models approach in community ecology. In so doing, he forever changed the face of our field. The shock waves from this debate still ripple through ecology. His work forced ecologists to ask: what would these patterns look like if mechanism *x* were not in operation? Boiled down to its essence, his arguments have been summarized as "rely on the data to tell you how nature operates; don't simply find the patterns that you're supposed to find."

His more recent work has been equally notorious. He has written pointed and controversial critiques about the wisdom of biological control, calling attention to the threats imposed by invasive species and raising the specter of "invasional meltdown." His criticisms of biological control gone bad (and his data to support those criticisms) are slowly reaching land managers and the general public. He has become a world expert on the threats imposed by invasive species.

These are just the highlights. In almost every aspect of his research program, he has been a leader and has demanded rigorous tests and critical interpretations of data. His approach — know your organisms, ask interesting questions, and deal with the data rigorously — has been an example for countless numbers of ecologists and has made ecology a better, more quantitative science.

Minutes of the ESA Governing Board

8–9 May 2006
Washington, D.C.

Members present:

Nancy Grimm (President), Jerry Melillo (Past-President), Norm Christensen (incoming President-Elect); Alan Covich (President-Elect), Gus Shaver (Vice President for Science), Carol Brewer (Vice President for Education and Human Resources), David Inouye (Secretary), Shahid Naeem (Member-at-Large), Richard Pouyat (VP for Public Affairs), Bill Parton (VP for Finance), Dennis Ojima (Member-at-Large), Meg Lowman (incoming Vice President for Education and Human Resources)

Staff present:

Katherine McCarter (Executive Director), Cliff Duke (Director of Science), Elizabeth Biggs (Director of Finance), Sue Silver (Editor), Jason Taylor (Director of Education), Nadine Lymn (Director of Public Affairs), David Baldwin (Managing Editor), Fran Day (Director of Development)

I. ROLL CALL (9:00 am)

A) The Governing Board unanimously adopted the proposed agenda.

B) A motion to ratify votes taken by e-mail since the October 2005 meeting was approved. These include:

- The San Jose 2007 Annual Meeting theme, "Ecological restoration in a changing world; Tracking a moving target";
- The Position Paper Biological Invasions: Recommendations for U.S. Policy and Management;
- A statement on the Endangered Species Act;
- The minutes of the October 2005 Board meeting ;
- Appointment of Margaret Palmer as the Awards Committee Chair; and
- The audit for the fiscal year ending 30 June 2006.

II. REPORTS

A) Report of the President

Grimm thanked the staff for its efficiency, and noted the good news that the Society is on track to reach 10,000 members soon. Areas for attention in the future include:

1) Publications. The Publications Committee report from Jim Reichman will be considered during the meeting.

2) Web site. A report from the consultant is

on the agenda for the meeting.

3) International activities. The Mexico meeting was exceptional. Some work is ongoing on the Federation of the Ecological Societies of the Americas (we are hosting the web page); ESA also has endorsed SF2010, an ad-hoc, international advisory committee on prevention of biodiversity loss, and is a co-sponsor of the third Eco Summit (organized and paid for by Elsevier, to be held in Beijing in May 2007); Mexican and Canadian ecological societies are now active.

4) Interactions with federal agencies. Tomorrow a group from the Board will meet with the USDA competitive grants program. Ideas for other agencies we should meet with are solicited, and for major ecological messages that we can convey to them. Melillo suggests three major areas: energy, competitiveness, and security, and the potential to work with other societies on such issues. Discussion centered on how these major themes relate to ESA's sustainability agenda and the activities of the Science Office.

5) Dinner this evening will be with seven AAAS fellows who are ESA members, and they will be invited to the Rapid Response Team lunch meeting in Memphis this summer.

6) The Regional Initiative will be discussed later.

7) Education and outreach. SEEDS is going well. We co-sponsored a session at the AAAS meeting about evolution and education, and issued press releases about the Pennsylvania and Kansas court rulings concerning Intelligent Design.

8) Financial issues. Board members are reminded about the Millennium Fund and the importance of having a high rate of Board participation to bolster other fund-raising efforts.

B) Report of the Executive Director and staff

1) Executive Director

Fran Day is the new Director of Development. Two new staff members, Michelle Horton and Devon Rothschild, are working hard on the Memphis meeting and coordinating well with the Program Chair and local host. Staff members gave 3-minute synopses of their main activities.

2) Science programs

Agricultural air quality conference is coming up next month (about 300 participants); 5 Latin American graduate students from the Mexico meeting will be funded to attend the Memphis meeting with funding left from the Mexico meeting.

3) *Frontiers*

The China special issue of *Frontiers* is completed except for one paper, the Mexico issue has all articles in, and the ESA Asian Section has become a wonderful resource for *Frontiers* (found a calligrapher to help with design of the special issue, are helping with translations, and facilitating access of ESA journals to China).

4) Public Affairs Office

Appropriations season in an election year is a busy time, but focus on economic

competitiveness in NSF and DOE is making it harder for some other areas in which ecology is funded. Some Senators need to be reminded about the need for NSF funding for ecology. Publicity for Memphis is beginning.

5) Finance and administration

Registration has opened for Memphis (about 3 weeks earlier than usual; planning is going well). ESA has 8700 members now (600 more than this time last year). The new web site is coming along well (to be demonstrated this afternoon). ESA met its financial goal to break even on the Merida meeting.

6) Education and diversity Programs

SEEDS students had a field trip at the Sevilleta LTER site, attended the Merida meeting, and will go to Konza Prairie in June. There's a monthly electronic newsletter that seems to be popular with the students. Institute for Learning Innovation is helping with developing an assessment process. A new CD for TIEE is in the works, as is a collaboration with other societies for a national science digital library. There's a suggestion for a mentoring program for young minority faculty.

7) Development Program

ESA is the most intelligently managed nonprofit Fran Day has worked with. The Staff has been very willing to take on the additional workload that a long-term commitment to development demands. College of the Atlantic (where Fran Day has an appointment) will give their graduating seniors (about 60) a one-year membership in ESA. Preliminary discussions are underway with a couple of major corporations (Subaru and Alcoa). Three proposals have gone out to foundations and another major one is in preparation, as are some for SEEDS.

8) Publications

Discussion later on the Publications Committee report. Allan Press ran a meeting last week on emerging trends in publication that David Baldwin and Sue Silver attended. Submissions continue to increase. All graphics work is now being done in-house (at a great savings), and publications are back on schedule after a slowdown due to the new composition system. Frequency of *Ecological Applications* publication will increase to eight issues per year in 2007. The *ESA Bulletin* is also doing well in its new electronic format.

9) Financial updates

Current estimate is that ESA will end the fiscal year with about $180,000 above expenses, which will be added to the operating reserve fund. The Mexico meeting broke even, and the Montreal meeting generated about $160,000, but the Memphis meeting will be less profitable. As of June 2005 our reserves reached $1,000,0000, half of our target goal. The investment portfolio (60% stocks, 40% bonds) is just under $1,000,000; one-year return was 11%, three-year return 15%. The issue of increasing the target for the reserve was discussed; in some societies an amount equivalent to half of the annual budget is held in reserve.

III. DISCUSSION / ACTION

A) Proposed 2006–2007 budget

The proposed 2006–2007 budget was presented and discussed. There was some discussion of raising membership dues. Suggestions were solicited for use of Board initiative funds; ideas include Profiles of Ecologists dissemination, a publication related to the sustainability science initiative, an ESA intern to write the undergraduate survey report, a meeting of the Publications Committee, a retreat for congressional interns or staffers, working toward the documentation of the ESA history, a travel budget for preparation of future policy papers, a meeting of education organizations from CSSP to discuss SEEDS, and the idea of funding an ecologist's sabbatical on Capitol Hill. Decisions about the use of these funds will be made in August.

B) Science "midterm" update

High-priority activities include:

- Advancing the Visions initiatives, through development of workshops (e.g., Agricultural Air Quality workshop next month), international outreach (e.g., Merida meeting, October 2007 Fourth International Nitrogen Conference), and follow-on activities for the Society Summit (2004 meeting with a dozen other societies to talk about data sharing activities); there are proposals in to NSF for three additional workshops.

- Responsiveness to the ecological community, including the air quality workshop, NBII cooperative agreement to develop a web site on pollination, and the upcoming peer review of the Sage Grouse comprehensive strategy.

- Development of a sustainability science agenda, working with the Science Committee, developing proposals for workshops on sustainability science in a nonequilibrium world, organizing a symposium for the San Jose meeting, and publishing symposium papers as *Issues in Ecology* to translate the information for nonscientists.

- Gus has met with representatives of SCOPE about collaborating on a meeting in Paris in 2007, a workshop leading to a symposium in San Jose, and possible an *Issues* edition.

NEON UPDATE

A lunch meeting update on NEON was presented by guests Liz Blood (program director for research resources at NSF's Division of Biological Infrastructure, in charge of NEON), Bruce Hayden (Co-Director for Science and Education of the NEON Project Office and NEON PI) and Jim MacMahon (NEON Senior Management Team and National Network Design Committee, Chair of the Board of Directors for NEON, Inc.). The Public Affairs Committee is asked to suggest what should be an appropriate Society position on NEON.

C) Publications issues

The report from the Publications Committee was discussed. The Society's cost per article is about $3000, and about one-third of

authors request grants to cover publication costs. The issue of open access publishing is still under active consideration and discussion by many societies and libraries, and it is premature for ESA to make any moves toward or away from such a policy for its journals. The Publications Committee may be asked to take on further consideration of the issues it has raised, with a charge to be prepared for the August Board meeting.

The current Publications Committee chair, Jim Reichman, would like to be replaced as of August. Two ESA members have agreed to serve if asked and other current Committee members may also be appropriate and interested; Vice President Shaver will make an appointment soon.

D) ESA Award nominations

The proposed slate of awardees from the ESA Awards Committee, chaired by Judith Bronstein, was presented and approved unanimously.

E) LTER initiatives

President Grimm reported on the LTER planning process, an effort to integrate research from LTER sites (continental-scale science). One component of this is a proposal to the NSF for multi-site research. A second component is an initiative called Integrative Science for Society and Environment (ISSE), which is being prepared for submission to the NSF and perhaps other agencies. The ISSE focuses on integration of ecological with social science through the lens of ecosystem services. Grimm informed the Board about these efforts and urged that the ESA support them.

F) Web site

David Gammel (consultant from High Context Consulting) described the process behind design of the new ESA web site, and demonstrated both the structure and appearance of the new design. Full implementation will involve a lot of staff time and will probably not be completed until the fall.

G) Development program

Vice President for Finance Bill Parton and Director of Development Fran Day presented a report about Development activities. A major step was the hiring of Fran Day as Development Director in February. Recent activities include trying to get the grant proposal pipeline going, contacting individuals who are potential major (>$50,000) donors, foundations, and corporations. The idea of endowment funds was briefly discussed. The Board is in agreement with the several projects receiving most attention at present. Norm Christensen is charged with working with staff to develop criteria that will be used to evaluate possible corporate and commercial sponsors, and to bring a proposal back in August.

Board members are asked to look over the list of potential corporate donors for any that they think should not be solicited. Fran presented a list of four corporations she would like to approach for funding: Interface, Subaru, Alcoa, Toyota. It is moved and seconded that we approve approaching these four corporations now, and consider the remainder on the list at the August meeting. Passed with two abstentions.

The proposed conflict of interest policy for Board members was considered and will be brought back for discussion in August.

H) Education issues

Vice President for Education and Human Resources, Carol Brewer provided updates on two projects.

1) The Profiles of Ecologists report is in (possibly final) draft form, and provides much food for thought. The Board is enthusiastic about finding ways to distribute the information, and about the idea of publishing the data as a data paper (as well as the results of the survey described next).

2) The survey of Ecology in the Undergraduate Curriculum was conducted and analysis performed (by a student). A recommendation is made that an intern working with Jason take on the task of writing a report; funding would cost about $2,000.

I) Nominations Committee

Jerry Melillo, Chair of the Nominations Committee, presented the report of the committee. They recommend the following slate of candidates:

- President: Jim Ehleringer and Alison "Sunny" Power
- VP for Science: Rob Jackson and David Schimel
- Secretary: David Inouye and Deb Peters
- Member-at-Large: Ann Kinzig and Kate Lajtha
- Board of Professional Certification: David Breshears, Carmen Cid, Steve Handel, Wayne Polley, Ed Reichel, Diane Wickland

It was moved and seconded that the list of nominees be accepted. Approved unanimously.

Break for dinner with AAAS Fellows who are ESA members.

Tuesday 9 May 2006; same participants minus Christensen.

IV. EXECUTIVE SESSION

V. DISCUSSION / ACTION continued

J) Regional Initiative

Past President Jerry Melillo, Director of Public Affairs Nadine Lymn, and Director of Education and Diversity Programs, Jason Taylor reported on efforts to date.

A meeting was held this spring to work on this initiative. Goal of the "Knowledge Partnership" initiative is to share the basic principles of ecology with decision makers and clarify how these principles can help solve some of society's most difficult environmental problems. Hurricane Katrina provided some incentive to pick the southeast as an initial focus. We might pick about 5 regions overall, consider them sequentially over 3-5 years. Rocky

Mountains/Great Plains area might be another possibility (a prospectus was prepared by Jill Baron), as well as East, Far West, etc. Steps toward establishing a partnership could be:

1) Appoint a high-profile regional leader and a 3-person advisory committee;

2) Define three priority topics based on a regional workshop;

3) Appoint three, five-member Regional Response Teams (R3Ts), one per topic;

4) Hire a regional network officer (perhaps housed at an academic institution) to

a) facilitate development of a regional network of ecologists;
b) track major environmental legislation in the region and coordinate with DC office on national links;
c) support interactions between R3Ts and key decision makers in the region;
d) write for, edit, and publish an electronic regional newsletter;
e) attend three ESA meetings, two in D.C., one at Annual Meeting;

5) Nurture the regional "knowledge partnership."

Robert Twilley (Louisiana State University) was identified as a possible leader for the southeast region, focusing on post-Katrina activities as well as other regional issues. Melillo has talked with some regional funding possibilities, and with Louisiana State University Board of Regents.

The sum of about $250,000/yr might be required for each regional office. Could be a way to invigorate chapters. Need to be politically savvy as well as nimble. Maybe have a training program for participants such as the Leopold program. Do we wish to go forward with this as a pilot project? Should we have a business plan before proceeding? Melillo will continue to work on this, with a possible joint meeting of the Science, Education and Policy committees before the 16–17 November fall Board meeting to develop a proposal for the overall project. Fran is given some direction about what fund-raising ideas would be appropriate. Two workshops will be pursued to identify the regional issues; first, the group of scientists, and second, a broader group of stakeholders. Finally, ESA must define how it wishes to proceed and develop a funding plan.

K) Position Paper process (Pouyat)

Dennis Ojima is monitor for the Ecological Foundations for Fire Management Position Paper review process, with both peer reviews and an open review process. The first draft of the paper is done and some reviews are now back.

The Public Affairs Committee met in March and proposes changes in the protocol for Position Papers. One change would be a category of proactive Policy Papers, with clarified process and goals (to target decision makers). The end result would not be a scientific publication, as has been the case for Position Papers, although publication in *Frontiers* is envisioned. The VP of Public Affairs would monitor the process, which would include a 2-day meeting and 1-year timeline for the finished product. Board

discussion noted that there may still be a role for Position Papers, whose goal would be more to find consensus about a potentially controversial issue in ecology, and not necessarily creation of a policy. We also have Position Statements, which are reactive one-pagers produced quickly on specific issues, and *Issues in Ecology*, which reflect scientific consensus but only pass an editorial review process, and do not require Board approval or represent an ESA position. Position Papers of the Society add a layer of approval but have often taken very long (years) to complete. *It is moved and seconded that we accept the idea of Policy Papers and the process for creating them, as described in the PAC Proposal (without its first sentence). Passed unanimously.* The new policy process would not eliminate the previous process for developing Position Papers. The Science Committee and editorial board of *Issues in Ecology* is charged with considering whether *Issues* could become an official publication of the Society and an outlet for ESA-approved positions.

L) Annual Meeting issues

1) Carbon-neutral meetings. The Meetings Committee has collected a lot of useful information, and the Board is supportive of having information placed on the Meetings web site and made easily available to registrants. *It is moved and seconded that we support the effort to promote carbon-neutral travel to the Annual Meeting. Passed unanimously.*

2) Abstract submission fee. Previous attempts have caused confusion on the part of meeting participants and created headaches for volunteers and staff. *It is moved and seconded that the Annual Meeting registration fee be increased $10 to cover the cost of the abstract software fee. Passed 6 to 4.*

No new business. Meeting adjourned at 12:50 pm.

David Inouye
Secretary

Annual Reports

Annual Reports to Council

Ecological Society of America, August 2006

I. REPORTS OF THE EXECUTIVE DIRECTOR AND STAFF

EXECUTIVE DIRECTOR

ESA has had another productive and successful year. The upward trend in membership continues, with growth to 10 000 clearly in sight. Our finances are strong and we are building a reserve to allow us to operate with no loss of service to our members in the event of some unforeseen disruption. The Annual Meeting in Montreal produced a record attendance and our new Annual Meeting staff team has developed a number of initiatives that will begin in Memphis.

Our themed meeting in Mexico this year was an exceptional success. The program attracted participants from all over the world, and travel support enabled many students from Latin America to attend. While in Mexico, ESA hosted a meeting of the Federation of the Americas, a gathering of Presidents of ecological societies from the Americas, led by ESA. The Federation activities are expanding, as is its membership.

In addition to fundraising and supporting the Mexico meeting, Science programs included leadership in a collaborative effort with other scientific societies on data-sharing issues, a successful National Agricultural Air Quality Workshop, bringing together attendees from 25 countries, and a continued focus on sustainability science.

A major new initiative in 2005 was the establishment of a Development Office to guide us in pursuing funding opportunities for priority activities identified by the Governing Board and staff. One of these is the plan for a Knowledge Partnership in the Southeast Region, an effort to address issues identified by stakeholders in the region.

Our Society's journals continue to be among the best in the field. Our newest publication, *Frontiers,* moved up in the ISI rankings (2nd out of 134 in the Environmental Science category and 6th out of 112 in the Ecology group) and *Ecology*, *Ecological Applications,* and *Ecological Monographs* remain top-rated journals. In 2005 we inaugurated the ESA data registry, a repository for authors to make their data widely available. This year, as well, we provided all our institutional subscribers with print and online access to our journals at a reduced cost.

Rapid Response Teams, established last year, are thriving. Members involved have provided scientific input on congressional legislation, proposed rulemaking by the Administration, and to a "friend of the court" brief submitted to the Supreme Court. ESA's policy briefings, leadership in national coalitions, numerous fact sheets, position papers, official ESA statements, and media outreach build ESA's reputation in the policy arena.

ESA's SEEDS program generates excitement among participants and ESA members involved in the program. The program hosted students at both the Montreal meeting and the Mexico meeting. SEEDS students attended a field trip to the Sevilleta Long Term Ecological Research Project, and another to sites in Kansas. For the first time this year, a leadership workshop was held that included three generations of SEEDS fellowship students.

The following staff reports highlight these accomplishments—and many more. ESA is a strong and growing organization of which I am proud to be Executive Director. Our staff team is professional, dedicated to the mission of the Society, and to serving the membership. All of us are enthusiastic about the future of ESA and our role in its success.

Submitted by:
Katherine McCarter

FINANCES/ MEMBERSHIP/ ADMINISTRATION

ESA continues to grow! The number of ESA members grew from 8718 in 2004 to 9264 members in 2005, and we have already passed that figure for 2006. We expect to end our 2006 membership year with close to 10,000 members.

We anticipate ending the 2005–2006 fiscal year with a positive bottom line. The meeting in Montreal was well attended, library subscriptions are holding up despite budget problems for many institutions, and expenses have been kept within normal variances.

Membership and subscriptions for the calendar year 2005 were:

Total Membership: 9264
Domestic: 7618
Foreign: 1646

By Class:

Regular: 6188
Student: 2155
Developing Countries: 339
Life Members: 245
Emeritus: 337

Subscriptions:

Ecology total: 5806
Members: 3827
Institutions: 1976
Other: 3

Ecological Applications total: 3374
Members: 2159
Institutions: 1211
Other: 4

Ecological Monographs total: 2823
Members: 1546
Institutions: 1273
Other: 4

Chapter Membership:

Canadian: 144
Rocky Mountain: 252
Southeastern: 474
Mid-Atlantic: 400
Western: 510
Mexico: 61

Section Membership

Asian: 94
Applied: 587
Aquatic: 874
International Affairs: 105
Paleoecology: 140
Physiological: 472
Vegetation: 447
Education: 388
Long Term Studies: 232
Statistical Ecology: 296
Soil Ecology: 286
Theoretical Ecology: 259

Plant Population Ecology: 323
Agroecology: 194
Rangeland Ecology: 214
Student: 434
TEK: 90
Biogeosciences: 329
Urban Ecology: 211

Membership affliation:

Academic: 66%
Government: 13%
Nonprofit: 5%
Consultant: 6%
Other/left blank: 10%

Ethnicity:

White: 75%
Asian: 5 %
Hispanic: 4%
African American: <1%
Native American: <1%
Other/ left blank: 15%

Gender:

Male: 60%
Female: 30%
Left blank: 10%

Administrative staff:

Elizabeth Biggs, CFO, Director of Administration; Rachel Dellon, Manager Membership Services; Thet Oo, Associate Director, Information Systems; Zaw Aung, Web-master; Win May, Financial Assistant; Marie Fredlake, Administrative Assistant/Governance Assistant.

ANNUAL MEETING

ESA's 90th Annual Meeting was held in Montreal, and was ESA's largest meeting to date, with close to 4500 attendees. This was a joint meeting with INTECOL, and program chairs from both societies worked closely with ESA staff. Challenges for staff included working with French-speaking vendors, paying hundreds of thousand of dollars worth of expenses in a foreign currency, and coping with customs, NAFTA, and immigration issues. However, all were overcome and we had a successful meeting.

Upon returning from Montreal, work immediately began on the 91st Annual Meeting, held in Memphis, Tennessee. A smooth transition was made from former Meeting Manager Ellen Cardwell, who left the Society in September 2005, to Michelle Horton, who came on board as Meeting Manager in October 2005. In addition, the Program Assistant position has been filled by Devon Rothschild, who is a full-time ESA staff member.

Program Chair Kiyoko Miyanishi and Local Host Chair Scott Franklin have worked closely with ESA staff in the planning of the Memphis Annual Meeting. We had ~2200 abstracts submitted, which leads us to expect roughly 3000 attendees. We continue to work on new programs to "green" the meeting. We have continued the effort begun in Montreal to encourage attendees to make donations to outside organizations to offset their carbon usage. We have begun a new program encouraging attendees to reuse the meeting tote bags. A new meeting patch will be given each year to those bringing back their bags from prior years. This will be the first year we are completely paperless with regard to the Abstracts, the end of a 3-year transition from printed Abstract books to electronic-only access. The Abstracts are available online through the itinerary planner, will be given to all attendees as a CD, and are available throughout the convention center at Abstract kiosks.

Work has also begun on the 92nd Annual Meeting, which will be held in San Jose in August 2007, and will be a joint meeting with the Society for Ecological Restoration International. A call for proposals has been sent to the membership. We have contracted with a new vendor to provide abstract submission software. Program chair Kerry Woods has been working with ESA staff and Memphis Program Chair Kiyoko Miyanishi. Rachael O'Malley will be the Local Host.

Future meetings

92nd Annual Meeting—San Jose, California—5–10 August 2007

93rd. Annual Meeting—Milwaukee, Wisconsin—3–8 August 2008

Annual Meeting staff:

Elizabeth Biggs, CFO, Director of Administration; Michelle Horton, Meeting Manager, Tricia Crocker, Meeting Associate and Registrar; Devon Rothschild, Program Assistant

FRONTIERS IN ECOLOGY AND THE ENVIRONMENT

Frontiers is now in its fourth year of publication, and has established itself as one of the top-ranked journals in the field of ecology and environmental science, while still maintaining a reputation for readability and accessibility.

Impact factor

In June 2006, *Frontiers* received its second impact factor ranking. The journal is ranked 2nd out of 134 journals in the Environmental Science category, and 6th out of 112 journals in the Ecology category.

Frontiers *in China*

In November 2005, an agreement was signed between the Chinese Government and ESA, providing online access to all ESA journals, including *Frontiers*, for up to 800 institutional libraries in China. This agreement was organized in conjunction with Charlesworth China, a company that specializes in introducing western scientific journals to the Chinese market.

Special Issues

The *Frontiers* Special Issue on China is complete and will be published in September 2006. This issue, made up entirely of articles written by Chinese authors in China, will focus on air and water pollution, urbanization, biodiversity loss, and land-use change. Although the abstract of each article appears in both English and Chinese in the journal, efforts are underway to find the necessary funding to have the entire issue translated into Chinese, as was done with the February 2005 Special Issue: *Visions For An Ecologically Sustainable Future*.

Copies of this issue will be distributed free in China, by the authors and at EcoSummit 2007. Ecological Complexity and Sustainability: Challenges and Opportunities for 21st Century's Ecology (Beijing, China, May 2007) where the ESA will have a booth.

A further Special Issue is also in preparation, based on the ESA meeting held in Merida, Mexico, in January 2006 (Ecology in an Era of Globalization). This issue, which is supported by a grant from the NSF, is scheduled to appear late in 2006 or early 2007. The issue will include an editorial by Jonathan Lash, Director of the World Resources Institute; an introductory article by co-chairs Jeff Herrick (USDA-ARS Jornada Experimental Range, New Mexico) and Jose Sarukhan (Instituto de Ecología-UNAM, Mexico; three review articles, based on the three themes of the meeting: Invasive species, Production, and Migration; and the six best workshop "reports," written by the chairs of workshops at the Merida meeting. All the other workshop reports submitted will be published online. All contents have been peer reviewed.

Paper

In August 2005, *Frontiers* began printing on 100% recycled, 10% postconsumer waste paper. However, early in 2006, the paper mill discontinued that particular line. Therefore, as of May 2006, *Frontiers* has been printed on 50% recycled, 30% postconsumer waste, processed chlorine-free paper.

Award

In October 2006, *Frontiers* won the Bronze Award in the Aveda Environmental Awards for Best Practices in Environmental Sustainability. The journal tied for third place with the Nature Conservancy

magazine. The gold award was won by the magazine *Natural Health*.

Articles

Articles received as of 14 July 2006
Total articles received: 127
Articles accepted: 51 (40%)
Articles rejected: 42 (33%)
Articles withdrawn: 8 (6%)
Articles currently in peer review: 24 (19%)

Conferences

In the past 12 months, *Frontiers* staff have attended a variety of meetings, including the Society of Environmental Toxicology and Chemistry Annual Meeting (Baltimore, Maryland), the ESA meeting, Ecology in an Era Of Globalization (Merida, Mexico), the AAAS Annual Meeting (St Louis, Missouri), the 2006 Ocean Sciences meeting (Honolulu, Hawaii), the Council of Science Editors Annual Meeting (Tampa, Florida), and the Society for Scholarly Publishing Annual Meeting (Washington, D.C.).

Finances

During the course of 2005, Executive Director McCarter and *Frontiers* Editor-in-Chief Silver visited a number of federal agencies, looking for interim financial support for the journal, while institutional subscription and advertising revenue continues to build up. The following agencies generously contributed funds:

NOAA: $45 000
U.S. Department of Energy: $74 202
U.S. Forest Service: $100 000
U.S. Geological Survey: $20 000
National Science Foundation: $73 414 (for the Mexico Special Issue)

Submitted by:

Sue Silver

DEVELOPMENT OFFICE

Fran Day joined the staff of the Ecological Society of America on 6 February 2006. With the assistance of ESA staff and the Development Committee, the initial draft of the development master plan was completed in March 2006. Since that time it has been continuously revised and updated as we completed research and/or developed proposals. We have focused on priorities as determined by the Governing Board. They include: Education Programs; *Frontiers in Ecology and the Environment*; Knowledge Partnerships; Federation of the Ecological Societies of the Americas; and Science Office programs. Case statements and funding strategies have or are being developed for each of the above.

Education programs

The focus of the Education Programs initiative is SEEDS expansion. Working collaboratively, we have completed the case statement for SEEDS for Teachers and are actively seeking funding to support the implementation of the program. We have submitted grants proposals to three foundations and have two additional proposals in development. The case statement for expansion of the student SEEDS Program internationally in conjunction with the Federation of the Ecological Societies of the Americas is close to completion and will be submitted to several foundations for major funding before calendar year end. The case statement for expansion of the SEEDS Program into "green" colleges is close to completion. Letters of inquiry have been submitted to two foundations for support of this project.

Frontiers in Ecology and the Environment

The funding strategy for *Frontiers* is to focus on the development of additional revenue through sponsorships, increased advertising, and grants development. The marketing package for *Frontiers* is in the design and materials development phase. We have identified and ranked potential sponsors and advertis-

ers and developed the marketing plan. The first phase of the sponsorship marketing plan will begin in September 2006. We are identifying potential grantors and underwriters for planned special issues of the journal, as well as institutional support. We will e-mail a voluntary consumer survey to the membership to provide information that will support the development of sponsorships.

Knowledge Partnerships

The inaugural focus of the Knowledge Partnerships is the Southeast region. We have identified a list of potential funders, and in collaboration with the Planning Committee chaired by Alan Covich, we are developing a case statement to provide to potential funders.

The Federation of the Ecological Societies of the Americas

The case statement for the Federation has been developed and sent to four potential funders. Two additional proposals are in development.

Science Office Programs

We have assisted with the development of a symposium presented by ESA members at the annual Society for Human Ecology in Bar Harbor, Maine, 18–21 October 2006. We have also helped with the development of a case statement for the Nitrogen 2007 Conference and begun discussions with the Golf Course Superintendent's Association of America regarding potential support.

Annual Fund for the Millennium

The plan for the Millennium Fund calls for a campaign of two e-mails and one regular mail contact over the next nine months. The first e-mail was sent in late June and we are receiving and tracking contributions. The purpose of this particular campaign is to increase the number of donors. At the time of this report, we have received 17 contributions. The second e-mail will be sent in the second week of November 2006. A mail appeal will be included with the Annual Report. In addition, we have created a promotion for the Annual Meeting called "Growing Ecology" and these responses will be tracked carefully.

Membership Development Test Campaign

The membership test campaign is well underway: the lists to be tested have been identified, the materials are in production, and the tracking system is established. The first test package will be mailed to 5000 potential members in September 2006.

Other development activities include Building the Prospect and Donor Base—we have identified over 300 potential major donors and entered ~100 into the database. We have also assisted with the development of the Conflict-of-Interest Policy and the Guidelines for Identifying Corporate Donors.

Submitted by:

Fran Day
Director for Development

PUBLIC AFFAIRS OFFICE

Public Affairs

Over the past year, ESA public affairs activities focused on conveying ecological information and resources to the media and to Congress, working with the broad scientific community to foster support for science, publicizing the Society's activities, and outreach to ESA members.

Highlights

1) This year, ESA's Rapid Response Teams provided timely scientific input to all three Branches of Government, providing expertise on congressional legislation, proposed rule changes from the Administration, and to the Supreme Court.

2) Working with Society President Nancy Grimm, Public Affairs staff developed and distributed 10 letters from the Society.

3) ESA sponsored or cosponsored four public briefings on issues ranging from forest fires to hurricanes.

4) Members and staff met with targeted congressional and Executive Branch offices to discuss issues of concern to the ecological community.

5) The Office assisted members of the media weekly with stories ranging from climate change to National Park Service science.

Environmental policy

Thanks to ESA member experts, Society leaders, and ESA Policy Analyst Laura Lipps, the Society was able to again play an active role in numerous environmental policy issues over the last year.

- Members of the Society's Rapid Response Teams (RRTs) provided ESA expertise to an Amicus brief ("Friend of the Court") submitted to the Supreme Court. The Court heard arguments on several wetlands case in early 2006. Other societies joining ESA in filing the Brief were the Society of Wetland Scientists, American Society of Limnology and Oceanography, and the Estuarine Research Federation. ESA President Nancy Grimm, President-Elect Alan Covich, and VP for Public Affairs Richard Pouyat reviewed and approved the brief, which was prepared by the Southern Environmental Law Center on the societies' behalf. (The brief has been printed in full in the *ESA Bulletin* 87(2):132–154.)

- RRT members David Lodge, Susan Williams, and Richard Mack, all authors of the Society's invasive species position paper, presented the paper in a National Press Club briefing and met with targeted Hill staffers to discuss its policy implications.

- Working with ESA's President Nancy Grimm and with RRT members, PAO developed and distributed 10 ESA statements throughout the year, which addressed a wide range of issues including a proposed rule on stream mitigation, ocean research, Great Lakes Implementation Act, and the Administration's American Competitiveness Initiative.

- ESA RRT members helped develop a multisociety position statement on the Endangered Species Act, subsequently released as part of a Senate-side briefing.

- RRT members Stan Temple (UW-Madison), and Virginia Dale (Oak Ridge National Laboratory), participated in a 2-hour working meeting on Endangered Species Act reform legislation with Senator Chafee's office. Chafee's staff person has subsequently followed up several times with the scientists.

- ESA RRTs also provided input on science education incentives, federal fisheries science, and climate change.

Science appropriations

- Nadine Lymn, Director of Public Affairs, continued to co-chair the Biological Ecological Sciences Coalition (BESC), working to raise awareness in the White House and Congress about the state of funding for the nonmedical biological sciences.

- As part of a BESC event, ESA President Nancy Grimm and Lymn met with two majority staff directors and other professional staff of the House Science Committee, as well as with Representative Ehlers' (R-MI) office in early December. Discussions centered on how to advance the life sciences in a political climate focused on economic competitiveness. In addition, Lymn and other BESC colleagues requested that Members of Congress avoid making public comments that appear to pit the life sciences against the

physical sciences.

- ESA helped organize a Spring Congressional Visits Day for over 40 biological scientists from 22 states, including field station biologists , academic researchers , and graduate students; they participated in BESC's Spring Congressional Visits Day on 14-15 March 2006. The event included a half day of briefings from agencies, the White House Office of Science and Technology Policy, and from Congress. The BESC and CoFARM (Coalition for Agricultural Research Missions) evening reception honored two Members of Congress, Representatives Vernon Ehlers (R-MI) and Rush Holt (D-NJ) for their integration of research findings into environmental policies, such as the prevention and control of invasive species, and their strong support for science education. Visits on 15 March consisted of over 50 meetings with congressional offices as teams of scientists met with Members' offices to advocate for federal support of biological research. ESA's first Graduate Student Policy Fellows as well as an RRT member participated in the events.

- PAO continued to track and report on the status of legislation, federal science appropriations, and environmental policy activities in the national and international arena through its bi-weekly Policy News. In March, Lymn teamed up with staff from AIBS to write a chapter for the annual publication of the American Association for the Advancement of Science, AAAS Report: Research and Development FY 2007. The ESA/AIBS chapter analyzed the nonmedical biological science elements of the Administration's proposed fiscal year 2007 budget.

Press

Throughout the year, Public Affairs Officer Annie Drinkard worked to highlight ecological research and ESA activities to the press.

- Press preparations for the 2006 Annual Meeting so far have included press releases highlighting symposia and oral sessions, and working with university and agency public information officers to generate additional publicity for the meeting.

- Coverage of the ESA Annual Meeting held in Montreal, Canada generated over 40 stories. Twenty reporters attended the meeting. Among the news outlets covering the conference were: CBC, Swedish Public Radio, MSNBC, *Science, Nature* and a host of local radio and newspapers. (ESA does not have a media clipping service; there was more coverage than we are able to track.) Some of the more popular sessions at the Society's 90th Annual Meeting were Ecological Effects of the Chernobyl Disaster, Underneath it all (soil ecology), and Restoring the Garden of Eden (Mesopotamian marshes).

- PAO staff continued to build on its media contacts this year and issued over a dozen press releases highlighting Society journal articles and the Annual Meeting. Drinkard also participated in the AAAS meeting.

- ESA continued to field a steady influx of reporter-initiated calls throughout the year. Inquiries came from both the popular press (*Boston Globe*) and scientific (*Nature*) and covered a wide range of topics from science policy to hurricanes.

- The media was especially interested in the cod stocks article published in *Frontiers* (generated 100's of articles around the globe), the wolves' top down effect article in *Ecology* (generated dozens of articles), and an *Ecological Applications* paper on nitrogen pollution.

- Laura Lipps attended ESA's meeting in Merida, Mexico, as ESA's press representative. Proficient in Spanish, she provided meeting information to members

of the seven Mexican news agencies in attendance, and arranged interviews with presenters and conference organizers.

Outreach

- ESA organized or co-sponsored four briefings this year:

Hurricane Katrina briefing. With a congressional audience of 50, ESA Rapid Response Team (RRT) members Robert Twilley, (Louisiana State University), and Dennis Whigham (Smithsonian Environmental Research Center), briefed over 40 congressional staff on the ecology of Gulf Coast wetlands and the role of ecological science in restoring Gulf Coast ecosystems, on 26 October 2005. The scientists highlighted the role of wetlands and the importance of delta restoration, and offered recommendations on integrating ecological principles into scientific decision making in Gulf Coast recovery. ESA President Nancy Grimm opened the session, highlighting the role of ESA's RRTs in contributing ecological expertise to environmental challenges.

Endangered Species Act. ESA joined several other scientific societies to present a multi-society statement during a briefing to 20 Senate staff on 27 February 2006. ESA member Nick Haddad (NC State) represented ESA during the Senate briefing. A press release was also distributed to ESA media contacts.

Forest Fires. RRT member Monica Turner spoke on the ecology of forest fires during a briefing to 35 House staffers that ESA hosted with several other scientific societies.

Invasive Species. ESA held a briefing at the National Press Club on 3 March 2006 to unveil the Society's position paper on invasive species and their management. The event, which was moderated by ESA President-elect Alan Covich, drew an audience of 75 federal agency representatives, congressional staff, and members of the media.

- Knowledge Partnerships. Following the Board's charge to explore a possible ESA regional initiative, ESA staff, the Society's Vice President for Public Affairs Richard Pouyat, and scientists in the Gulf Coast region met in Baton Rouge, Louisiana in December 2005. After further Board discussions, the Society is now planning to explore launching a pilot initiative that would focus on the southeast United States and address issues identified by stakeholders in that region.

- ESA President Nancy Grimm and other members of the Society's Governing Board met with NSF's new Assistant Biology Director Jim Collins during his first week on the job. Board members also met with the U.S. Department of Agriculture's Competitive Grants staff to discuss areas of mutual interest.

- Lymn and Lipps, together with colleague Adrienne Sponberg (American Society of Limnology and Oceanography), developed and gave a Policy Training Workshop during the Montreal Annual Meeting which was designed to equip biological scientists with tools to participate in public policy. The trio worked with about 20 scientists to coach them in methods to influence policy, concluding with simulated congressional visits.

- Drinkard and Lymn organized a special session held during the Annual Meeting designed to ease presentation jitters and offer constructive tips on public speaking. Offered since 2004, their hands-on session draws on improv' comedy techniques.

- Drinkard produced the Society's ninth Annual Report, distributed to the membership in February. This report focused on 90 years of ESA and offered a historical quiz to test members' knowledge of their membership Society. In addition to providing an overview of Society activities for ESA members, the report is useful for meetings with potential

funding sources and with others who are interested in the Society.

Public Affairs Committee

Members of the Society's Public Affairs Committee offer valuable guidance to the organization's public affairs activities, ranging from review of newsworthy Annual Meeting abstracts to highlight to the press, and assessing pending Society position statements and papers.

The Public Affairs Committee (PAC) met in late March to address several key activities planned for the Memphis meeting, including a PAC-sponsored symposium. In addition, PAC developed a new proposal for Board consideration on the development and venue of future ESA Position Papers. The Governing Board approved the new guidelines for Society public policy papers in May 2006. The committee also spent one day with the Society's Education and Human Resources Committee, addressing areas of overlapping interest and participating in several meetings with Capitol Hill staffers.

Members of the PAC are Richard Pouyat (Vice President), Rick Haeuber (Environmental Protection Agency), David Lodge (Notre Dame), Evan Notman (USFS AAAS Fellow) Candan Soykan (Student Representative), Christy Williams (USAID).

Public Affairs Office staff
Nadine Lymn, Director of Public Affairs; Annie Drinkard, Public Affairs Officer; and Laura Lipps, Policy Analyst.

SCIENCE PROGRAMS OFFICE

The Office of Science Programs carries out a broad range of activities in support of the ESA membership, the scientific community, and public agency scientists and decision makers. These activities are grouped into three broad categories: advancing Visions initiatives, maintaining responsiveness to the ecological science community, and developing a new sustainability science agenda. These efforts, in collaboration with those of ESA's Education, Public Affairs, and Publications programs, maintain ESA's reputation as a source of reliable knowledge in ecological science. We appreciate the continuing support of the Society and the direct involvement of Society members in Science activities, and we welcome your advice, ideas, and energy.

Advancing Visions initiatives

Advancing Visions initiatives includes providing the scientific underpinnings for ESA public awareness and rapid response projects, leading international outreach, and promoting standardization of data collection, documentation, and sharing, based on ESA's Ecological Visions Project.

Ecology in an Era of Globalization

The Science Office played a major role in helping plan and raise funds for ESA's Ecology in an Era of Globalization meeting in Merida, Mexico in January. The conference was highly successful, attracting more than 480 attendees from 20 countries. The more than 200 student participants included 99 Latin American students supported by a Ford Foundation grant to ESA, and 31 U.S. students assisted by an NSF grant. The conference was officially opened at an evening ceremony featuring the Governor of Yucatan, Patricio José Patrón Laviada; conference co–chairs Jose Sarukhan and Jeff Herrick; ESA President Nancy Grimm; and a presentation by former Secretary of the Interior Bruce Babbitt. Invited speakers at the conference also included World Resources Institute President Jonathan Lash; former Environment Minister for Mexico Julia Carabias; and Governor of Zacatecas Amalia Garcia. Approximately 70 attendees made oral presentations at the conference, and about 300 presented posters. Follow–on efforts are continuing, including preparation of reports about the conference workshops and development of a special issue of *Frontiers*.

As an additional follow–on to the meeting, the Ford Foundation gave ESA permission to use remaining grant funds to provide five scholarships to ESA's

2006 Annual Meeting. The five students selected are: Julieta Bono (Argentina), Galia Selaya (Bolivia), Alzira Maria Ferreira (Brazil), Jorge Eliécer Acosta (Colombia), and María Verónica Aguirre (Ecuador). All attended the Merida meeting, and will present papers in Memphis. They will also take part in the SEEDS activities sponsored by the Education Office.

Data-sharing initiative

With a grant from the National Science Foundation, awarded in May 2006, the Office is continuing the collaboration with other scientific societies on data-sharing issues begun at the Society Summit Meeting in September 2004. On behalf of the Joint Working Group formed at the 2004 meeting, ESA will host three workshops on data registries, data centers, and barriers to data access, respectively, over the course of the next 12 to 18 months. The first workshop, on data registries, was held 11–12 July 2006 in Washington.

Issues in Ecology

The Science Office continues to provide staff support to ESA's *Issues in Ecology* series. Two *Issues in Ecology* reports are currently under development, one focusing on science and conservation of migratory birds, and one on climate change in marine systems. Eight issues have now been translated into Spanish and three into Chinese; the translations are available on the ESA web site.

NBII Web site on pollination

Under a cooperative agreement with the National Biological Information Infrastructure (NBII), Science is supporting development of an NBII web site about pollinators, with content developed by Science staff, drawing on information from sources such as ESA's pollination ecosystem services toolkit, and the North American Pollinator Protection Campaign.

Maintaining responsiveness to the ecological science community

This category of activities includes a wide range of projects that help maintain ESA's reputation as a source of scientific expertise and offer ESA members the opportunity to provide input to environmental management decisions. Some activities overlap with the scope of Visions initiatives; for example, the ESA Vegetation Panel's VegBank database links to the promotion of data sharing under advancing Visions initiatives.

Ecosystem services provided by agricultural wetlands

Science is working with the USDA Natural Resources Conservation Service to develop a set of articles about conservation practice effects on ecosystem services provided by wetlands on agricultural landscapes, along with a nontechnical summary for distribution to decision makers and the general public. The articles will be prepared by researchers in the field and submitted to a peer–reviewed journal (possibly a supplement to *Ecological Applications*), and the summary will be prepared by Bette Stallman and distributed by the Office. A meeting of the article authors is scheduled for 12–13 September 2006, at the National Conservation Training Center in Shepherdstown, West Virginia.

ESA Panel on Vegetation Classification

Science continues to provide support to the ESA Panel on Vegetation Classification. The Panel is revising its *Ecological Monographs* manuscript describing the Guidelines for Describing Associations and Alliances of the U.S. National Vegetation Classification. The Federal Geographic Data Committee (FGDC) Vegetation Subcommittee is engaged in continuing discussions to create a federal vegetation classification standard based on the Guidelines. The Panel also continues to maintain the VegBank plot data archive.

Harmful algal blooms workshop and plan

The Science Office has completed its efforts supporting the National Oceanic and Atmospheric Administration on the revised National Plan for Marine Biotoxins and Harmful Algae, first issued in 1993.

Under a cooperative agreement, Office staff helped organize and participated in a workshop in Charleston, South Carolina, 21–25 March 2004. The workshop, attended by ~50 invitees, reviewed progress made in the last decade toward achieving the goals of the 1993 plan. Rhonda Kranz and Devon Rothschild worked with a steering committee chaired by Don Anderson of Woods Hole Oceanographic Institution and John Ramsdell of NOAA's Charleston, South Carolina laboratory, to complete the revised plan, HARRNESS, Harmful Algal Research and Response: A National Environmental Science Strategy 2005–2015, which is available at ‹http://esa.org/HABPlan›. Cliff Duke served on the steering committee and managed the cooperative agreement that funded the project.

National Agricultural Air Quality Workshop

The Science Office supported a team headed by Dr. Viney Aneja of North Carolina State University and Bill Schlesinger to develop the National Workshop on Agricultural Air Quality: State of the Science, held 5–8 June 2006 at the Bolger Center in Potomac, Maryland. This workshop, supported by USDA, NSF, and others, focused on improving agricultural air quality inventories and recommended technological and methodological changes in current modeling and measurement practices. The Workshop, which attracted 345 attendees from 25 countries, featured a plenary address by Dr. Ralph Cicerone, President of the National Academy of Sciences, 88 oral presentations, and more than 190 posters on agricultural emissions, monitoring and measurements, biomass burning, best management practices, and public policy. The Workshop proceedings have been published, and an Assessment Report and several special issues of journals with papers by Workshop presenters are in preparation.

National Parks Ecological Research Fellowship Program

The National Parks Ecological Research (NPER) Fellowship Program has been a partnership of ESA, the National Park Foundation (NPF), and the National Park Service, funded through a grant from the Mellon Foundation. The program encouraged and supported outstanding postdoctoral research in ecological sciences related to the flora of U.S. National Parks, Monuments, Seashores, and other sites administered by the National Park System. Due to changed priorities at NPF, this program is being phased out, with no new awards in 2006. ESA will continue to manage existing fellowships that have not been completed, and a final meeting of current and past fellows and the ESA review committee is being considered for ESA's Annual Meeting in San Jose in 2007.

Peer review support

The Science Office continues to manage the scientific peer review of a set of 10 assessments of the historic range of variation of Rocky Mountain Ecosystems for the U.S. Forest Service's Region 2. Each report is reviewed by the review panel chair and four other reviewers. Dr. Duncan Patten chaired the review until recently, when Dr. Wallace Covington took over. Five reports (Medicine Bow National Forest, Bighorn National Forest, Pike and San Isabel National Forests, Arapaho and Roosevelt National Forests, and Grand Mesa National Forest) have been reviewed and reports submitted to the Forest Service. Five additional reports are being completed by the authors and will be reviewed in the future.

Developing a new sustainability science agenda

This effort is intended to develop a series of activities to examine and articulate the intellectual foundations for a new sustainability science. It began formally with a special session, "Ecological Sustainability in a World of Constant Change: Developing a New Research Agenda for ESA," organized by Vice President for Science Gus Shaver, President Nancy Grimm, and Science Director Cliff Duke at the 2005 Annual Meeting. A Steering Committee led by Gus Shaver and including Terry Chapin, Cliff Duke, Ann Kinzig, Debra Peters, and Osvaldo Sala is planning an NSF–sponsored workshop, Ecological Foundations of Sustainability in a Constantly Changing World, to be held at Woods Hole, Massachusetts in late 2006 or early 2007. This workshop will review recent advances in ecological theory and identify how those advanc-

es can improve our understanding and achievement of sustainability. The workshop will also set the stage for a symposium at the 2007 ESA meeting, a larger international workshop to be cosponsored by ESA, UNESCO, and SCOPE, and several publications.

Annual Meeting activities

Science is organizing or participating in a number of activities at the 2006 Annual Meeting. These include meetings of the Science Committee, the Vegetation Panel, and the *Issues in Ecology* Editorial Board. Science Director Duke, with ESA President Nancy Grimm and President–Elect Alan Covich, will cochair a special session on funding agency initiatives. The National Parks Ecological Research Fellowships Review Committee will host a breakfast for current and past Fellows and guests.

Other activities

ESA continues as a Cooperator with the Plant Conservation Alliance, a cooperative program of a number of Federal agencies, which seeks to address problems related to native plant conservation and restoration. Science represents ESA at Alliance meetings, which are held every two months in the Washington area.

Science staff also participate in the scientific community in ways that help communicate ESA capabilities to the community and in turn inform the efforts of staff in the projects and activities summarized above. For example, Devon Rothschild represents ESA at Annual Meetings of the North America Pollinator Protection Campaign, and in the activities of National Invasive Weeds Awareness Week. Rothschild is also advising a high school student on a research project for the Intel Science Talent Search (formerly the Westinghouse Science Talent Search.)

Bette Stallman represents ESA on the Sustainable Water Resources Roundtable (SWRR), which is developing sets of environmental indicators. The most recent meeting, on 25–26 April 2006, featured updates on other indicator efforts, a review of a framework and indicators developed to date for water resources, and planning for next steps in the process.

Cliff Duke represents ESA on the Sustainable Rangelands Roundtable (SRR), which is developing sets of indicators for rangelands. The next meeting, on 2–5 October 2006, will focus on ecosystem services provided by rangelands. Duke also serves on EPA's Board of Scientific Counselors, which advises EPA's Office of Research and Development, and on the Key National Indicators Initiative, an effort to integrate a wide range of environmental, social, and economic indicators into a single, accessible source of information.

Science Committee

The Science Office thanks the members of the Science Committee, who provide valuable advice and input on Office projects: Gus Shaver, Chair (Marine Biological Laboratory); Laurie Drinkwater (Cornell University); Susan Harrison (UC–Davis); Mathew Leibold (University of Texas); Mary Power (UC–Berkeley); Phil Robertson (Michigan State University); Ricardo Rozzi (University of North Texas); and Michael Slimak (U.S. Environmental Protection Agency).

Science Office staff:
Cliff Duke, Program Director; Bette Stallman, Program Manager; Devon Rothschild, Program Associate.

EDUCATION AND DIVERSITY INITIATIVE ACTIVITIES OFFICE

This year has been a busy one for ESA Education staff. The education and diversity initiatives office develops and manages programs that aim to increase the diversity of ecology-related professions and improve the quality of ecology education at all levels. In 2005/2006 we continued to expand on our main education projects, including the Bioscience Education Network (BEN), and SEEDS (Strategies for Ecology Education Development and Sustainability), as well as remaining active in education and policy activities

occurring both nationally and in the D.C. area. The Education office staff also engages in many outreach activities, such as dissemination of education materials through our web site and mail.

August–October

The ESA Annual Meeting in Montreal featured many education and diversity events. An ESA member selection committee identified 30 students and 20 faculty to receive travel awards. Each student was paired with a meeting mentor, an ESA member with expertise in their interest area, to help guide them through the meeting. Mentors included six SEEDS alumni who are now in graduate school. Events at the meeting for participants included orientation sessions, a breakfast for students and mentors, and a participants' workshop.

In late August, Taylor and Strickland attended and exhibited at the Minority Environmental Leadership Diversity Initiative (MELDI) and the Society for Advancement of Chicano and Native Americans in Science (SACNAS) conferences.

In late September, ESA received 4 years of funding from the National Science Foundation to continue and expand its digital library project (BEN). This grant is part of collaboration with the American Association for the Advancement of Science and other biological societies.

November–January

In November Taylor attended the Conservation Learning Summit at the National Conservation Training Center in Shepherdstown, West Virginia, the North American Association of Environmental Education Annual Meeting in Albuquerque, New Mexico, and the National Science Digital Library Annual Meeting in Denver, Colorado.

SEEDS sponsored a Student Field Trip, 10–13 November 2005, to the Sevilleta Long Term Ecological Research (LTER) Project. Attendees of the field trip included 25 students from 16 schools across the country, two SEEDS faculty, and four faculty representatives and team leaders. Faculty representatives included Mike Collins (United Tribes Technical College), Joe Fail, Jr. (Johnson C. Smith University), Stacey Mortensen (Fort Berthold Community College), and Sashi Sabaratnam (Livingstone College). Scott Collins, Professor and Lead Principal Investigator of the Sevilleta LTER, and Nancy Grimm, CAP LTER and ESA President, hosted the field trip.

The first electronic copy of the SEEDS monthly newsletter was published in early December, and all subsequent issues can be found at: ‹http://www.esa.org/seeds/newsletter/›.

In early January, education staff coordinated SEEDS events for 16 students to attend the Merida, Mexico Meeting. In addition to attending SEEDS-sponsored events, SEEDS participants were actively involved in the International Conference by attending field trips, and seven students presented their research at poster sessions. Several events were planned specifically for SEEDS participants. These events included lunch and orientation, field trip and dinner, and a wrap-up session. ESA President Dr. Nancy Grimm was the invited speaker for the wrap-up session. Photos from the International Conference can be found at ‹http://www.esa.org/seeds/albumPhotos/index.php›

In late January a proposal was submitted to the National Science Foundation to continue the Teaching Issues and Experiments in Ecology project. Unfortunately this grant was not funded.

February–April

From 18 to 23 February, Jason Taylor attended the American Society of Limnology and Oceanography (ASLO) Ocean Sciences meeting in Honolulu, Hawaii. Taylor participated in a number of sessions related to diversity in the ocean sciences, and exhibited SEEDS and ESA to the conference attendees; he also visited with the University of Hawaii at Manoa SEEDS Chapter. He was given a tour of the campus by President Andrea Rivera and Vice-President Pollyanna Fisher and discussed their planning for the East

Maui Ecology Field Trip.

Melissa Armstrong organized a SEEDS leadership workshop, which included three generations of SEEDS fellowship students. Many of their mentors attended this workshop, held 2–5 March in Tempe, Arizona at the Arizona State University (ASU) campus. The workshop was hosted by Nancy Grimm, ESA President, Director of the Global Institute of Sustainability at ASU, and current SEEDS Fellowship mentors.

In early March, Education staff prepared a nomination for ESA and the SEEDS program for the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM). We are still waiting for notification.

Strickland and Taylor attended the 25th Anniversary American Indian Higher Education Consortium (AIHEC) Conference 11–14 March in Green Bay, Wisconsin. SEEDS co-sponsored the Science Bowl Competition; the Science Oral Interpretation Competition; and the Science Poster Competition with the All Nations Louis Stokes Alliance for Minority Participation. Jeramie and Jason assisted with the Science Bowl Competition and learned more about the students and other tribal schools during the competition. The College of Menominee Nation (CMN) in Keshena, Wisconsin won the Science Bowl Competitions. CMN is in the SEEDS Campus Ecology Chapter cohort. In addition, SEEDS staff interacted with other conference participants and disseminated ecology educational materials along with information about ESA and SEEDS.

SEEDS exhibited and sponsored a workshop at the 2006 MANRRS (Minorities in Agriculture, Natural Resources, and Related Sciences) Annual Conference, 30 March –1 April, in St. Louis, Missouri. Katherine Hoffman organized a SEEDS Saturday workshop, St. Louis Riverfront Trail: How People Use Ecology. This field trip traveled along the 12-mile trail on the Mississippi River's west bank, focusing on the natural and cultural sites while learning about local conservation, restoration, and environmental justice efforts.

The Education and Human Resource Committee (EHRC) met from 22 to 24 March in Washington, D.C. The committee spent most of its time focusing on the Profiles of Ecologists report, and the ecology in the undergraduate curriculum survey. EHRC also met with the Public Affairs committee and visited two congressional offices.

May–July

From 4 to 9 June 2006, SEEDS conducted a student field trip to various sites in Kansas. Attendees included 19 students from 16 schools across the country, including the territories of American Samoa and Puerto Rico; one SEEDS faculty member from Yale University; and three SEEDS staff from the Ecological Society of America. The main goal of the field trip was to provide students with a positive experience with the ecology profession in Lawrence and Manhattan, Kansas. The field trip also included cultural and artistic aspects of areas the group learned about, and attempted to give a rich perspective of Kansas. Participants toured the Haskell/Wakarusa wetlands and were given a behind-the-scenes tour of the Natural History Museum at the University of Kansas.. The field trip then moved from Lawrence to Manhattan, Kansas, where students learned about the ecological research in progress at Kansas State University and the Konza Prairie.

A proposal was submitted to the Department of Education's Fund for the Improvement of Postsecondary Education. If successful, this project will address the epidemic national teacher shortage that is most severe in science/math and in communities with high levels of minority students.

The fourth volume of *Teaching Issues and Experiments in Ecology* was published at ‹www.tiee.ecoed.net›

Submitted by:
Jason Taylor

PUBLICATIONS OFFICE

A. Submissions and production (see Table 1 for summary)

Calendar year 2005 brought yet another marked increase in submissions to ESA journals relative to the previous year. Between 1 January 2005 and 31 December 2005, the Publications Office logged in 2016 manuscripts, a 12.9% increase compared to 2004, and a new all-time record. Of the manuscripts received last year, 1409 were submitted to *Ecology/ Ecological Monographs* (a 14.6% increase relative to the previous year), and 607 were submitted to *Ecological Applications* (an 8.9% increase). The data for submissions since 1987 are presented graphically in Fig. 1. The Publications Office staff (Jane Shaw, Anne Marie Whelan, Linda Stoddard, and Heather Carlo) deserve recognition for handling the increased workload so capably. Anne Marie Whelan deserves special recognition for keeping EcoTrack (the online submission and review system) updated and running smoothly.

Based on the submissions so far in 2006 (through 30 June; 1095 total), submissions in the present year are up 8.6% over 2005. Submissions to *Ecological Applications* account for a disproportionate share of this year's increase (353 submissions in 2006, as of 30 June). If the trend continues through the year, *Ecological Applications* will receive 16.3% more submissions in 2006 than in 2005!

The acceptance rates (percentage of decisions made during 2005) were 20.7% for *Ecology/Ecological Monographs* and 22.6% for *Ecological Applications* (see Fig. 2). The numbers indicate that ESA's journals are among the most selective journals publishing papers related to ecology.

The continuing declines in the average length of *Ecology* and *Ecological Applications* articles (see Fig. 3) reflect the ongoing effort to encourage authors to submit more concise papers for publication and to promote the use of Ecological Archives. During 2005 >50% of papers published in the three print journals were associated with Ecological Archives postings (279 of 554 papers published).

The three print journals published 6254 pages in 2005, 3.2% fewer pages than in 2004 (see Fig. 4). This decrease is due to the fact that no supplements were published in 2005.

The page budget was increased in 1999 in an effort to decrease the backlog of papers awaiting publication (thereby decreasing the time between acceptance and publication). The Governing Board has recently approved another increase in the page budget for *Ecological Applications*. This will be reflected in the pages published for 2006.

During 2005 the *ESA Bulletin* published 332 pages, a 55.9% increase over 2004. Congratulations and thanks to David Gooding and Regina Przygocki for all the extra work! Our ability to include color images and Ed Johnson's new innovations to take advantage of this opportunity have added to the visual appeal of the *ESA Bulletin*.

Overall, the journals remain healthy. The large volume of submissions, the high circulations, and the consistently high impact factors for ESA journal articles (according to the ISI Science Citation Reports) reflect the esteem with which the profession views ESA publications.

B. Time to publication

We have made dramatic progress over the past few years in decreasing the time to publication (as is evident from the manuscript histories printed as footnotes to each published paper). The backlog of accepted papers awaiting publication is essentially a thing of the past, thanks primarily to the increased page budget adopted several years ago. There have also been payoffs resulting from the efforts to encourage authors to submit more concise papers as Reports (*Ecology*) and Communications (*Ecological Applications*), as well as the increasing use of Ecological Archives for digital publication of information not integral to accepted papers. Shorter papers can be reviewed, revised, and copy-edited more quickly than the standard articles of

the past. In addition, we can publish more of them in a given issue, while still keeping within the page budget. It is increasingly common to see papers published in as short a time as 5–6 months following submission.

C. Ecological Archives

We have continued to promote the publication of appendices and supplemental materials in ESA's Electronic Data Archive, *Ecological Archives*. During 2005, 279 of the papers published in ESA journals had one or more digital appendices and/or supplements published in *Ecological Archives* (and linked to the online versions of the published papers)—a 60.3% increase over 2004. Data Archive Manager Jane Bain has done a superb job of keeping up with the accelerated pace of files to be posted. The default is that all appendices and supplementary material referred to as being "available" in published papers are posted in digital form in *Ecological Archives* and are not printed. ESA is one of the leaders in the biological sciences in the use of digital archiving in conjunction with its publications.

Table 1.
ESA PUBLICATIONS
Summary Statistics

Statistic	2004	2005	Percentage change, 2004–2005
MSS submitted, *Ecology/Monographs*	1229	1409	+14.6
MSS submitted, *Applications*	557	607	+8.9
Total MSS submitted	1786	2016	+12.9
Acceptance rate (%), *Ecology/Monographs*	22.4	20.7	---
Acceptance rate (%), *Applications*	25.1	22.6	---
Pages published, *Ecology*	3470	3454	−0.5
Pages published, *Monographs*	702	586	−16.5
Pages published, *Applications*	1968	2214	+12.5
Pages published, Supplement	322	---	---
Total pages published, journals	6462	6254	−3.2
Pages published, *ESA Bulletin*	213	332	+55.9
Papers with *Ecological Archives* postings (% of *Ecol., EM,* and *Applications* papers)	174	279 (50.3%)	+60.3

D. Graphics work brought in-house

During 2005, we began doing all modifications to figures (including sizing, alterations to labels, and layout) in the Publications Office. This has resulted in significant savings to ESA and fewer revisions at the proof stage. Congratulations to Regina Przygocki, Rachel Lodder, and Heather Carlo (our in-house graphics team) for taking on this new challenge so successfully.

E. Data sharing

Effective with the 2005 submissions, we have announced that the editors and publisher expect authors to make their data available. More recently, we have encouraged authors to take advantage of ESA's new Data Registry for depositing metadata. Soon, we will include Data Registry information in published papers.

Table 2. Geographic sources of papers.

	Country	No. MSS	Acc. (%)
1	United States	1027	34
2	Canada	159	27
3	United Kingdom	88	26
3	Australia	86	28
5	China	78	0
6	Spain	62	15
7	Germany	52	19
8	France	47	28
9	Japan	43	9
10	Sweden	41	17
11-50	All others	335	19

Fig. 1. Submitted MSS

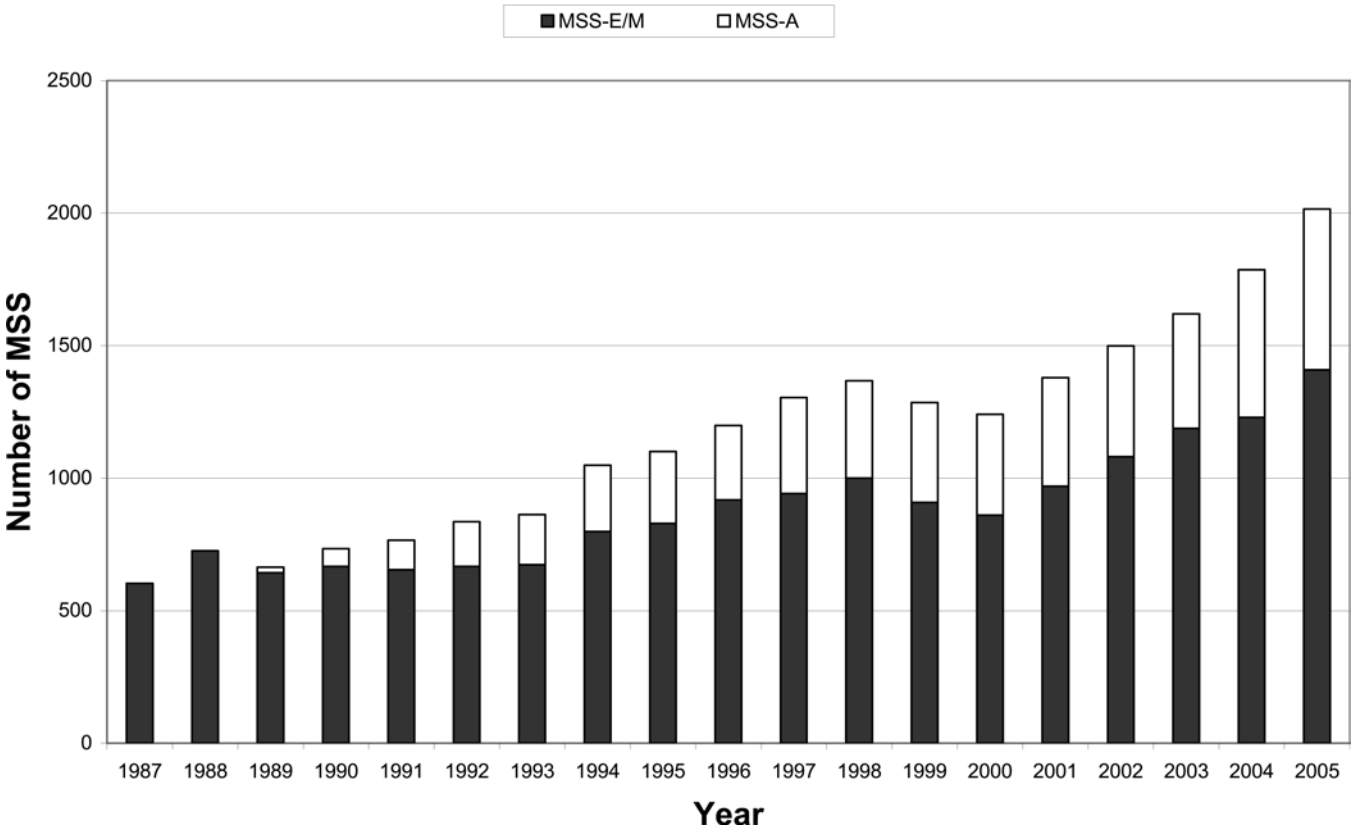


Fig. 2. Acceptance Rates

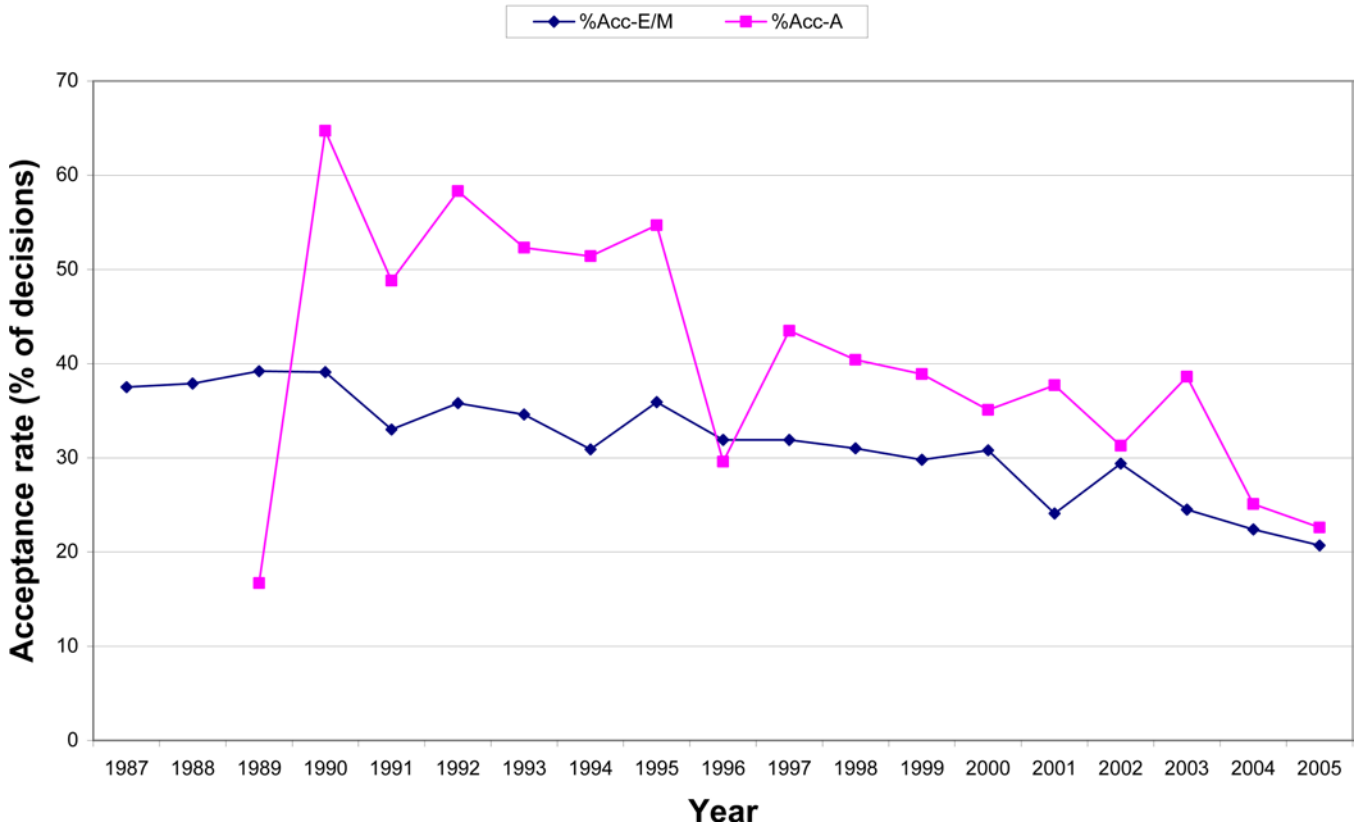
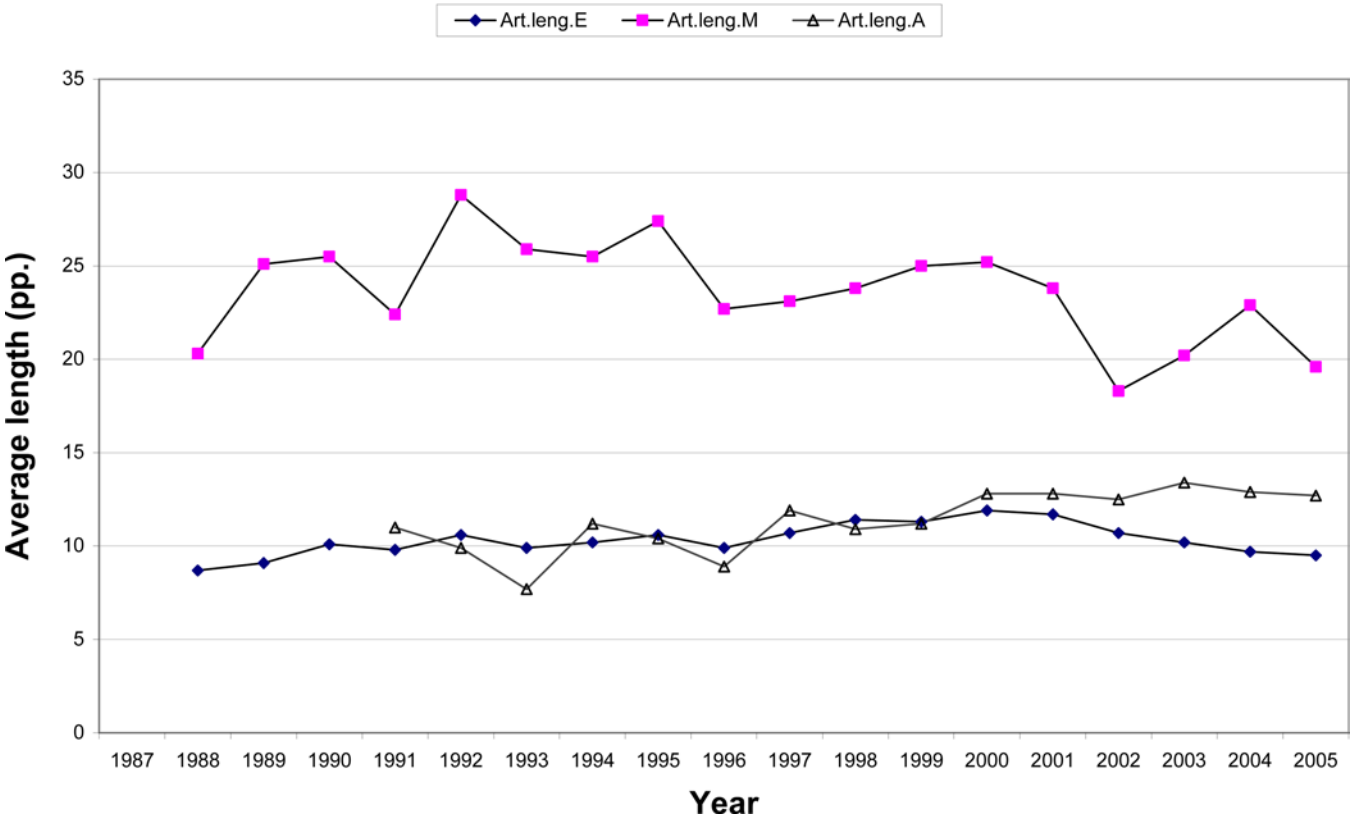
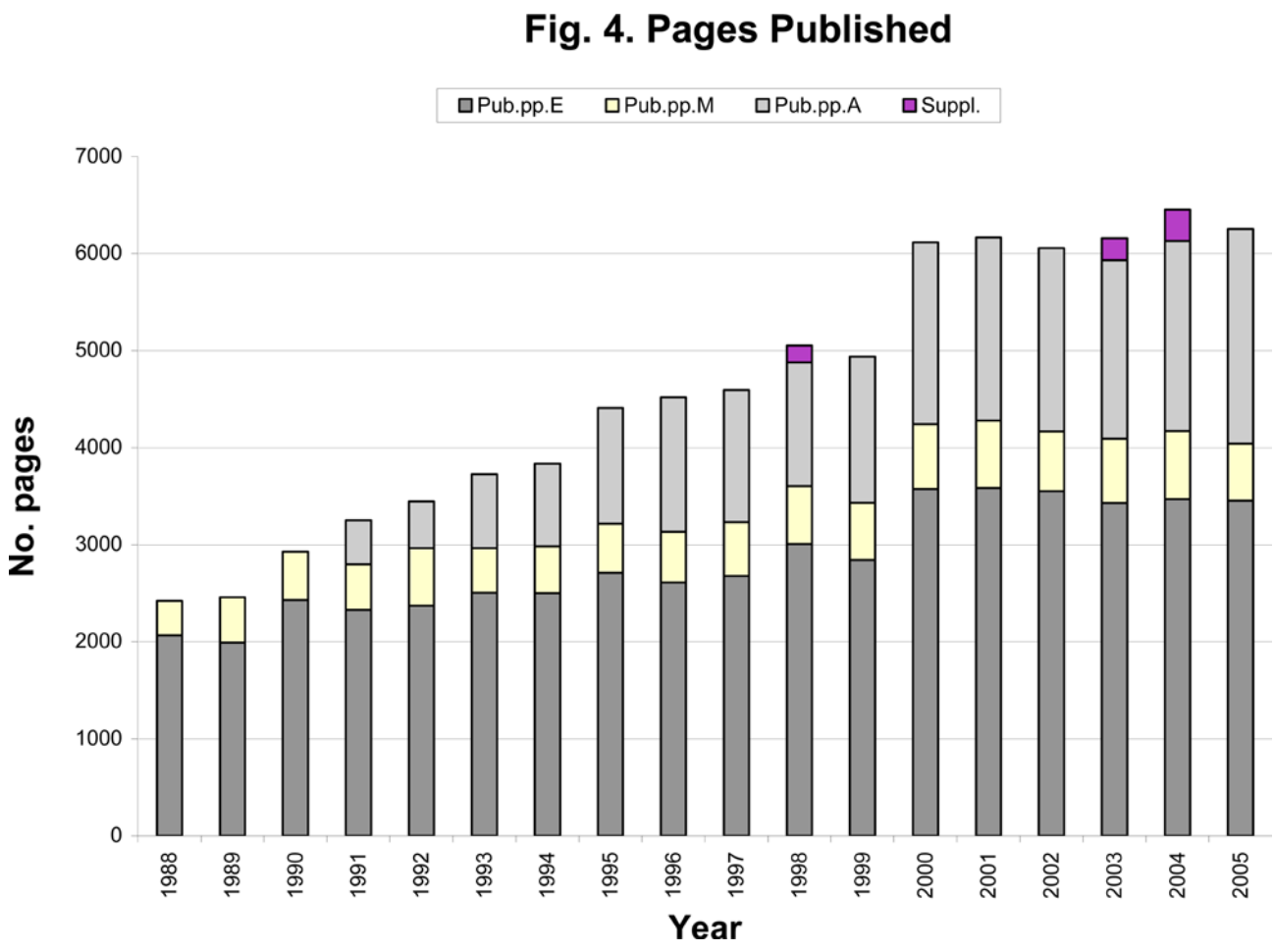


Fig. 3. Article Length





F. Submissions to ESA journals from outside the United States

ESA's journals attract submissions from many countries outside the United States. In fact, the corresponding authors for only about 50% of papers submitted during 2005 had a U.S. institutional affiliation. Table 2 lists the numbers of submissions (and acceptance rates) by country of the corresponding author for the 10 countries accounting for the most manuscripts submitted to ESA journals during 2005.

G. Acknowledgments

The quality of ESA's publications is the result of hard work by an extremely talented and dedicated staff in the Publications Office: Jane Bain (Data Archive Manager and Features Editor), Gail Blake (Copy Editor), David Gooding (Associate Managing Editor), Dooley Kiefer (Copy Editor), Rachel Lodder (Copy Editor), Regina Przygocki (Graphics/Production Editor), Jane Shaw (Office Manager), Margaret Shepard (Technical Editor), Nancy Sorrells (Copy Editor), Heather Carlo (Office Assistant), Linda Stoddard (Editorial Assistant), and Anne Marie Whelan (Publications Coordinator). We are also indebted to our freelance copy editors (Ellen Cotter, Tracey Cranston, Paula Douglass, Nancy Istock, Nancy Kleinrock, and Anita Seaberg) for their fine work and adherence to deadlines.

David Baldwin, Managing Editor

II. REPORTS OF OFFICERS

REPORT OF THE VICE PRESIDENT FOR EDUCATION AND HUMAN RESOURCES

Awards Committee

Slate of awardees

The ESA awards subcommittees met virtually during the fall and winter to select a slate of awardees to be recognized at the 2006 Annual Meeting in Memphis. Dr. Judie Bronstein and her committees did an outstanding job again this year. Dr. Bronstein's term as chair will be completed in August 2006. Dr. Margaret Palmer has been appointed to chair the Awards Committee from August 2006 to August 2009. I wish to acknowledge the excellent work and service of Dr. Bronstein over the past 3 years of her term, and the innovations she has introduced to the process of reviewing nominations and honoring the award recipients at the Annual Meeting. The following individuals were recommended and approved for ESA awards:

Eminent Ecologist: Daniel Simberloff

Distinguished Service Citation: Margaret Palmer

Odum Education Award: Claudia Lewis

Cooper Award: Steve Hubbell

Corporate Award: Strauss Family Creamery

Mercer Award: Anurag Agrawal

Honorary Member Award: Suzanne Milton

Sustainability Science Award: Millennium Ecosystem Assessment Team

MacArthur Award: Alan Hastings

Following in the tradition established in 2002, posters honoring ESA awardees will be displayed throughout the meeting, and then on the ESA web site at ‹http://www.esa.org/education/whatdoecologistsdo.htm›

Education and human resources at the Annual Meeting

Education and Diversity initiatives and meetings are well represented at the Annual Meeting in Memphis in 2006. In addition to the many mixers, business meetings, and SEEDS events, 1 symposium, 12 workshops, 3 special discussion sessions, and 2 contributed paper sessions and 1 poster session related to this topic are scheduled.

EHRC theme events. The EHRC theme for the Annual Meeting in Memphis is "Celebrating 10 years of SEEDS." This theme will tie activities together for the Diversity Mixer and the Diversity Luncheon.

Profiles of Ecologists. Following in the tradition established in 2002, selected ecologists plus the 2006 award winners have been invited to contribute biographical sketches for the "Profile of Ecologists" Project. Posters prepared for display during the meeting will feature the stories of how these ecologists entered their careers in ecology, and their views on communicating ecology to diverse audiences. These posters will be added to the "Profiles" link on the ESA web site at ‹http://www.esa.org/education/whatdoecologistsdo.htm› to inspire and motivate both current and future ecologists to excel in the field.

Luncheon. Carol Brewer will address the topic, "Who's in the Club? Diversity in the Field of Ecology," where she will discuss the results of the recently completed "Profiles of Ecologists" survey.

Education and Human Resources Committee

In all of the efforts described below, staff support at ESA Headquarters, especially from Jason Taylor and his staff in the Education Office, has been outstanding.

Representatives of the EHRC met in Washington, D.C. in March 2006. For one day of the meeting, EHRC met in conjunction with the ESA Public Affairs Committee. Both Committees visited congressional representatives and learned more about the Congressional Fellows program, as well as congressional staff viewpoints on how ESA can better communicate ecological science to Congress.

The committees also deliberated on ways they could work together to enhance the ESA's education and outreach initiatives.

EHRC received the "Profiles of Ecologists" report summarizing the results from the survey of the ESA membership. The committee developed a plan for disseminating the results of this survey within and beyond the ESA. EHRC also received the data from the recently completed survey "On the Status of Education in the Undergraduate Curriculum." The Committee developed a plan for finalizing a report from this survey and disseminating the results to the ESA membership.

Education and diversity initiatives are alive and well and prospering in the ESA!

At the 2006 Annual Meeting of the ESA, I will rotate out of the office of Vice President for Education and Human Resources after six years of service. During this time, I have been privileged to work with the many members of the Governing Board, the excellent staff at the ESA headquarters, and scores of dedicated committee members and volunteers. Because of the leadership, passion, hard work, and service of these members of the ESA, the profile and impact of education and diversity initiatives within the ESA and the field of ecology has continued to grow. Some of the substantive endeavors and accomplishments of the EHR Committee and working groups during the last six years include: advocating successfully for a senior staff level position for education and diversity; working with Governing Board Members-at-Large to promote translating some of the *Issues in Ecology* into Spanish; bringing education and diversity perspectives into science symposia; implementing joint activities with the Vice Presidents for Public Affairs and Science and their standing committees; initiating the "Profiles of Ecologists" series and posters for the Annual Meeting and ESA web site; broadening the types of workshops and discussions related to education and diversity at the Annual Meetings; working with ESA journal editors to foster publication of manuscripts on education and diversity in the ESA's journals; and shepherding the expansion of the SEEDS program to Tribal Colleges and Hispanic-serving campuses. Moreover, during this period two major reports were completed, the "Women and Minorities in Ecology II" and "Profiles of Ecologists: Results of the 2005 Survey of the Membership of the Ecological Society of America." These documents will guide the next decade of education and diversity initiatives within the ESA. I would like to extend a hearty thanks to all of the members who have volunteered their time to bring these initiatives to fruition and completion. Finally, it truly has been an honor and a pleasure to serve as a Vice President of the ESA, and I look forward to supporting the work of the Society in the years to come.

Submitted by:

Carol Brewer
Vice President, Education and Human Resources

III. REPORTS OF STANDING COMMITTEES

AWARDS COMMITTEE

The Awards Committee consists of the Chairs of nine active subcommittees. Each subcommittee is responsible for making recommendations for its own award(s). The compositions of the subcommittees and the recipients of the respective awards for 2005-2006 were:

Student Awards (Murray F. Buell and E. Lucy Braun Awards) Subcommittee

Christopher Sacchi (Chair), J. Alan Yeakley, Paul Marino, and Nancy Eyster-Smith.

Recipients from the 2005 ESA Annual Meeting:

Buell (best student presentation): Sean Menke, University of California, San Diego.

Braun (best student poster): Phoebe Zarnetske, Utah State University.

Cooper Award Subcommittee

Stephen T. Jackson (Chair), Sandra Diaz, Yves Bergeron, David Peterson, Miles Silman, Scott Collins, Loretta Battaglia

Recipient:

Steve Hubbell for his 2001 book, *The Unified Neutral Theory of Biodiversity and Biogeography*, Princeton University Press.

Corporate Award Subcommittee

Laura Huenneke (Chair), Gregory Aplet, Scott Stoleson

Recipient:

The Strauss Family Creamery.

Eminent Ecologist Award and Distinguished Service Citation Subcommittee

Paul K. Dayton (Chair), Carla D'Antonio, Robert Holt, Nelson Hairston, Jr., Kay Gross, Peter Groffman.

Recipients:

Eminent Ecologist: Daniel Simberloff, University of Tennessee.

Distinguished Service Citation: Margaret Palmer, University of Maryland.

Honorary Member Award Subcommittee

Sandy Tartowski (Chair), Michael Auerbach, Jayne Belnap, Denise Breitburg, Deborah Clark, Denise Dearing, Steven Hamburg, Janet Lanza, and Richard Ostfeld

Recipient:

Suzanne Milton of the University of Stellenbosch, South Africa.

MacArthur Award Subcommittee

Robert K. Colwell (Chair), Carla D'Antonio, Judy Meyer, Ann Kinzig, Jim Reichman, Bill Murdoch, Steve Carpenter.

Recipient:

Alan Hastings, University of California, Davis.

Mercer Award Subcommittee

Ellen Simms (Chair), Jean Richardson, Sally Holbrook, Andy Sih, and James Morris

Recipient:

Anurag Agrawal for his 2004 paper, "Resistance and susceptibility of milkweed: competition, root herbivory and plant genetic variation," *Ecology* 82(8): 2118–2133.

Odum Education Award Subcommittee

Charlene D'Avanzo, (Chair), Margaret Carriero, Margaret Lowman, and Alan Berkowitz

Recipient:

Claudia Lewis, Director of Education for Pinellas County, Florida.

Sustainability Science Award Subcommittee

Terry Chapin (Chair), Kathy Cottingham, Carl Folke, Gary Kofinas, Garry Peterson, and Matthew Wilson.

Recipients:

The Millennium Ecosystem Assessment team for their 2005 book, *Ecosystems and Human Well-Being: Synthesis*, Island Press.

This is my last year as chair of the Awards Committee. I will be replaced this fall by Dr. Margaret Palmer.

Submitted by:
Judith L. Bronstein, ESA Awards Chair

BOARD OF PROFESSIONAL CERTIFICATION

The Board of Professional Certification (BPC) worked throughout the 2005–2006 year to advance the goals of the Ecological Society of America's (ESA) professional certification program and promote certification among ecologists. Gary W. Barrett completed his term as chair of the BPC at the ESA Annual Meeting in Montreal, Quebec. Diane E. Wickland began her term as Chair of the BPC for 2005–2006 immediately thereafter, as did William K. Michener as Chair Elect.

The Evening Session sponsored by the BPC at the Montreal meeting, "Quick Response to Natural Disasters," was well received and lauded for treating a most timely topic. Featured speakers were D. Peters, B. Hayden, and M. Sanjayan.

The BPC held a business meeting on 10 August 2005, in Montreal. Topics discussed were: the status of pending 2005 professional certification applications, the budget for BPC activities, future plans for the professional certification display and newsletter, and topics for a proposed 2006 Evening Session at the ESA Annual Meeting. The BPC tentatively agreed to propose an Evening Session focused on scientific assessments and ethical issues. The BPC members whose elected terms were ending in 2005, Patricia Flebbe and Gary Barrett, were thanked for their service on the BPC.

During the autumn of 2005, it was discovered that one application for professional certification in 2005 was lost at ESA Headquarters and never evaluated by the BPC. The BPC caucused and decided not to set a precedent for reviewing applications on an ad hoc basis. It recommended that the ESA extend the applicant's current certification for one additional year and that the application be resubmitted for the 2006 review. This was done.

Carolyn Hunsaker and Reed Noss were elected by the ESA membership to serve on the BPC starting 1 January 2006. On 9 May 2006, Reed Noss resigned from the BPC, explaining that a new appointment must take priority for his time. On 11 May 2006, Katherine McCarter informed the BPC that the ESA nominations committee had made plans to elect a replacement to complete the remainder of Noss's term (through 2008) in the ESA election for 2007.

The BPC met at ESA Headquarters on 23 May 2006 to review applications for professional certification and recertification. A total of 126 applications for professional certification was received by ESA in 2006; this is a substantial increase over the 74 applications received in 2005. There were 65 applications for new certification and 61 for recertification. These included 10 for Associate Ecologist, 38 for Ecologist, and 78 for Senior Ecologist. Of the Senior Ecologist applications, 41 used the streamlined application process. The BPC requested additional information from 15 applicants prior to completing its review of their applications. Of these, 7 were applications in which the applicant's CV did not provide dates for relevant experience, making it impossible to assess professional experience in the past 5 years. Two applications for certification were denied and 124 were approved. Of the approvals, two applications were approved at a higher level than requested and one was approved at a lower level. The BPC was impressed and pleased with the high quality of applications in 2006 and the responsiveness and professionalism of those contacted for additional information.

A brief BPC business meeting followed the review of applications on 23 May 2006. Several actions were recommended: (1) the BPC should encourage the ESA to move to an all-electronic application process as soon as feasible, (2) the BPC should ask ESA Headquarters to explore ways to remove personal and financial information from the applications before distributing them to the BPC members for review, (3) the BPC noted some inconsistencies in regard to reference requirements between the pdf and Word application forms and recommended they be corrected, and (4) the BPC recommended that some confusing language in the description of the streamlined application process on the ESA web site be revised to clarify that streamlined applications are subject to the same

rigorous review process as other applications, and also to make it clear that professional activity within the past 5 years must be highlighted in the application.

The BPC made plans for an e-mail announcement of the 2006 Evening Session to be sent to all certified ecologists and to update the professional certification display for the 2006 ESA meeting. It was noted that the BPC would benefit from additional members who work in environmental consulting, and discussed ways to get such ecologists on future ballots. Carolyn Hunsaker was selected to become the new Chair Elect for the BPC.

The 2006 BPC-sponsored Evening Session is scheduled for Monday, 7 August. The title is: "Scientific assessments as upstarts in ecology: ethical considerations for ecologists." Confirmed speakers are: J. Melillo, A. King, D. Schimel, and J. Collins. A BPC Board Meeting will be held on Wednesday, 9 August.

The BPC received strong support of its activities from the ESA office in 2006, and in particular, is highly appreciative of the competency, professionalism, and hard work of Rachel Dellon in her direct support of the BPC.

Submitted by:

Diane E. Wickland, Chair
William K. Michener, Chair Elect
David Breshears
Carolyn Hunsaker
Jeffery Klopatek
Rebecca Sharitz

Abstracts/sessions	Portland	Montréal	Memphis
Total abstracts accepted	2722	3361	2226
Abstracts submitted by category:			
Symposia	195	198	235
Organized oral session	298	499	153
Contributed oral session	1326	1767	1080
Poster	915	1126	758
Number of sessions:			
Symposia	24	24	24
Organized orals	36	53	14
Contributed orals	142	169	115
Poster	37	38	26
Special sessions	5	15	10
Workshops	21	36	26
Evening sessions	21	20	16
Ticketed events	10	9	9
Field trips and tours	18	12	13
SEEDS	9	10	11

Table 1. Size of the 2006 Memphis Meeting compared to the 2004 Portland and 2005 Montréal Meetings. These numbers are based on mid-July reports for all meetings.

MEETINGS COMMITTEE

Status of the 2006 Memphis ESA Meeting

The meeting this year is smaller than either of the past two meetings. The 2005 Montréal meeting was especially large as it was a joint meeting with INTECOL. However, the overall trend of increasing meeting size over the past several years appears not to have continued with this year's meeting.

1) Symposia and Organized Oral Sessions

We received 38 Symposium proposals and 7 Organized Oral Session (OOS) proposals (both numbers were down significantly from the past two years). We basically followed the same procedure used as the previous year, with Symposium proposals being reviewed by Section and Chapter Chairs, the 2005 Program Co-chairs, the 2006 and 2007 Program Chairs, and the Program Assistant. The OOS proposals were reviewed by the Director of Science Programs and members of the Science Program Steering Committee, the 2006 and 2007 Local Host Chairs, the 2006 and 2007 Program Chairs, and the Program Assistant. The final selection of Symposia and OOSs were made by the 2006 and 2007 Program Chairs and the Program Assistant. One change in the process from past years was that the Meeting Planner was not involved.

All 7 OOS proposals were deemed acceptable by the reviewers and the selection committee. The selection of 24 Symposia from the 38 proposals was based on an average of 12 reviews per proposal (with a range of 8–18 reviews). Of the remaining 14 proposals, 11 were considered more suitable as an OOS, and 3 as Evening Sessions. However, 3 of the 11 organizers who offered an OOS withdrew their session, and one organizer could not get a sufficient number of speakers confirmed for an OOS, and so had to cancel his session. Thus, the final number of Organized Oral Sessions was 14.

2) Contributed Oral And Poster Sessions

A) Following extensive discussions among members of the Meetings Committee and the Governing Board, we made a significant change this year in the information requested from submitters to help in allocating their abstracts to sessions. The new system of selecting 3 of 5 thematic categories ranked in order of priority (with associated descriptive key words) greatly simplified the allocation process and allowed us to generally place presenters as they requested. The result was that, of the 2241 contributed abstracts accepted, we received only seven complaints from contributors who were dissatisfied with the type of session in which they were placed. Of those seven, we were able to reallocate five into their preferred sessions.

B) The 1080 abstracts for contributed oral sessions were assigned to 115 sessions (with a small number being assigned to the mandatory available slots in the 14 Organized Oral Sessions) and the 758 poster abstracts were assigned to 26 poster sessions.

C) We continued with last year's innovation of scheduling two brief orientation sessions for volunteer presiders of the Contributed Oral Sessions.

3) Workshops, Special Sessions, and Evening Sessions

Proposals for these sessions were reviewed by the 2006 and 2007 Program Chairs and the Program Assistant.

4) Local Host Committee

The Local Committee chaired by Scott Franklin organized an exciting program of 13 field trips and tours. The Local Host Chair also participated in the proposal review process.

5) New events

A) With the help of Val Smith from Kentucky University, we initiated a new nonticketed Undergraduate Student Welcome and Mixer that will involve a welcome from the ESA President, Nancy Grimm, and brief words to the students from the Program Chair, Jason Taylor (SEEDS), Val Smith (REU Travel Awards), Liz Harp (Student Section), and Kerry Woods (2007 Program Chair). The intent is to make undergraduate students feel welcome at the meeting, to encourage them to continue in the field of ecology, and to allow

them to meet their peers in a small-group setting.

B) Due to popular demand, we have added a "Musicians Central" room available every day for musicians. In addition, there is time scheduled for a performance on Tuesday evening entitled "An Evening Of Music And Ecology."

6) Symposia Reports in the ESA Bulletin

The Editor-in-Chief of the *ESA Bulletin*, Ed Johnson, also invited a selected number of symposium organizers to prepare a summary of their sessions after the meeting for publication in the *Bulletin*. All those contacted agreed to submit a report.

7) Issues with Allen Press

This was the final meeting that would involve Allen Press (AP) for proposal and abstract submissions as well as for printing of the program. AP was no longer interested in maintaining and supporting the abstract submission software. As a result, it was difficult to make whatever changes were required on the submission site to make the new system of submission categories work optimally. Furthermore, while we were able to submit the completed program ahead of schedule, AP was considerably behind schedule in providing the program galleys for proofing, giving us insufficient time for proper proofing.

ESA 2007 Meeting in San Jose

Plans for the 2007, 92nd Annual Meeting of the ESA are underway. The theme for this joint meeting with the Society for Ecological Restoration is "Ecology-based Restoration in a Changing World." The meeting is being co-chaired by Kerry Woods (ESA) and Bill Halvorson (SER), with Rachel O'Malley as the Local Host Chair. The Call for Symposia and OOS Proposals on the San Jose Meeting web site were posted in early July.

Meetings Committee

The meetings committee is co-chaired by Steve Chaplin and Kiyoko Miyanishi for the current Annual Meeting. The committee is composed of all future, current, and immediate past program chairs and local hosts.

The committee researched the options for making travel to the Annual Meeting carbon neutral by offering attendees the opportunity to voluntarily contribute funds to offset the emissions they create. The committee recommended a set of criteria to choose appropriate organizations to receive the donations, and recommended we provide links to the Carbon Fund and the Sustainable Travel International on ESA's registration web site.

During 2006 site visits were made to Austin, Texas, and Charlotte, North Carolina as potential sites for future ESA Annual Meetings. Austin is being considered for the 2011 meeting and Charlotte for the 2011, 2012, or 2013 meetings. A report and recommendation from the Meetings Committee will be made to the Governing Board at their August meeting.

Issues on the current agenda for the Committee include: redefining the period when the Program Chair will serve as co-chair of the Meetings Committee, providing input during the review of meetings staff, implementing new ideas such as "Recent Advances" sessions, review of carbon neutral ideas, and criteria for the selection for future Annual Meeting sites.

Personnel notes and acknowledgments

In July 2005, Devon Rothschild was hired as Program Assistant and in October 2005, Michelle Horton was hired as the new Meetings Planner to replace Ellen Cardwell. Thus, the three core people involved in planning this year's meeting in Memphis were all on a steep learning curve when meeting preparations began in earnest last fall. Despite this, planning and preparations for the meeting went remarkably smoothly, thanks to Devon and Michelle. The 2006 Program Chair is extremely grateful to them for making the job of Program Chair much easier and more manageable. The involvement of the 2007 Program Chair, Kerry

Woods in many aspects of this year's program planning, especially in the selection process for Symposia and Organized Oral Sessions, is also gratefully acknowledged. Finally, past Program Chairs Tom Swetnam, Paul Ringold, and Becky Sharitz provided helpful advice and guidance to the current Program Chair.

Submitted by

Kiyoko Miyanishi and Steve Chaplin
Co-Chairs Meetings Committee

PROFESSIONAL ETHICS AND APPEALS COMMITTEE

The Professional Ethics and Appeals Committee (PEAC) remains a viable committee even though no appeals or ethical issues have been brought to the committee this year.

PUBLICATIONS COMMITTEE

The Publications Committee commissioned a review of the Editor-in-Chief of *Ecology* and *Ecological Monographs*, which will be completed in time for the November Governing Board meeting. Bill Murdoch asked to be replaced as Editor for *Issues in Ecology*, and the replacement process has begun.

ESA instituted a data registry associated with articles in its journals. This effort was initiated by the Publications Committee, starting in 2003, and has been activated through efforts by the Headquarters Office and the Publications Office.

The Publications Committee continued to monitor issues pertaining to data access, especially as it relates to the journals of the Society. Assistance was provided to the Headquarters staff and Board members as they addressed journal pricing issues pertaining to electronic and paper access for libraries. This continues to be a rapidly changing phenomenon.

At the request of the Governing Board, the Publications Committee provided a suite of issues for consideration by the Society in regard to publications. Perhaps the most important recommendation was that ESA join with other, similar, societies to secure professional advice on the future of electronic and open access publications, including how authors and readers (and not just the societies as publishers) view the issue, and what impact this might have on the Society and its journals.

I am stepping down as Chair of the Committee, to be replaced by Scott Collins. It has been a pleasure serving the Society, Staff, and the Governing Board.

Submitted by:

Jim Reichman, Chair
Publications Committee

Committee Members: Emily Bernhardt, John Briggs, Aaron Ellison, Susan Harrison, Laura Huenneke, Nancy Huntly, Steve Jackson, Alan Knapp, Robert Peet, David Roberts, and Sam Scheiner

SHREVE/WHITTAKER AWARDS COMMITTEE

The Shreve/Whittaker Awards Committee is responsible for soliciting, reviewing, and making these awards. This year the committee chose to fund Dr. Laura Bellis at Universidad Nacional de Córdoba in Argentina for the Whittaker award. Her proposal was to study avian diversity in forests with Dr. Volker Radeloff at the University of Wisconsin, Madison. The committee chose to fund two proposals for the Shreve award. The first is Andrea Campanella at the Jornada Basin LTER, who plans to study desert rodent diversity along desert ecotones. The second is Joanna Redfern at the University of New Mexico, who will study the phylogeography of Ocotillo.

The committee received eight Whittaker applications and four Shreve applications. Although notices were disseminated in several ways, via e-mail and web sites, the committee would like to see the number of applicants increase.

The committee is also contemplating the addition of a luncheon at the Annual Meeting for awardees

of both awards to discuss their research progress.

The committee has changed its chairperson in the past six months. Wendy Anderson (Drury University) has resigned and Michael Peek (William Paterson University) has agreed to chair. The committee consists of six other members: Drew Talley (University of California, Davis); Clive Jones (Institute of Ecosystem Studies), Walter Whitford (New Mexico State University), Jonathan Chase (Washington University); Julian Nathaniel "Nat" Holland (Rice University), and Doug Kelt (University of California at Davis). Dr. Whitford has indicated his desire to step down; the committee will solicit a replacement.

Submitted,
Michael S. Peek

IV. REPORTS OF SECTIONS

APPLIED ECOLOGY SECTION

About the Applied Ecology Section

The Applied Ecology Section of ESA is the second largest and the third oldest of the active sections within this Society. The Section was established in 1971 and has a twofold purpose: (1) to facilitate communication of the application of ecological principles to the solution of practical environmental problems, and (2) to encourage liaisons with specialists in policy, administration, planning, health, agriculture, and natural resource management who use ecological principles in the resolution of their problems.

Mixer and Business Meeting ESA Annual Meeting, Memphis, Tennessee

The Applied, Agroecology, Rangeland, and Long-Term Studies Sections are planning a joint mixer for the 91st ESA Annual Meeting in Memphis, Tennessee, 6 –11 August 2006. The mixer will be held on Wednesday, 9 August. The Applied Ecology Section will hold its business meeting following the mixer. We will review the past years' business and accomplishments, as well as discuss the future direction of the Section.

Elections
Results of the elections for officers for 2006–2008 are as follows:

Chair
Shibu Jose, Ph.D., Associate Professor of Forest Ecology
School of Forest Resources and Conservation
351 Newins-Ziegler Hall
PO Box 110410
University of Florida
Gainesville, FL 32611-0410
(352) 846-0872
E-mail: sjose@ufl.edu

Vice Chair
Scott Roberts, Associate Professor
Department of Forestry
Box 9681
Mississippi State, MS 39762-9681
(662) 325-3044
E-mail: sroberts@cfr.msstate.edu

Secretary
Becky Kay Kerns, Research Ecologist
Western Wildland Environmental Threat Assessment Center
USDA Forest Service, Pacific Northwest Research Station
3160 NE 3rd Street
Prineville, OR 97754
(541) 416-6602
E-mail: bkerns@fs.fed.us

Student Travel Award

The Applied Ecology Section will support students in their efforts to present their work at the 91st ESA Annual Meeting in Memphis, Tennessee, 6–11 August 2006.

This year's scholarship recipient is Sean Michaletz, Department of Biological Sciences, University of Calgary. The award this year is $750.

Submitted by:

Martin Spetich

AQUATIC ECOLOGY SECTION

The Section continues to concentrate its efforts on awards that support and recognize graduate student researchers. Below we summarize this year's activities.

Awards

Detailed information on awards presented by the Aquatic Ecology Section can be found on the ESA web site at: ‹http://www.esa.org/aquatic/awards.html›

The Aquatic Ecology Section is providing two travel awards to help student members attend the 2006 Annual Meeting in Memphis. One award was turned down. The awards are for $150 and will be presented to the following students at the Business Mixer:

Ben Koch, University of Wyoming
Michael Heck, USGS

The 2005 Thomas M. Frost Award for Excellence in Graduate Research was awarded to:

James Vonesh for his paper "Complex life cycles and density dependence: assessing the contribution of egg mortality to amphibian declines," published in *Oecologia* (133:325–333). In this paper, James and co-author Omar De la Cruz used demographic models to demonstrate that post-embryonic factors should not be overlooked in studies of amphibian population declines. This paper is just one of several outstanding publications resulting from Dr. Vonesh's dissertation research done at the University of Florida under the direction of Craig Osenberg.

Previous Frost Award winners

2004–Thomas Okey, Moss Landing Marine Laboratories
2003–Cynthia Kolar, University of Notre Dame
2002–Jon Shurin, University of Chicago

Current officers of the Aquatic Ecology Section

Chair (2005–2007)
Orlando (Ace) Sarnelle
Department of Fisheries and Wildlife
Michigan State University
East Lansing, MI 48824-1222
(517) 353-4819
E-mail: sarnelle@msu.edu

Vice-Chair (2005–2007) and Chair-Elect (2007–2009)
Daniel Schindler
School of Aquatic and Fishery Sciences
University of Washington
Seattle, WA 98195
(206) 616-6724
E-mail: deschind@u.washington.edu

Secretary (2005–2007)
Maria Gonzales
Department of Zoology
Miami University, Oxford OH 45056
(513) 529-3189
E-mail: gonzalmj@muohio.edu

Communications Editor (1999–present)
Chris Swan
Department of Geography and Environmental Systems
University of Maryland, Baltimore County
Baltimore, MD 21250
(410) 455-3957
E-mail: cmswan@umbc.edu

Submitted by:

Orlando Sarnelle
Chair, Aquatic Ecology Section

ASIAN ECOLOGY SECTION

In the past year (2005–2006), AES has contributed to promote collaboration and information exchange between American and Chinese ecologists. We focused on several activities including the translation of ESA recent key documents and important papers of ESA journals into Chinese, and assisted several meetings and workshops between American and Chinese ecologists. AES expects that the Chinese versions of ESA documents will benefit research, policy, and stra-

tegic plan development, and decision making in ecological and environmental sciences in China.

AES worked together with the Sino-Ecologists Association Overseas, the Ecological Society of China, and the Key Lab of System Ecology of Chinese Academy of China on the translation of New Millennium EcoVision Report, the Special Issue (Volume 3, 2005) of *Frontiers in Ecology and the Environment,* the 21st Century Vision and Action Plan for ESA; and two *Science* and *Nature* papers. The Chinese version of the Report is at ‹www.frontiersinecology.org/›

ESA has recently reached an agreement with the Chinese Government to make all ESA journals accessible to institutions in China. AES assisted ESA's efforts on the Chinese version of the ESA web site ‹http://www.esachina.cn/›

AES assisted the *Journal of Plant Ecology*, a leading peer-reviewed journal of plant ecology in China, to organize a task force consisting of mostly graduate students to translate the table of contents of four ESA journals into Chinese. These journals are *Ecology*, *Frontiers in Ecology and the Environment*, *Ecological Applications*, and *Ecological Monographs*. The Chinese versions of these journals can be visited at ‹www.plant-ecology.com/cn/dgml.asp›

AES also helped the translation of three important papers in *Issues in Ecology.* The Chinese versions of these papers are posted at ‹www.esa.org/science/Issues›

Submitted by:

ShiLi Miao, Chair
Asian Ecology Section

BIOGEOSCIENCES SECTION

The Section has grown further during 2005–2006, and now consists of 329 active members. We recently held an election; the new Chair is Alan Townsend (University of Colorado); the new secretary is Emily Berhnardt (Duke Univversity). In addition, the Section supported a symposium led by Adrien Finzi for the 2006 ESA Annual Meeting.

Submitted by:

Lars Hedin, Past Chair
ESA Biogeosciences Section

EDUCATION SECTION

Members of the Education Section continued to be active in many diverse areas during the 2005–2006 year. The Section continued to grow, and more educational resources were made available by the membership to the Society to enhance effective teaching and learning. The Annual Meeting in Montreal was well attended, with a tremendous diversity of educational workshops, papers, and poster presentations. At the annual business meeting/mixer, two areas of concern were presented by the outgoing chair, Kathy Williams, as potential areas of focus for the coming year. Each was strongly supported by those in attendance. These included support of the teaching of evolution in school curricula instead of intelligent design, and the use of outside activities for experiential learning by children. The theme of "No Child Left Inside" was voted to become one of our focus areas as we strive to prepare students for careers in ecology and to be informed citizens.

At the Montreal meeting, Charlene D'Avanzo and Michael Mappin organized an education discussion group called: "Scientific teaching in ecology education: what is it, why do it, and how can we help faculty succeed at it?" This was very successful at generating focus groups for further discussion, and will be continued at the Memphis meeting. These included nine areas: (1) The need for standards. What do we want them to know/do?, (2) Issues of diversity in class, (3) Public understanding of ecology, (4) Literature review research base on cognition in ecology, (5) Distance learning, (6) Field work and Instructional Technology, do they work?, (7) Diagnostic assessment tools, (8) Course design: how best taught and how to assess, (9) Other ideas including: a workshop on research in education methodology, IRB—meeting their

needs, and research ethics/human subjects.

Members of the Section continue to be involved in many ongoing highly successful activities including areas such as TIEE, SEEDS, Syllabus Exchange, Ecology 101, and EcoEdNet. In addition, David Kirschtel has developed a new web site for the Section with links and resources to improve communication within the Section. It can be found at: ‹http://www.esa.org/educationsection/› or linked from the ESA Education Page under Resources for Educators.

Finally, the AAAS sponsored a workshop on "Challenges and Opportunities in Teaching and Learning about Evolution and the Nature of Science" at their February 2006 meeting in St Louis, Missouri. Representatives of the Education Section provided information in response to a series of discussion questions concerning the Society's activities in this area, in support of this workshop.

Submitted by:

Bob R. Pohlad, Chair
Education Section

LONG TERM STUDIES SECTION

The Section held its business meeting on 9 August 2005. Scott Collins (University of New Mexico) replaced Mark Stromberg (UC Berkeley) as Chair. John Briggs (Arizona State University) was appointed Vice Chair, and Brian Kloeppel (University of Georgia) and Randy Balice (Los Alamos National Laboratory) were appointed Councilors-at-Large. The group approved the minutes of the 2004 business meeting. We co-hosted a mixer with the Rangeland and Applied Ecology Sections at the 2005 ESA meeting, and similar arrangements have been made for the 2006 ESA meeting in Memphis. Members of the Section discussed the possibility of developing bylaws, but no formal bylaws have been produced to date. We continue to investigate the need for more formal proceedings, and are using the Vegetation Section as a model. Recently, the Section web site was updated, and the James T. "Tom" Callahan travel award was resurrected to provide partial support for one or two graduate students to attend the ESA meeting and present a paper or poster derived from long-term data. Applications are to be sent to the Chair of the Long Term Studies Section.

Submitted by:

Scott Collins

PALEOECOLOGY SECTION

The Paleoecology Section held its annual business meeting during the 2005 ESA Annual Meeting in Portland, Oregon. Robert Booth chaired the meeting. Elections for the 2005–2006 officers were held. Sara Hotchkiss moved from vice chair to chair, Sarah Finkelstein was elected vice chair, Jason McLachlan will continue as secretary, and Jason Lynch will continue to chair the Deevey Award Committee. Our e-mail newsletter continues to reach over 200 members.

The paleoecology oral and poster sessions and discussion sessions at the Annual Meeting in Montreal were well attended and promoted a great deal of discussion. A workshop before the meeting, "Interpreting fire history from sediment records of macroscopic charcoal: theory, analytical techniques, and future directions," was very successful, attracting new people to the ESA meeting and promoting active discussions that continued through the entire week. An evening discussion session was also held, on "Testing ecological hypotheses with paleo-data."

The Section sponsored a symposium entitled "Species range dynamics: past, present, and future," which was very well attended. The symposium was linked with a workshop on "Species range dynamics: integrating phylogeographic, paleoecological, and contemporary data sources," which attracted ecologists from a broad range of subdisciplines and promoted a very lively conversation.

Zoe Finkel, who recently completed her Ph.D at Rutgers University and is now at Mount Allison University in New Brunswick, was awarded the

2005 Edward S. Deevey Award for Outstanding Student Presentation in Paleoecology. Her presentation was entitled "Climatically driven macroevolutionary change in the size of marine planktonic diatoms." Her research considered multiple hypotheses and demonstrated long-term evolutionary changes in diatom size with potential links to global carbon and nutrient cycles.

Phillip Higuera, University of Washington, received honorable mention for his presentation entitled "The relative importance of vegetational vs. climatic controls on post-glacial fire regimes in the southern Brooks Range, AK," coauthored by Linda Brubaker, Patricia Anderson, Feng Sheng Hu, Ben Clegg, and Tom Brown. The Section thanks Jason McLachlan, Bob Booth, Dan Gavin, and Jack Williams for judging the presentations this year, and Jason Lynch for chairing the Deevey Award committee.

The Section discussed possible 2006 symposium proposal ideas and decided that other proposed symposia overlapped substantially with the symposia the Paleoecology Section might contribute. Several ideas having to do with temporal perspective on ecosystems on evolving landscapes were discussed, and it was concluded that since other likely symposium proposals included aspects of Quaternary evolution of rivers in the southern U.S., the Paleoecology Section would do well to contribute to several other symposia rather than hosting one that overlapped with others this year. A discussion was held about possible symposia for the 2007 Annual Meeting.

PHYSIOLOGICAL ECOLOGY SECTION

New Secretary

Jed Sparks took over as Secretary of the Section on 1 January 2006. Jed is an Assistant Professor in the Department of Ecology and Evolutionary Biology at Cornell. Stan Smith continues as Chair of the Section until the end of this year. We are in the process of starting a Call for Nominations and will announce an election for a new Chair at the annual business meeting in Memphis.

Student awards

The recipient of the 2005 W. D. and S. M. Billings Award, given in recognition of the lifetime contributions of Dwight and Shirley Billings to physiological ecology, is Laura Scott-Denton from the University of Colorado. Her presentation "Spatially-explicit modeling of soil respiration rate in a high-elevation, subalpine forest," was co-authored by Russ Monson. The recipient of the 2005 Best Poster Award was Lisa Patrick from Texas Tech University. Her poster presentation, entitled "Responses of net ecosystem carbon and water exchange to a large winter precipitation pulse in a sotol-grassland at Big Bend National Park, Texas," was co-authored by Traesha Robertson, Natasja van Gestel, and David Tissue. Due to an overwhelming preponderance of oral presentations in relation to poster presentations, the judges' committee and officers of the Physiological Ecology Section decided to give two Honorable Mentions for the 2005 Billings Award. Honorable mentions for the Billings Award were Catarina Moura from Duke University and Rachel Spicer from Harvard University.

This year's competition

We currently have 21 entrants for the Billings and Best Poster Award competitions, and a healthy number of Section members (>20) who have volunteered to be judges this year.

Continuing Section prize support

The Section has again received commitments to support the Billings Award in the form of a $500 contribution by the New Phytologist Trust, and Elsevier (Academic Press) will make available a free book of the student's choice (from an AP list of books <$100) to the winners and honorable mentions of the Billings and Best Poster awards.

Support for the Section web site

The Section was awarded funds from the ESA to improve the Section's web site with regard to pedagogy. Russ Monson, as Past Chair of the Section, and

Rob Jackson, as current Section Web Guru, teamed for a proposal that was awarded in 2004 and provided funds for Rob to hire a staff person to contribute to the web site course and teaching sections. Based on that proposal, the class listings were thoroughly updated and now contain links to >80 different courses in physiological and ecosystem ecology and global change. Four brand new pages of links were also added on these topics: Writing Resources; Time Management; Publish or Perish; and Ethics and Professional Conduct. The advent of Blackboard and other proprietary web sites has made locating actual notes and lectures more difficult than it used to be, so if individuals have course material that they would like to share, they should send those links to Rob ‹jackson@duke.edu›, Will Cook ‹cwcook@duke.edu›, or Stan Smith ‹stan.smith@unlv.edu›.

Booth at the Annual Meeting

The Section will again maintain a booth at the Memphis meeting in order to consolidate the Student Awards programs at ESA. The booth will have boxes with ballots and judging information, and will display winning posters shown from the previous year. This enables us to highlight the research that students are doing in the Section, and helps alleviate judging confusion over the Billings, Best Poster, Braun, and Buell Awards.

Annual Meeting Symposia

In 2005, the Section sponsored two organized oral sessions. Howard Neufeld (Appalachian State University) and Nancy Grulke (U.S. Forest Service) organized a session entitled Appreciating the Impacts of Oxidative Stress: From Genes to Ecosystems. Additionally, Stan Wullschleger (Oak Ridge National Lab), Rob Jackson (Duke University), and Todd Dawson (University of California, Berkeley) organized a session entitled Sensors and Sensor Networks in Ecology.

This summer, the Section is sponsoring one Symposium titled Thermal Physiology as a Biogeographic Determinant: Historical and Mechanistic Perspectives, organized by Sarah Gilman (University of Washington), Jonathan Stillman (San Francisco State University), and Joshua Tewksbury (University of Washington). The symposium is scheduled for Thursday, 10 August.

Submitted by
Stanley D. Smith

PLANT POPULATION ECOLOGY SECTION

Summary of Section activities 2005–2006

Student Travel Awards

At the business meeting last year in Montreal, our Section approved extending eligibility for student travel funds to undergraduates. This year, we had numerous excellent applicants for support, all of whom were graduate students. From the pool of eligible applicants, we randomly chose five to receive $200 each to offset the costs of presenting their research at the Annual Meeting. The following students will receive their awards at the annual business meeting in Memphis:

Melanie Barnes, University of New Mexico (advisor Diane Marshall), “The genetics of restoration”

Erika I. Hersch, University of Oregon (advisor Bitty Roy), “Patterns of parasite attack in three species of Castilleja and their co-occurring hybrids”

Kristen Hladun, University of Massachusetts, Amherst (advisor Lynn Adler), “Influence of above and below ground herbivory on pollination and plant reproduction in *Cucurbita moschata*”

Abigail Kula, Kansas State University (advisor David Hartnett), “Nitrogen addition alters ramet demography and reproductive allocation in two caespitose grass species of tallgrass prairie”

Somereet Nijjer, Rice University (advisors Evan Siemann and William Rogers), “Soil feedbacks influence an invasive species in a temperate forest community”

Silent auction

One of the main funding sources for student travel awards comes from the proceeds of a silent auction held in the exhibit hall during the Annual Meeting. We will continue our tradition this year in Memphis. Section members donate crafts or other items of general interest to be auctioned for a (tax-deductible!) donation toward the Section budget. This year, in an attempt to spark additional interest and increase funds available for awards, the Section chair proposed a theme to the auction, inspired by the local culture of the host community. We are encouraging donated items that resemble, suggest, depict, honor, or otherwise acknowledge Elvis Presley, whose home (Graceland) is near Memphis.

Web site upgrades

The Plant Population Ecology Section web site ‹http://plantpop.cas.usf.edu› has recently been updated, thanks to the tireless perseverance of Gordon Fox. In addition to a new look, the user interface has been streamlined, and improvements to the mailing list facilitate communication among Section members. The web site also hosts a forum for discussion of ecological ideas and developments, in a format that encourages dialogue and debate. Gordon updated the host server, as well as its software, and many of the tasks associated with web site maintenance are now automated and should be more stable.

Call for Symposia

Each year, our Section has the opportunity to endorse one symposium proposal. We will discuss symposium ideas during the annual business meeting, and later vote (by e-mail) for one to be considered for the 2007 meeting in San Jose. The theme of next year's meeting is: Ecological Restoration in a Changing World: Tracking a Moving Target.

Agenda for Business Meeting

Our annual business meeting will be held in Memphis on Wednesday, 9 August. The agenda thus far is:

1) Presentation of student travel awards

2) Update on web site upgrades

3) Discussion of symposium ideas

4) Transfer of power (secret handshake) to the new chair (Tiffany Knight) and solicit nominations for a new vice-chair.

5) New business and announcements from the floor

Current officers:

Christopher T. Ivey, Chair (2005–2006)
Department of Biological Sciences
California State University, Chico
Chico, CA 95929

Tiffany Knight, Vice-Chair (2005–2006)
Department of Biology
Washington University
St. Louis, MO 63130

Submitted by:

Christopher T. Ivey, Chair

RANGELAND ECOLOGY SECTION

Revisit 2005 activities at ESA

The Rangeland Section was active at the 2005 ESA Annual Meeting. We sponsored a special session that was well attended, and we had a workshop/discussion following our mixer/business meeting.

Special session: "Delivering on the promise of ecological science to improve land management: Ecological site descriptions"

Co-sponsored with the Society for Range Management. Organizers: Joel Brown and Jeff Herrick. Ecological sites are groupings of soil and landform units that have similar potential to support plant communities, and which respond similarly to disturbances. For each site, a unique Ecological Site De-

scription (ESD) is developed that includes: (1) a description of the ecological processes affecting critical aspects of soil/vegetation relationships, (2) a synthesis of research results and management knowledge to predict site responses, and (3) a discussion of ecosystem services associated with potential stable sites. This special session brought together academic scientists and federal agency leaders charged with management of public and private lands. Presentations covered (1) the utility of ESDs to identify critical research questions, especially related to thresholds and transitions between stable states, (2) the organization, communication and application of relevant research results, (3) identification of key questions of site-scaling behavior and improvement of cross-scale linkages to extend the applicability of ESDs to landscapes and regions, and (4) the utility and practicality of implementing ESDs into land management decisions facing public and private land managers and management agencies.

2005 Evening Session: "Delivering on the promise of ecological science to improve land management: Ecological site descriptions, an informal discussion"

The majority of this session was devoted to an informal discussion on the topic of ecological site descriptions, with applications to improved land management. Organized by Linda Wallace and Sam Fuhlendorf; Wednesday, 10 August. Attendance was quite good with ~30 persons attending. Four primary questions were addressed: (1) What can theoreticians learn from management-oriented questions? (2) What can managers use from the theoretical literature? (3) What are the most pressing issues in land management? and (4) What information do political bodies need from scientists to help in management of government lands?

2005 Business meeting/mixer

The joint mixer with the Applied, Agroecology, and Long-Term Studies Sections was a fantastic success, and will be repeated at the upcoming Memphis meeting. At the business meeting, the Student Award Committee led by Linda Wallace (other members include Jack Morgan and Sam Fuhlendorf) reported that they had secured commitments from various book publishers for sponsorship of awards for the 2006 Annual Meeting in Memphis. Linda will work with the Vegetation Section to determine how they select appropriate oral and poster presentations for consideration of the awards. Justin Derner presented the most recent volume of *Rangeland Ecology and Management* (formerly *Journal of Range Management*) and suggested that members consider submitting manuscripts for publication. Justin also mentioned that persons interested in becoming an Associate Editor could visit with him, Sam Fuhlendorf, or David Briske. Cindy Salo and Robert Washington-Allen volunteered to organize the efforts for submitting a symposium sponsored by the Section for the 2006 meeting in Memphis. The general topic was along the lines of catastrophe theory. The Section will co-sponsor a symposium (with Walter Willms) at the 2006 Society for Range Management meeting in Vancouver, British Columbia (February). The topic of the symposium will cover effectiveness of grazing systems on rangelands with a critical examination of the scientific evidence.

Other symposia and organized oral sessions sponsored by Section members at the 2005 Annual Meeting

Symposium: Spatial nonlinearities and cross-scale interactions: Cascading effects in the Earth system. Co-organized by Debra Peters (incoming 2007 Chair) and Brandon Bestelmeyer.

Plans for ESA Rangeland Section at 2006 Annual Meeting in Memphis

The Rangeland Section will again be busy at the ESA meeting in Memphis. Activities sponsored by the Rangeland Section or organized by members who represent our Section are listed below.

Symposium: The detection of catastrophic thresholds: perspectives, definitions, and methods Tuesday, 8 August. Organizers: Robert Washington-Allen, Lucinda Salo; jointly sponsored by the Rangeland Ecology Section and the Society for Range Management.

The concept of threshold behavior of ecosystem variables and parameters in space and time has received theoretical treatment as early as C. S. Holling's (1973) landmark paper on resilience (*Annual Review of Ecology and Systematics* 4:1–23). Contemporary research has renewed this focus, particularly on the use of catastrophe theory as a mathematical framework for operational use in natural resource management. The speakers in this symposium will discuss threshold concepts including catastrophe theory, self-organized criticality, operational definitions, scaling laws, and methods for detection of thresholds including time-scale calculus and renormalization. For example, catastrophic regime shifts in aquatic and terrestrial ecosystems will be discussed, as will the novel use of time scale calculus to model the outbreak of West Nile virus in New York City and to direct the mosquitoes spraying schedules, and a recently discovered general scaling law for landscapes. The symposium will conclude with a discussion and synthesis of talks.

Organized Oral Session: Application of behavioral principles for ecosystem stewardship. Friday, 11 August. Organizers: Mark Brunson, Fred Provenza

Ecology has contributed greatly to the conservation and restoration of managed ecosystems such as forests and rangelands by informing the design of management strategies that reflect our current understanding of processes and conditions of the abiotic and vegetation components of ecosystems. Less attention has been given to behavioral ecology and the interactions of animals and microorganisms within ecosystems. This session addresses how new ideas about behavior can be applied to improve ecosystem stewardship. If one assumes animal behavior is fixed in the genome, then improvements in vegetation or abiotic condition generally require removal of species (especially nonnative or domestic animals) whose behaviors are associated with ecosystem degradation. This session will highlight research demonstrating that animal behavior is more plastic than traditionally thought—determined by learning as well as genome—and will describe how ecosystem managers have been able to take advantage of, and even influence, behaviors of both domestic and wild animals in order to achieve desired stewardship outcomes.

Evening Session: Trends in long term ecological research: opportunities and challenges in the synthesis of long term data. Tuesday, 8 August. Organizers: Debra Peters, Christine Laney.

Long-term studies are increasingly recognized as critical to understanding short-term patterns and dynamics, and as providing the context for short-term mechanistic studies. In addition, data from long-term studies are needed to distinguish directional changes from natural variability. Synthesizing long-term data from a variety of ecosystem types for different kinds of ecological and social science problems provides opportunities as well as challenges. In this informal session, we will discuss both the opportunities and challenges associated with this type of synthetic effort. We will also discuss an ongoing collaborative effort among federal agencies (USFS, USDA-ARS) and the NSF-supported Long Term Ecological Research sites to synthesize long-term data into a book format and a web page. Opportunities to contribute to this effort and to access the data sets will also be discussed.

Business Meeting/Mixer

The Business Meeting will be held on Wednesday, 9 August. This mixer will be held jointly with the Agroecology, Applied Ecology, and Long-term Studies Sections, prior to a short business meeting at the end of the mixer.

Ongoing activities

Web site development: Section web site ‹http://www.ag.unr.edu/esa/›. Rangeland forum web site (informal forum to post, describe, and discuss observations, data, and results). Section role: sponsor, lead contact: Bob Nowak ‹nowak@scs.unr.edu›

Submitted by:

Justin D. Derner, Chair

SOIL ECOLOGY SECTION

2005 and 2006 Annual Meeting Symposium

We are glad that one of the symposium proposal ideas that arose from discussion during our 2004 Section meeting, and which we endorsed as an organized oral session, was selected for the 2005 Annual Meeting. Organized by Serita Frey and Josh Schimel, the session "From microbes to ecosystems: How do we really make the connections?" had appeal well beyond our Section membership, as evidenced by the packed room and vibrant discussions.

This year we look forward to the Friday morning symposium, "Returning soils to restoration ecology: rethinking the trade of structure for function," organized by Mac Callaham and Christine Hawkes. Several other organized sessions at this year's Annual Meeting address issues of particular interest to our Section members. These include the new Microbial Ecology Section's symposium, "Integrating microbial ecology into the general science of ecology: opportunities and challenges," to be held on Monday morning, organized by Brendan Bohannan. A second symposium, "Functional roles of fine roots and mycorrhizal fungi in carbon and nutrient cycling," is scheduled for Tuesday morning, and was organized by Erik Hobbie and John Hobbie. A third, "Rhizosphere functioning in carbon and nitrogen cycles," is scheduled for Thursday morning, and was organized by Wendy Silk and Gretchen North.

Student presentation competition/evaluation

Over the past few years student awareness of our Section competition has increased substantially. We went from a pool of 8 entrants at the 2003 Annual Meeting to 23 at the 2004 meeting. Due to organizer exhaustion, the competition was suspended for 2005. This year we were delighted to have the ESA respond to our request to include Section student presentation competition enrollment on the same form students use to enter the Society-wide Buell-Braun Awards competition. About 10 students will compete in the 2006 Soil Ecology Section student presentation competition. Faculty are encouraged to remind their students to submit their meeting presentation for evaluation, and nonstudent Section members are encouraged to participate as judges. We need a new competition organizer for the 2007 Annual Meeting.

Soil Ecology Section web site

The Section web site is accessible at ‹http://www.esa.org/soilecology/index.htm› In addition to the home page, and information on Section governance, the site contains notices of upcoming meetings of interest, blurbs on past Section student awards, and funding sources. Additional materials to be added include links to useful web sites of interest to soil ecologists, new publications by Section members, and a discussion forum. Many thanks to Gary Rachel for establishing this web site and to the ESA staff for maintaining it.

What can the Soil Ecology Section do for you? enterprise

This project elicits much discussion at our Section meetings, but little response or development between meetings. Students report that they appreciate not only the Section's competition for the best student presentation in soil ecology (for which we provide anonymous evaluative feedback to all entrants), but also the Section's role in facilitating connections with established researchers at our Mixer, Business Meeting, and at organized sessions. Section members have long voiced interest in pre-meeting techniques workshops. In collaboration with the Biogeosciences Section at the 2005 meeting in Montreal, we hosted a few funding agency program directors at our Mixer, offering an opportunity for informal communication. Recently, interest in reestablishing a consistent Section presence in international soil-focused scientific advisory groups and/or in contributing to ESA "white papers" has rebounded. Concern about interest overlap between a habitat-centered Section such as ours and taxon- or level of inquiry-centered ESA sections has emerged during recent discussions. The time is ripe for a Soil Ecology Section needs assessment, followed by a revision of our mission and activities.

Section leadership

It is time for new Soil Ecology Section leadership! (Current Chair Whitbeck apologizes for the year-long lapse in organizing an election.) Nominations for Section Chair, Vice-Chair, and Secretary are proceeding, and the election will be carried out by e-mail during the month of August.

Section finances

June 2006 balance: $1,412.92
Aug 2006 Annual Meeting expenditures: $710 ($250 for student award, $460 for mixer)

Our Soil Ecology Section business meeting follows our mixer, held on Tuesday 8 August, which we share this year with the Physiological Ecology Section.

Submitted by:

Julie Whitbeck

STATISTICAL ECOLOGY SECTION

The Statistical Ecology Section seeks to encourage research in statistical theory and methodology applied to ecological problems; to sponsor forums for presentation of advances in statistical ecology; and to facilitate communication between the disciplines of statistics and ecology so as to enhance statistical design and analysis in ecological research.

At the annual ESA meeting, the Section conducts the competition for the E. C. Pielou Student Award, which is a competitive award made to a graduate student or recent Ph.D, based on overall quality of the student's scientific contribution to statistical ecology, as evidenced by his or her oral presentation at the Annual Meeting. In 2005, the award was presented to David Delaney, from McGill University, for his presentation, "Predicting discrete secondary spread of aquatic invasive species."

At the 2006 Annual Meeting in Memphis, the Section has sponsored a full-day workshop, "A brief introduction to hierarchical Bayesian Modeling," organized by K. Ogle, I. Ibáñez, B. Beckage, and J. HilleRisLambers.

The Section also sponsored a symposium at the 2006 Annual Meeting, "Large-scale studies: challenges in experimental design and analysis." This symposium was organized by S. Miao, J. Serino, and S. M. Carstenn.

The Section has maintained its web site ‹http://stat-ecol.evsc.virginia.edu/› to provide a way to communicate with its members and to enhance interactions among statistical ecologists. The site allows for threaded discussions and the posting of papers and software. The web master is Masami Fujiwara of UC Santa Barbara.

Submitted by:

Randy Balice, Section Chair

STUDENT SECTION

The Student Section of the Ecological Society of America was formed in 2000 to facilitate communication among all student members of ESA, enhance interactions between students and the Society as a whole, and provide a more formal way for students to communicate their needs to the Society.

Membership

The Student Section currently has >500 members, nearly double 2002 membership, and has been steadily increasing for the past two years. More importantly, the Student Section has been enjoying a dramatic increase in active student involvement during the past year, with the number of student-organized sessions at the Memphis meeting at an all-time high.

2006 Annual Meeting

Student members are organizing 11 sessions and workshops for the Memphis meeting in August 2006. These sessions include a symposium on genetic

diversity and ecology, our third annual How to Succeed in Ecology evening session, our second annual What Editors Want evening session, and other sessions and workshops geared toward career and skill development. Students are also looking out for first-time meeting attendees by instituting a buddy system to pair up first-timers with ESA veterans, and providing a selection of essays on our web site describing student members' experiences at previous ESA meetings.

Web site

We have completely redesigned the Student Section web site ‹www.esa.org/students› to better advertise student opportunities and activities. We are also maintaining a job announcements section to advertise graduate positions, postdoctoral opportunities, internships, faculty positions, and other jobs appropriate for Student Section members.

Cross-participation with other sections, chapters, and committees

We now have a student representative, Candan Soykan, on the Public Affairs Committee. The Student Section, represented by the Student Section Chair, is an active participant in the Meetings Committee. Liz Harp, Student Section Chair, is a member of the ESA Web site Redesign Committee.

Officers

Liz Harp, Chair 2004–2006
Abraham Miller-Rushing, Vice Chair 2005-2006, Chair 2006–2007
Kia Ruiz, Secretary 2005–2006
Alessandro Catenazzi, Web master 2005–2007

The 2006 election results will be announced via e-mail and also posted on the Student Section web site ‹www.esa.org/students› shortly after the 2006 Annual Meeting.

Questions about the Student Section can be sent to Liz Harp ‹eharp@lamar.colostate.edu› or Abraham Miller-Rushing ‹ajmr@bu.edu›.

TRADITIONAL ECOLOGICAL KNOWLEDGE SECTION

The Traditional Ecological Knowledge (TEK) Section of ESA has successfully implemented focused programs at the Society meetings in Montreal, Merida, and this year at the Annual Meeting in Memphis. The Section has a membership of ~90 paid members, as well as an extensive mailing list of interested colleagues. Section programs at the Annual Meeting have been well-attended and lively sessions. We have received strong feedback that the presence of the TEK Section within the ESA organization has had a positive influence, diversifying the participation in ESA. A number of meeting participants, from a wide array of ecological fields, including tribal colleges, have commented that the existence of the TEK Section has encouraged them to join ESA and contribute their energies to our shared mission. We feel that there is a good synergy with the successful activities of the SEEDS program, which has brought new faces and interests to the ESA meetings, who then find that the TEK Section engages their interest.

Like many other sections, we recognize the discrepancy between our goals for development of the Section, and the reality of engaging sufficient leadership, time, and energy to make those goals a reality. The Section activities are accomplished by only a small group of committed individuals. A priority for this next year is to create better communications and community building, so that we can build greater participation in the leadership and activity level of the Section. We are looking forward to discussions with the new ESA Development Director, on strategies to accomplish these goals. We plan to continue building our membership and to sponsor thought-provoking programs.

Notable activities for the year

1) Annual meeting activities in MONTREAL

- Sponsored "Sense of Place: Indigenous Homelands of Eastern Canada" special session which attracted a large crowd to listen to native leaders from Eastern Canada. Our featured speakers included Henry Lickers, Director of Environment Division, Mohawk Council of Akwesasne, Dr. John Scott, United Nations Environment Program, Traditional Knowledge Program

A Sense of Place: Indigenous Homelands of Eastern Canada

The 2005 ESA meeting convenes within the ancestral homelands of Canada's' first inhabitants. Most of us are strangers to this place. To indigenous people, a sense of place goes beyond natural history to encompass a bio-cultural landscape rich in story and meaning. This very special session opens our meetings with a welcome by representatives of the indigenous people of the region. Representatives of the First Nations of Eastern Canada have been invited to provide an introduction to a sense of place through an indigenous perspective. Drawing on diverse experiences with the region's rivers, forests, mountains, and coast, speakers will share their multi-faceted understanding of these ecosystems, and traditional land management practices. Presenters incorporate traditional ecological knowledge as a foundation for addressing traditional land management practices and current ecological pressures. This session is sponsored by the Traditional Ecological Knowledge Section.

- Evening session on Ethics of Incorporating Traditional Ecological Knowledge into Ecological Research, with John Scott (United Nations Environment Program) and Dennis Martinez (Indigenous Peoples Restoration Network, Society for Ecological restoration).

- TEK contributed papers session with eight presenters.

- TEK Business meeting and brown bag lunch.

2) Workshop sponsorship in Merida, Mexico

- The TEK Section, in cooperation with Melissa Jurgenson-Armstrong of the SEEDS program, developed and presented the workshop described below. The workshop was successful in attracting ~20 participants interested in continued collaboration on development of educational materials for introducing concepts of TEK in the ecology classroom. The TEK Section also hosted a discussion roundtable during luncheon meetings on the topic of

Workshop: Educational opportunities for cross-cultural sharing of Traditional Ecological Knowledge

Traditional ecological knowledge (TEK) is being recognized by scientists and policy makers for its potential to contribute to our understanding of ecological systems. TEK can be a source of new biological insights and models for conservation biology and ecosystem management. There is a compelling need for educational efforts to build bridges between TEK and western sciences, so that the strengths of both approaches may respectfully be brought to bear on ecological problem-solving. This workshop will initiate a cross-cultural dialogue and develop a network of collaborators working together to develop educational materials for integrating TEK into mainstream ecology education.

3) TEK will have a presence at the 2006 Memphis Meeting

A) Special "Sense of Place: Indigenous Homelands of Tennessee " Session Evening Discussion, " Ethical Issues and Intellectual Property Rights in tribal partnerships"

B) TEK Section meeting and luncheon.

4) TEK Section web site online

Thanks to Mark Fulton for his efforts at maintaining the Section web page

5) Section goals for next year

- Development of partnerships with tribal environmental professionals.
- Development of educational materials on TEK to be presented in a workshop at ESA Annual Meeting and subsequently made available in the model of TIEE
- Development of annual symposium proposals
- Creation of linkages with other professional societies concerned with TEK issues, such as Conservation Biology, Ethnobiology
- Enhanced funding to bring more tribal people to ESA meetings
- Development of "position papers" relating TEK and ecological science
- Broadening the membership and leadership capacity of the Section beyond the original group

7) Nomination/election of new officers

The Coordinating Committee has offered the following slate of nominees for Section leadership positions, which will be voted on at the Memphis meeting.

Past Chair: Robin Kimmerer

Chair: Jesse Ford

Vice-Chair: Hoski Schaafsma

Secretary: Mimi Lam

8) Forest Service grant

The TEK Section continues to benefit from a generous grant from the U.S. Forest Service through the auspices of our colleague Kheryn Klubnikan. The funds are being used to sponsor speakers and other TEK events at the Annual Meetings.

Submitted by:

Robin W. Kimmerer
Chair

THEORETICAL ECOLOGY SECTION

The Section was formed in 1993 to (1) foster theoretical research in all areas of ecology; (2) sponsor meetings for the presentation of results; (3) foster communication and research collaboration between theoreticians and experimental/field ecologists; and (4) encourage the application of ecological theory to the resolution of societal problems.

Officers

Priyanga Amarasekare will be stepping down as Chair at the end of the Section's business meeting in Memphis. Ottar Bjornstad (the current Vice Chair) will take her place. The Section's Secretary, Kim Cuddington, will be in office until 2007. Election for the next year's Vice Chair is in progress, and the winner will be announced at the business meeting in Memphis.

Awards

The Theoretical Ecology Section awards the Alfred J. Lotka and Vito Volterra prizes for the best presentations given by students during the ESA Annual Meeting. The award is open to graduate or undergraduate student members of the ESA who, as sole or first author, present a talk or poster at the ESA Annual Meeting on original research in theoretical ecology. All suitable approaches that yield theoretical insight

to ecological phenomena are considered. Prizes are awarded on the basis of merit, originality, and clarity of presentation. The winner of the best talk in 2005 was Karen Abbot (University of Chicago). The poster award was not presented this year.

This year the Section is sponsoring an organized oral session, "The devil is in the detail: theory for empirical model systems," organized by Ottar Bjornstad and Priyanga Amarasekare. This session will explore the utility of the foundational models in understanding the ecological dynamics of specific systems, and discuss how important conceptual insights have been reached by embracing the "idiosyncrasies" of any particular system. The individual presentations detail these issues using case studies from behavior, biological control, epidemiology, and community ecology.

Submitted by:

Priyanga Amarasekare
Chair

URBAN ECOSYSTEM ECOLOGY SECTION

The Urban Ecosystem Ecology Section received a long-range planning grant in the amount of $800 for web site development and communication among the board and the webmaster. The Section paid a private webmaster $500 to develop the site and managed to keep all of the communication online.

As a result, we will not need the remaining $300. The webmaster received permission from the Physiological Ecology Section to use their web site as a template and did a fine job getting our web site up and running. The new site efficiently communicates the goals of the Section, describes the Section activities, provides contact information for the board, lists venues for urban ecology publications, and provides links to urban ecological research sites, course syllabi, and academic programs. We hope the new board (to be elected at this year's business meeting) will continue to develop the Section by increasing membership, adding a job board and a member list to the web site, and planning an urban ecology field trip for the 2007 meeting. The Section thanks the ESA Council for their financial assistance this year.

Submitted by:

Roarke Donnelly, Chair

V. REPORTS OF CHAPTERS

CANADA CHAPTER

The objectives of the Canada Chapter are to encourage education and research, to sponsor meetings for communicating ecological education and research activities, to facilitate access to ESA for graduate students, and to provide scientific information to those interested in the ecology of Canadian ecoregions.

The Canada Chapter is relatively new, and at the Annual Meeting in the summer of 2005 the first group of officers after the initial cohort was elected. They will serve a 2-year term, and new officers will be elected in the summer of 2007. The current officers are: Ken Lertzman, Simon Fraser University, Chair; Karen Yee, University of Calgary, Vice-Chair; and Beatrix Beisner, Université du Québec à Montréal (UQÀM), Secretary. We would like to express our great appreciation of the efforts of those involved in establishing the Canada Chapter of ESA, especially to our first Chair, Sina Adl of Dalhousie University

Over the past year, the Canada Chapter awarded two student prizes to Danielle Way and Patrick Vogan.

For the 2006 Annual Meeting the Chapter sponsored a symposium entitled, "The ecological consequences of genetic diversity." The symposium was co-organized by Marc Johnson and Randall Hughes.

In the past year a new society was formed in Canada that will be of major importance to Canadian ecologists and is relevant to the ESA more generally. The Canadian Society of Ecology and Evolution/So-

ciété de l'Écologie et de l'Évolution (CSEE/SCEE) was inaugurated at its first general meeting in Montreal. Over 400 people attended the meeting. The major Canadian federal funding agency, NSERC, participated in order to promote discussion of the state of funding for ecological and evolutionary research in Canada. The new society hopes that in the future joint meetings with other ecological/evolutionary organizations, such as the ESA, can be held. The Canada Chapter of ESA was represented at the CSEE/SCEE meeting by Beatrix Beisner, who is also now a council member for the CSEE/SCEE. More information about the society can be found at their web site: ‹www.eco-evo.ca›

Submitted by:

Ken Lertzman
Chair

MEXICO CHAPTER

This has been an extremely busy year for the Mexico Chapter, which currently has 61 members from six countries and is growing steadily. Following the election of new Chapter officers at the ESA meeting in Mérida, Yucatán, in January 2006, the new officers set about updating the Chapter web page and the Chapter bylaws to insure continuity over time by (1) electing officers in a staggered fashion, and (2) making the chair-elect (formerly vice-chair) become the chair of the Chapter automatically after 2 years unless the chair seeks reelection. Modifications to Chapter bylaws were also streamlined by allowing electronic voting by members, as well as by reducing the time required for submitting suggested changes from 6 to 4 weeks prior to the Annual Meeting. Other Chapter activities included the following.

Publication of the results of the first Chapter-sponsored symposium: M. L.Martínez, , R. H. Manson, P. Balvanera, R. Dirzo, J. Soberón, L. García-Barrios, M. Martínez-Ramos, P. Moreno-Casasola, L. Rosenzweig, and J. Sarukhán. 2006. The Evolution of Ecology In Mexico: Facing Challenges and Preparing for the Future. *Frontiers in Ecology and the Environment* 4(5): 259–267.

Co-sponsoring a new symposium for the 2006 Annual Meeting entitled, "Integrating Ecosystem Services into the Policy Realm," together with the ESA Public Affairs Committee and the Mid-Atlantic Chapter.

Organizing a symposium entitled, "Strategies for Promoting Ecology Science in Decision Making in Mexico" at the first Annual Meeting of the newly formed Mexican Scientific Society of Ecology, to be held in Morelia, Michoacán, Mexico in late November 2006. By inviting members of the ESA Public Affairs Committee to Mexico to discuss how ESA strategies for networking with decision makers and reporters in the United States could be adapted to the Mexican context, this is one of the first official collaborations between these two professional societies and should help strengthen the links between them.

Sponsoring an ESA Board proposal to reduce the registration costs for Latin American ecologists attending the ESA Annual Meeting as a mechanism for increasing their attendance and thus ESA links in this important region. This proposal was based on the fact that scientists and students from this region face the dual hurdles of higher travel costs and lower wages that often limit their ability to attend the ESA Annual Meeting.

In a similar initiative, it was decided that the $250 in dues collected so far from Chapter members should be used to create 2-3 small travel grants to help Latin American students (especially those from Mexico) attend the 2006 ESA Annual Meeting.

The new Chapter officers would like to formally recognize and thank the original officers (Julia Carabias, Rodolfo Dirzo, and Renée González Montagut) for their strategic planning and hard work, which allowed the creation of the Chapter and the organization of its first symposium: "The Evolution of Ecology in Mexico" at the 2004 Annual Meeting.

Submitted by:

Robert H. Manson
Chair
Institute of Ecology–Xalapa

Luis E. Eguiarte
Chair-elect
Center for Ecosystem Investigation – UNAM

Alexandra Ponette
Secretary
Yale University

MID-ATLANTIC CHAPTER

The current Chapter leadership consists of the following people:

Chair: Dirk Vanderklein, Montclair State University, New Jersey.
Chair-Elect: Karl Kleiner, York College, Pennsylvania.
Secretary/Treasurer: Brian Pedersen, Dickinson College, Pennsylvania.
Past Chair: Juliette Winterer, Lancaster, Pennsylvania

After the ESA Annual Meeting, the leadership will be as follows:

Chair:	Karl Kleiner
Chair-Elect:	To be determined
Secretary/Treasurer:	Brian Pedersen
Past Chair:	Dirk Vanderklein

Membership: Holding steady at around 390 members.

Current balance: $10,862.24 (!)

Chapter activities

As a fairly new Chapter, we have been mainly directing our energies to presenting annual scientific meetings focused on regional issues. This year, our meeting was held all day at The School of Conservation in northwestern New Jersey on 8 April. The School is affiliated with Montclair State University. Our meeting theme this year was "Ecology in the Field." Dr. Joan Ehrenfeld of Rutgers University was our keynote speaker. Her talk addressed the dual themes of ecology in New Jersey and the importance of ecosystem engineers. Our evening speaker was Dr. William Thomas of Montclair State University, who presented the trials and tribulations of incorporating indigenous peoples into conservation work in Borneo. A total of about 100 people attended 22 oral sessions and 39 poster presentations. Most of the presenters were students. By all accounts, the meeting was a success. On 9 April, we had a field trip to the Delaware Water Gap National Recreation Area. This field trip was led by Richard Evans, an ecologist with the National Park Service, who showed different ecosystems within the park and discussed the management issues associated with them.

In addition to organizing our annual meetings, the Chapter has begun to expand its activities. An ad-hoc committee has been formed to look into how we as a Chapter can contribute to the national organization's "Regional Policy Initiatives." We have started discussions to identify issues of regional importance. Based on these issues we will then identify members who can act as "experts." We are still in the early stages, but it is my hope that we can develop this into a more prominent part of Chapter activities.

For the coming year we will continue to plan and hold a regional scientific meeting and further develop the "regional initiative response team." We will also be holding an election for Chair-Elect.

Submitted by:

Dirk Vanderklein
Chair

ROCKY MOUNTAIN CHAPTER

The objectives of the Rocky Mountain Chapter are to encourage education and research and to sponsor meetings for the communication of ecologi-

cal education and research activities of special interest to ecologists in the Rocky Mountain Region of North America. The Chapter continues to sponsor the Annual Front Range Student Ecology Symposium at Colorado State University. The 12th symposium was held 8 March 2006, and our Chapter provided $500 of support. Students from six universities in Colorado and Wyoming and one high school participated. A full description and schedule of events can be found at: ‹http://lamar.colostate.edu/~ecosym/_Home.html›

Following discussion on the National Environmental Observation Network (NEON) during our 2005 Annual Meeting in Montreal, we applied for and received a long-range planning grant to support a planning meeting for the Northern Rocky Mountain Ecological Observatory (NORMEO) held in Bozeman, Montana, 30–31 March 2006. Minutes for that meeting, a list of participants, and other information can be found at: ‹http://www.normeo.org/› Discussion at this and previous meetings provides a foundation for development of proposals to NEON when that RFP is released.

All leadership positions of the Chapter will be open this year, and we will hold elections at our Annual Meeting on Thursday, 10 August 2006. Continental breakfast will be served.

Submitted by:

Geneva Chong, Chair

SOUTHEASTERN CHAPTER

General

The Southeastern Chapter (SEC) held two meetings during the last year. The traditional Brown Bag Lunch occurred at the ESA meeting in Montreal, Canada. The business meeting was held at the Association of Southeastern Biologists Meeting on 31 March 2006 in Gatlinburg, Tennessee.

Finances

All Chapter accounts have grown over the last year. The Chapter General Fund has $5790, the Odum Award fund has $10,136, and the Quarterman-Keever award fund has $1597.

Activities

The Southeastern Chapter was involved in three major activities. The Odum Award and the Quarterman Keever Award were bestowed at the 31 March meeting of ASB. Symposia for the 2006 ESA meeting were discussed, submitted for review, and eventually two of these were accepted. These symposia included "Exchange Between Channel and Floodplain in Large Rivers," and "Plant Clonal Growth: Ecological Implications." Finally, fund-raising efforts for the Quarterman-Keever Award were discussed and implemented.

Elections

New officers were elected at the 2006 ASB meeting. The new officers are as follows: Frank Gilliam, Marshall University, was elected Chair and will serve from 2006 to 2008. Howie Neufeld, Appalachian State University, was elected Secretary/Treasurer and will serve from 2006 to 2008. Gary Wein and Diane DeSteven were elected as co-Chairs of the Odum Award.

Chapter newsletters have been published on the Chapter's web site ‹http://www.auburn.edu/seesa/› and in the *ESA Bulletin*.

Submitted by

James Luken
Chair

Photo Gallery

Editor's note: The scientific article connected to the Photo Gallery feature by Amano et al. in the July 2006 issue of the Bulletin, will be published in November Ecological Monographs 76(4), and not, as earlier anticipated, in November Ecology 87(11).

FEEDING PREFERENCES IN A NEOTROPICAL LEPIDOPTERAN

Inga umbellifera

The major resource for folivorous herbivores is young, expanding leaves. Tropical rain forest herbivores have selected for diverse forms of leaf development, including delayed chloroplast development (white or light pink young leaves) and leaves that double in area in a single day (with a vertical or hanging orientation).

Inga oerstediana

Species of *Inga*, an abundant and diverse genus of trees, show the full range of developmental types as well as surprisingly diverse defensive chemistry. On Barro Colorado Island, Panama (BCI), with 11 common species of *Inga*, many caterpillar species attack only 1–4 species of *Inga*. In the case of such specialized herbivores, it has proved difficult to investigate the relative importance of developmental traits and food quality in determining host choice. One species of caterpillar on BCI, in the Gelechiidae, attacks young leaves of 10 species of *Inga* at different rates, allowing just such a test. Despite large differences in leaf chemistry among *Inga* species, the caterpillar grew well on most species. The study indicates that the availability of young leaves, competition from other herbivores, and to some extent parasitism rates, determine preferences among Inga species. Young leaves of the 11th species, *I. acuminata*, are not attacked by the gelechiid, nor do its young leaves support growth in laboratory experiments. In the case of *I. acuminata*, host chemistry likely determines host choice.

Two examples of *Inga umbellifera*

Inga goldmanii

Lycaenid on *Inga*

These photographs illustrate the article, "Food quality, competition, and parasitism influence feeding preference in a Neotropical lepidopteran" by Thomas A Kursar, Brett T. Wolfe, Mary Jane Epps, and Phyllis D. Coley, tentatively scheduled to appear in Ecology 87(12), December 2006.

ASSESSING TIGER POPULATION DYNAMICS

Tigress with cubs.

Multiyear camera trapping studies using a robust design capture–recapture model permit estimation of population parameters, such as mortality and recruitment, in tiger populations. The study was conducted in the central part of Nagarahole Reserve in Karnataka State, India, from 1991 to 2000. This 644-km^2 reserve supports high densities of prey (~56 ungulates/km^2), and consequently, of tigers.

Photo credit for the tigress with cubs is Ullas Karanth/Wildlife Conservation Society, and for the prey species is Ullas Karanth only.

The demographic viability of wild tiger populations is strongly linked to maintaining high densities of large ungulate prey species, such as (in India) gaur (*Bos frontalis*) (photo 2), chital deer (*Axis axis*) (photo 3), and sambar deer (*Cervus unicolor*) (photo 3).

These photographs were taken in association with the article, "Assessing tiger population dynamics using photographic capture–recapture sampling," by K. U. Karanth, J. D. Nichols, N. S. Kumar, and J. E. Hines, which is tentatively scheduled to appear in *Ecology* 87(11), November 2006.

Contributions

Commentary

Some Reflections on ESA: Then and Now

As ESA celebrated its 90th year, and on the occasion of the ESA meeting in Montreal, I was asked to reflect on some of the major changes that have occurred in our professional Society during the last few decades. I decided not to offer a full historical account, but instead and because of first-hand knowledge, I will focus on some of the major changes that have occurred since I was ESA President in 1981–1982. I will discuss briefly six features that have changed dramatically during these 24 years:

1) The general membership has increased from slightly over 6000 in 1980 to more than 9200 currently, and is growing, representing an increase of ~50% since 1980. There were 307 members in 1916–1917. At the end of 2004, members' affiliations were categorized as 66% academic, 13% government, 5% nonprofit, 6% consulting, and 11% other.

I quote from my President's Report published in the *ESA Bulletin* in 1982 for the year 1981–1982:

"Last year when I took this office I suggested that the 1980's represent a critical period for ecologists, ecology and the Ecological Society of America. This conclusion stemmed from:

— reduced funding for research and jobs

— enormous pressures on natural resources from waste disposal (e.g., toxic chemicals), from land clearing and development (agriculture, forestry, urbanization, mining, etc.), from recreation, air pollution, etc.

— potential loss of ground on environmental regulation

— threat of unthinkable ecological devastation from nuclear war." (…some problems just don't go away!!)

Some other major changes that have occurred in ESA since 1980 include:

2) Applied Ecology

There was a huge controversy in the early 1980s about forming a section on Applied Ecology. Great concern was expressed by many members that applied ecology was not appropriate for the ESA! Now, this Section is very active and has become the second largest section in ESA with more than 620 members.

3) The Washington Office

Again, quoting from my report in the 1982 *ESA Bulletin*: "My top priority was to promote a component of public outreach for ESA, our so-called 'PRESENCE IN WASHINGTON'." I appointed Dr. Ralph Good from Rutgers University-Camden to chair the Public Affairs Committee and bring a definitive report about whether we should form an office in Washington, D.C., or not. Ralph and his Committee did a superb job, and again, from the *ESA Bulletin* in 1982:

"In many regards, today's annual meeting is

truly an historic event. Officers and members of the ESA have been proposing some kind of a voice or presence in Washington for at least 20 years. The topic regularly appears in the reports from Presidents over the last several years. I am happy to report that on 8 August 1982, the Council approved funds and administrative support for a person in Washington to represent the interest of the Ecological Society of America…". As a result, staff was hired and an office was established.

Today's ESA Presence in Washington is an active and important part of our Society's activities. Many ESA Presidents, particularly since 1982, have worked hard to support and advance this agenda for an active ecological presence in decision-making and public policy.

Back to the *ESA Bulletin*:

"I also report that I made a visit to Dr. John Slaughter, Director of the National Science Foundation, on behalf of the Society. I tried to stress the important role of ecological concepts and data in national affairs. I pointed to the unique position of NSF in supporting research in Systematics, and the value of long-term ecological research."

1982 *ESA Bulletin* 63(4)

This brief history is not to indicate what I did in 1981, but to indicate how far the Society has come in only a quarter of a century, and the effective role we currently play in public policy.

Some of the programs we now take for granted, took much effort to initiate. BUT, we can and we must do even better!

The ESA needs to be a clear, powerful, unbiased, and professional voice for ecology in public policy issues (at local, regional, national, and international venues). No longer are environmental problems based only or solved only at local levels (e.g., CO_2 and mercury transported in the atmosphere). We have a critical need for strong scientific leadership at the highest levels, unlike what we have at present. Maybe most importantly, truth and ethics do matter!

4) Sustainable Biosphere Initiative

This program was started in 1992 and now has expanded and been incorporated into the Science Programs Office. The goal of this office is to promote the integration of ecological science into management and decision-making by government agencies and the private sector at all levels. Projects of the Science Office fall into four major categories: Society Activities; Support to Science—Policy + Management; Scientific Conferences; and Publications.

5) Two important new journals were initiated during this quarter century: *Ecological Applications* (first issue in 1991) and *Frontiers in Ecology and the Environment* (first issue February 2003). These journals have greatly expanded the coverage and reach of ecological issues, and by all accounts are very successful in communicating ecological knowledge. Personally, I am sorry to see less prominent use of *Ecological Monographs*. I believe that the pendulum has swung too far toward the "Least Publishable Unit," or how many papers can be obtained from a particular study (Likens 1989). It is interesting to note that *Ecological Monographs* (5.0) currently has a higher "Impact Factor" than *Ecology* (4.1). And, *Issues in Ecology* has been a successful effort to summarize scientific, ecological knowledge on current, major environmental topics in peer-reviewed and nontechnical language, and to point out relationship to policy and management.

6) Education

I was almost totally unsuccessful in providing the leadership necessary to initiate a viable education program for ESA. Members seemingly were not interested in doing more than teaching their various classes and/or supervising their graduate students. An Education Section was established in 1988, and since the early 1990s ESA's education activities have been innovative, strong, and growing.

All of these six major changes are related in many ways and have made our professional society more relevant, and particularly more popular and attractive, particularly to young scientists, and, I believe, the public.

Major challenges

1) Unfortunately, there is little or no "memory" about the history of ESA's large and robust progress passed on as the Society's leadership changes over time. I argued in 1982 for a two-year term for President. I would still make this argument.

2) As the world changes (and currently it is changing very profoundly and rapidly), organizations need to be responsive. Probably never before has there been a time when there was a greater need for a strong, vibrant and aggressive ESA.

3) We need to maintain the highest standards of scholarship and ethics in our science.

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Gene E. Likens
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Commentary

A Response to the ESA Position Paper on Biological Invasions

As an ecologist and pest risk analyst, I read with great interest the recent position paper of the Ecological Society of America, "Biological Invasions: Recommendations for U.S. Policy and Management" (Lodge et al. 2006). I work in the Center for Plant Health Science and Technology (CPHST) ‹http://cphst.aphis.usda.gov/›, which provides scientific support for the Plant Protection and Quarantine (PPQ) program of the Animal and Plant Health Inspection Service (APHIS) in the USDA. My intent with this letter is to correct what I believe are two errors in the position paper about CPHST/PPQ and how we produce pest risk assessments (PRAs), and to share information about ongoing projects that already address some of the recommendations in the position paper. I hope this fosters the idea that groups like PPQ and the ESA are primarily allies, rather than adversaries, in safeguarding the United States from the threats posed by exotic invasive species. (I apologize in advance for the profligate acronyms: I work in government.)

The first error I would like to correct is the statement, "No USDA or USFWS employee has a job dedicated to evaluating the risk associated with importations of [specific] organisms" (Lodge et al. 2006:23). In CPHST, that is the primary task of the scientific team for Quarantine 37 (Q-37 or plants for propagation) assessments in the Plant Epidemiology and Risk Analysis Laboratory (PERAL). Other PERAL scientists are sometimes tasked with assessments on specific organisms, usually because of special importance (e.g., *Caulerpa* spp., *Phytophthora ramorum*) or new interceptions (e.g., pinecones in potpourri from India). Besides organismal assessments, the 40 PERAL scientists assess the risks associated with pathways and imports of commodities, publish new pest alerts and do rapid evaluations, and support domestic response and management programs. Plant PRAs by PERAL are used by decision makers in government and in the Federal rulemaking process.

Secondly, for PERAL, it is not true that PRAs "…rely exclusively upon qualitative, expert opinion", or that "…protocols rarely meet any of the essential criteria for rigorous risk assessments…" where the listed criteria were peer review, transparency, repeatability, specified uncertainties, and quantitative output (Lodge et al. 2006:26). Every PRA published by PERAL has been peer-reviewed within both CPHST and PPQ. Often, PRAs are reviewed in other relevant APHIS programs, and externally reviewed by stakeholders, non-Federal scientists, and scientists in other Federal agencies. Both our qualitative and quantitative PRAs are transparent: rationales for methods, risk ratings, and results are detailed and referenced; documents are available for review by the public; and contacts and authors are clearly identified. Our PRAs explicitly consider environmental as well as economic consequences of introduction of exotic plant pests. Quantitative PRAs are done if the objectives warrant it and if enough relevant data exists, which is no different from ecological modeling in general. In quantitative PRAs propagule pressure (Recommendation No. 2) is explicitly considered, and the uncertainties for inputs and outputs are always specified (e.g., Griffin 1997, Sequeira et al. 2002, 2004, Caton and Spears 2005, Caton et al. 2006*a*, *b*). Besides being good scientific practice, we must follow the criteria above because of possible legal challenges to our PRAs. Finally, PERAL recently completed ISO (International Organization for Standardization) 9001 certification for commodity-based PRAs and evaluations of new pests. This was done to enhance quality assurance and continual process improvement.

I will address one additional problem because it is in my area of expertise, and because I think it points to the complexity of biological invasions and biosecurity efforts. On p. 18, Lodge et al. (2006) make the unreferenced statement that, "Commerce in living organisms usually introduces species at a lower rate than transportation related pathways." That may only

be true for some taxa, such as the aquatic animals they discuss. In contrast, two-thirds of introduced plant species in Australia were escapes from horticulture, with that proportion expected to increase over time (Groves et al. 2005). For the continental United States, estimates are that more than half of all naturalized exotic plants were brought for gardening (Randall and Marinelli 1996, Mack and Erneberg 2002). A less general statement was probably warranted there, but my main point is that pathway risk levels seem likely to depend on such factors as taxa, commodity, geographic origin, and conveyance. Therefore, in agreement with Lodge et al. (2006) (Recommendation No. 1), better understanding of the relative risks presented by different pathways is a priority goal of our organization.

Now I will address the recommendations made by Lodge et al. (2006), but not necessarily because I disagreed with them. Rather, I felt that in some cases they mistakenly gave the impression that Federal pest risk scientists and managers are merely sitting around waiting for help to appear.

Describing "proposed lead organizations" for their first three recommendations, Lodge et al. (2006) wrote each time that "Universities continue to develop…" new tools for analyses and biotechnology. This implied to me a vision in which "government funds, universities research, and then government adopts." I think that view is unfortunate, and, at least for PPQ and CPHST, inaccurate. Scientists in PPQ work cooperatively with university scientists on many research and analysis projects, often from conceptualization through technology transfer. A selected list of recently completed or ongoing projects in CPHST that are highly cooperative includes the following:

- Agricultural Internet Monitoring System (AIMS) to identify and interdict U.S.-based online pathways for exotic invasive species [with the Center for Integrated Pest Management (CIPM) at North Carolina State University (NCSU)]

- Annual prioritization of species for the Cooperative Agricultural Pest Survey [with many state agencies, universities, and private organizations]

- Applying remote sensing technology for detection of exotic invasive plant pests [e.g., emerald ash borer, with Michigan State University; Asian long-horned beetle, with Clark University]

- Computer diagnostics for quarantine mites (exotic Acarines) [with Colorado State University and the University of Alberta]

- Creation of a global weed prioritization model for potential invasiveness in the United States [with the Weed Science Society of America]

- Modeling United States metropolitan areas as hubs of human-mediated pathways of invasive species [with Michigan State University and the U.S. Forest Service]

- NCSU/APHIS Plant Pest Forecast (NAPPFAST; ‹www.nappfast.org› system for climate- and weather-based risk mapping [with CIPM-NCSU]

- Pathway prioritization project (Lodge et al. (2006: Fig. 2)) [public and Federal scientists coordinated by the National Invasive Species Council]

- Predicting the atmospheric transport of soybean rust from South America into the United States [with NCSU and Penn State University]

Regardless of who conceived of these projects, all groups have benefited. We value those collaborations, but often develop tools and technologies ourselves. Examples include enhanced lures for early detection of pests, and improved diagnostic tests for detection and identification of pests. I urge ESA members to view PPQ more as a possible partner in biological invasions research and development than just as a potential source of funding. In particular, PPQ scientists and managers may often have the best, most current

information about what pest threats may be emerging, what important statutory changes are forthcoming, what topic areas most need research, what operational issues may need to be addressed, and what challenges likely loom ahead.

One of my colleagues has half-jokingly said that the public only knows what the government is doing about two years after the fact. I am pleased to mention the following selected, ongoing PPQ projects about which Lodge et al. (2006) may have been unaware, that address the two prevention-related recommendations in the position paper:

Recommendation (1): Reduce species in pathways.

- AIMS, for reducing introductions of regulated plant pests and animal products
- Commodity origin by trace elements analysis, to quickly identify mislabeled/ smuggled cargo of high risk
- Development of odor-based detection and monitoring systems for exotic pests
- Offshore Pest Identification System (OPIS), to monitor potential emerging pest species and outbreaks
- Proposed revisions to the Quarantine-37 (plants for propagation) regulations, including a new designation for plant species of "Not Authorized Pending Risk Assessment"

Recommendation (2): Institute risk screening.

- Cooperatively developed lists of plant pest species of particular concern (e.g., mites with Acaralogical Society of America, nematodes with Society of Nematologists, insects with the Entomological Society of America)
- Global weed prioritization model, to identify high risk plant species for assessments and possible listing as Federal noxious weeds [trait-based species screening]
- NAPPFAST risk mapping for *Phytophthora ramorum*, *Maconellicoccus hirsutus* (pink hibiscus mealy bug), and other pest species. CPHST has compiled insect developmental requirements for over 500 insect species. [environmental matching]

In particular, in this era of internet commerce the development of AIMS was so revolutionary and important that plant and animal protection agencies in several other countries have requested cooperative access to AIMS or help in developing their own similar systems.

I think the position paper could have benefited from including a PPQ scientist as a co-author or reviewer. Besides correcting some errors and highlighting examples of progress being made, one of us could have pointed out that one of the biggest challenges now facing PPQ is the recent transfer of agricultural inspectors at ports into the Department of Homeland Security. Whereas the primary objective of the inspectors used to be preventing introductions of quarantine materials and associated pests, they now also have to work to prevent terrorism. How this change will affect Federal biosecurity efforts in the long term remains to be seen, but it is clearly a significant development.

Our nation faces serious challenges in plant and animal protection, and we appreciate that the ESA position paper will help to raise awareness and improve Federal policies and programs. Simberloff et al. (2005) recently noted that the strongest voice for improving the prevention and management of invasive species problems has always come from scientists, and I believe they meant scientists in its most general sense, i.e., from all types of institutions. I hope this letter demonstrated that PPQ scientists are capable and serious about biosecurity, have been making progress in key areas about which ESA made recommendations, and could be valuable partners for ESA members interested in or researching biological invasions.

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Sincerely,

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Commentary

Reply to Letter by B. P. Caton in Response to ESA Position Paper on Invasives

We thank Caton for his informative letter responding to our position paper (which is now in press at *Ecological Applications* [December 2006]). We would like to make it clear that the position paper was not intended to disparage directly or indirectly the PPQ scientists and other federal scientists who are working hard to improve biosecurity in the United States. We agree fully that federal scientists are valuable partners for ESA members interested in biological invasions, and the position paper is meant to encourage such interaction.

ESA wished to have federal scientists participate as authors on the position paper, but the scientists invited were denied permission by their agencies to co-author a paper that made policy recommendations. Nevertheless, during multiple rounds of written review and revision, the authors of the position paper received and responded to reviews from 17 independent experts, the ESA Public Affairs Committee (twice), and the ESA Governing Board (twice). These reviewers included at least six federal scientists representing at least three federal departments. None of those reviewers raised the objections made by Caton.

Caton's concerns give us the opportunity to clarify two foundational issues on which we based the specific recommendations of the position paper. First, existing policies (and their implementation) determine the ways in which existing scientific expertise is employed, and determine the topics and goals of research, and applications by federal scientists in particular. While we agree with Caton that there are many talented and dedicated federal scientists, the first two recommendations of the position paper emphasized that existing policies on invasive species do not focus technical and regulatory efforts sufficiently on prevention of introductions.

For example, prohibitions of importation of particular plants and plant pests (by USDA) and animals (by USFWS) are largely reactive. This is dictated in part by policy (established by Congress) and in part by implementation (over which the agencies have some discretion). Thus U.S. practices are based largely on a blacklist approach, such that if a plant, animal, parasite, or pathogen is not specifically banned, it may be imported. Thus, despite the dedicated contributions by many talented scientists with a variety of affiliations that have dramatically increased capacity in ecological risk assessment, species not banned are allowed to enter the country. Similarly, pathways are often regulated only after they have delivered species that have established and become demonstrably dangerous. We believe that regulatory risk assessments are narrowly focused, and often so late in the invasion process that species and the damages they cause are guaranteed to spread geographically and grow over time. Therefore, we strongly support the PPQ initiatives highlighted by Caton, as small steps in the right direction. One of us, for example, has submitted official public comments in support of the proposed changes to Quarantine-37 practices, which would institute screening of some plants proposed for importation. We applaud these improvements under consideration, which would allow the application of recent scientific advances in risk assessment highlighted by the position paper. In addition, however, we re-emphasize the need for changes to higher level policy, rules, and implementation to more adequately prevent entry into the United States of species likely to be harmful. The position paper and other recent reports (NRC 2002) were motivated by this perspective.

Second, U.S. funding for biosecurity with respect to invasive species remains inadequate despite recent efforts to improve coordination and focus priorities within Homeland Security and older agencies. We share Caton's concern about Homeland Security's impact on invasive species risk assessment and management. The current inadequacies apply across the board, including research to generate new knowledge that could lead to significant changes in biosecurity policy, development of sufficient scientific support for regulatory action, and maintenance of human capital for surveillance and interdiction. Even if federal scientists had the authority and the desire to conduct more and better risk assessments, such as those advocated by the position paper, the resources are inadequate to support these activities. It is no surprise, then, that scant resources are devoted to links with traditional agricultural sciences, and resources to support collaboration with university ecologists are rarer still. The challenges are large and urgent, and partnerships among scientists in a variety of institutional settings are needed to slow the tide of invaders. ESA supports Caton and his colleagues in USDA and other federal agencies in trying to stem the tide of invasive species. We and other ESA scientists are eager to continue a dialogue with federal agency scientists in the national effort to reduce the damages from invasive species.

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Commentary

Adding Ecological Considerations to "Environmental" Accounting

Environmental accounting is a rapidly evolving area of management, accounting, and finance. It enables an organization and its stakeholders to evaluate the organization's performance with both economic and environmental measures (Thayer 1995, Atkinson 2000, IFA 2005). If the market were complete, this would not be necessary, and Milton Friedman's dictum, "A company's only responsibility is to increase profits for stockholders" would suffice. However, the flawed and incomplete market we have today, with enormous uncounted costs and incorrectly attributed costs, performs poorly. This should not be a surprise; as British economist A.C. Pigou noted early in the last century, the market will fail unless it includes all costs. Most markets today consider only a small fraction of the total transaction cost, leaving many "externalities" out of the picture (Antheaume 2004, Bainbridge 2004). If full costs were known, many market transactions would not occur, and the environment would be cleaner and safer.

A wide range of environmental accounting approaches and methods are being used to more accurately determine financial performance, to improve operations, and to compare alternative strategies for strategic planning and driving innovation. The governments, nongovernmental organizations, companies, and professional organizations that deal with these issues have adopted very different approaches and perspectives, which remain in their formative stages (Gray et al. 1995, Rikhardsson et al. 2005, Chua 2006). Cultural differences play a clear role in what is considered reasonable or desirable (Mathews and Reynolds 2001). While a growing number of tools are available to facilitate environmental accounting, much remains to be done to make them more useful, inclusive, effective, accurate, and user friendly (Beets and Souther 1999, O'Dwyer et al. 2005). The weaknesses are particularly apparent in discussions of ecological issues such as: the value of nature's services, ecotoxicity, nutrient cycle disruption, biodiversity, invasive species, habitat fragmentation, and restoration costs (Günther 1997, Karlen et al. 2001, Howarth and Farber 2002). It is an area where the Ecological Society of America can make a contribution, and where active involvement could create funding for new career paths for undergraduate and graduate students and post-docs.

University training still lags far behind the need and slightly behind the demand, with very few opportunities in most ecology, business, or engineering curricula for the integrated approach to accounting demanded by this new field. To succeed with this new approach, we will have to surmount a number of obstacles common to interdisciplinary studies (Baumann 2003, Moore 2005). Revisions to university curricula, continuing education, and more detailed and user-friendly web resources can help improve the value of environmental accounting.

Environmental accounting is increasing in traditional financial and management accounting, policy accounting, and environmental management accounting (Schaltegger and Burritt 2001, Sigma Project 2002, International Federation of Accountants 2005). The growth has been quite rapid, with more than 10,000 sustainability reports now prepared annually worldwide (Rikhardsson et al. 2002). Certified or Chartered Accountants do much of the financial accounting, which includes preparing financial and tax statements and auditing, often focused on investors, lenders, and regulators. Management accounting supports business operations and strategy, and activity-based and enterprise accounting can be used to improve allocation of overhead and more directly link environmental costs to operations. Improved process flow mapping, integrated substance chain management, and material flow analysis better account for inputs/outputs and help identify costly nonproduct outputs. Governments and advocacy groups use environmental accounting to help develop and review the effects of policy, in-

centives, and regulation on the performance of companies, industries, and nations (Bainbridge 2004). The focus has generally been on management applications, although all fields of environmental accounting are rapidly developing.

Environmental management accounting focuses on collecting and evaluating data on an organization's environmental performance, often using accounting over the full life cycle of products or policies, from inception to disposal, recycling, or closure. Environmental management tools include: eco-footprinting, material flow analysis, substance flow accounts, environmental accounting information systems, environmental audits, and required reports for regulators, such as the Eco-Management and Audit Scheme (EMAS) in Europe (GRI 2002, Robert et al. 2002, Bringezu et al. 2003, Palm and Jonsson 2003, EMAS 2006). The basic premise of environmental management accounting is that conventional accounting practices and existing operational and financial management within organizations obscure environmental information. By clarifying inputs, outputs, and impacts, environmental management accounting can help companies and organizations develop innovative solutions to changing resource constraints, regulations, and public pressure.

Environmental and social accounting may be included in preparation of company documents for the Global Reporting Initiative (GRI), Dow Jones Sustainability Index, Corporate Social Responsibility rankings, Social Accountability 8000, the International Organization for Standards Environmental Management Systems 14001, and other environmental and social standards. Environmental accounting also plays a role in a range of new approaches to improved product and service development including: Factor X (Factor 10), the Natural Step, Industrial Ecology, Design for Environment, Cleaner Production, Dematerialization, Cradle-to-Cradle, Leadership in Energy and Environmental Design (LEED), Material Flow Accounting, and the Triple Bottom Line (Baumann and Cowell 1999, Rezaee 2000, Robèrt et al. 2000, McDonough and Braungart 2002, Robèrt et al 2002).

The potential benefits of environmental accounting include:

- Improved profitability
- Better decision making
- Discovered opportunities for cost saving
- Discovered opportunities for new processes
- Discovered opportunities for new products and services
- Competitive advantage
- Improved internal reports
- Improved external reports
- Improved employee morale and health
- More accurate and complete costing and pricing
- Reputation building
- Societal benefits
- Environmental benefits
- Improved stakeholder relations
- Reduced risk and liability

The first challenge is deciding what approach to use, at what level, and how best to integrate environmental accounting into current accounting and management systems. There are many alternatives, and a growing number of corporate financial reports and case studies provide some insight into what works, and what needs work (Wallage 2000, O'Dwyer et al. 2005). These studies, and others, generally suggest that proactive environmental reporting improves profitability and reduces risk, and creates a competitive advantage. Software development is underway, but no standard has yet emerged for this complex task. Ideally the software could be easily integrated with existing business management software to provide data and reports useful for financial, management, and policy purposes. These programs would translate the gallons/liters of gasoline consumed into global warming gas cost contributions, the cost of local nitrogen pollution remediation, and the water and air pollution generated

in the supply and disposal chain. This will take a concerted effort from ecologists, accountants, software developers, managers, engineers, and environmental scientists. I would suggest an environmental accounting software contest, like the recent, highly successful Defense Advanced Research Projects A robotic vehicle test, where a well-administered $2 million prize brought incredibly fast progress through intense competition and real-world testing.

The second challenge is more fundamental, reflecting our incomplete understanding of the complex environmental systems that we live in and attempt to manage. This is where the Ecological Society of America can make its biggest contribution. Our often profound ignorance of function and structure in ecosystems makes current attempts at full-cost accounting very crude and incomplete. Much more detailed and interdisciplinary long-term ecological research is needed to better understand the external costs of business operations. The Long Term Ecological Research Program should immediately be doubled, with the new program directed at research involving environmental accounting issues. The creation of the National Ecological Observatory Network, NEON, provides another excellent opportunity for needed interdisciplinary, integrated, long-term research and monitoring (NEON 2006). Progress in including more and better ecological science in environmental accounting will not happen without funding, and much of this should be sought from corporate sources. I look forward to the day when there will be as many corporate ecologists as there are corporate accountants (9000 ESA members today vs. 335,000 American Institute of CPA members).

The members of ESA have not been as active in the fields of environmental accounting or ecological economics as we might have hoped, but we have not ignored these issues, either. A recent survey using Google as a crude indicator suggests we are doing better than most organizations, but we have much to do (Table 1). It is also instructive to compare the European accounting organization with the American ac-

Table 1. Hits per search term linked to association title, Google, March 2006.

Association	Assoc. and environmental accounting	Assoc. and environmental externalities	Assoc. and sustainability
U.S. Society Ecological Economics	1.585	0.0225	0.498
European Accounting Association	0.262	0.0045	0.316
Academy of Management	0.045	0.0093	7.084
American Solar Energy Society	0.018	0.0365	16.314
Ecological Society of America	**0.016**	**0.0114**	**9.433**
American Economic Association	0.009	0.0128	2.074
Am. Soc. Agric. and Biol. Engineers	0.009	0.0084	4.608
American Planning Association	0.006	0.0069	7.133
Am. Institute Chemical Engineering	0.004	0.0010	1.169
Am. Institute CPA	0.001	0.0001	0.059
American Bar Association	0.000	0.0004	0.142
Ecological Society of America, Rank	5	3	2

counting organization. The European accountants are 300 times more likely to be involved in environmental accounting. This reflects cultural differences, policy failure in Washington, reflecting the power of corporate lobbies, and our failure to push an agenda for full cost accounting.

Environmental accounting is developing rapidly and improving decision-making around the world. Modest investments in improved environmental accounting can lead to significant gains in profitability, corporate image, and reduced liability. Environmental accounting demands new skills, tools, and more integrated accounting across department and division lines within companies and all the company or organization stakeholders. Environmental accounting is also increasingly in demand for policy development by NGOs and a range of levels of government.

If we look outside the United States we can find many excellent examples, ranging down to the city level. Ecology programs, business schools, environmental science programs, health programs, engineering and design programs, and all of our professional organizations need to embrace this new challenge and opportunity (Bainbridge 1985, Gray and Collison 2002, Thomas 2004, Haigh 2005).

The ESA can make its impact by developing a more aggressive campaign to require more detailed environmental accounting in the United States. We should also quickly reshape our educational programs to provide ecologists and environmental scientists with a solid grounding in ecological economics and environmental accounting, and to encourage our brethren in accounting and business to include courses in ecology and environmental science. We can also make a difference by joining and participating in related organizations, such as the U.S. Society for Ecological Economics and the International Society for Industrial Ecology, and the major business organizations, particularly the Academy of Management. The Society could also help by assisting in building pressure to create new Sustainability Citation Indexes to credit researchers and faculty who tackle these important, but time-consuming and challenging interdisciplinary issues (Baumann 2002) and to make research more accessible. One of the weakest points of ecological economics and environmental accounting has been the ecological science, and that is something we can help correct.

Acknowledgments

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Web resources

Environmental Management Accounting Research and Information Center ‹www.emawebsite.org›

Environmental Management Accounting Network-EU ‹www.emanu-eu.net›

International Federation of Accountants ‹www.ifac.org›

Global Reporting Initiative ‹www.globalreporting.org›

U.S. Society for Ecological Economics ‹www.ussee.org›

International Society for Industrial Ecology ‹www.is4ie.org›

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Commentary

A History of the Ecological Sciences, Part 22: Early European Naturalists in Eastern North America

Many explorers of foreign lands and seas brought back to Europe plants and animals for authorities to study and describe, but some explorers were also naturalists who published their own observations. Previously (Egerton 1976, 1977) I surveyed contributions by early naturalists to American natural history that might be of interest to ecologists. Now I will go into more detail about fewer naturalists, but before doing so, let us view them within a broader context.

George Basalla (1967) studied colonial science and found that it flourished to the same extent that it did in the mother country. In the New World, the Spanish had a head start in colonization over the British and French by a century; however, since science was not strongly supported in Spain, it developed slowly in its colonies (Verdoorn 1945, Beltran 1970, Egerton 2004*b*:112–114, de Asúa and French 2005). Science flourished about equally in Britain and France, and therefore one might expect that their colonial science would be comparable. The first book on North American plants was very well illustrated by a Frenchman, Jacques Philippe Cornut (or Cornuti [1635, 1966]), but Cornut found his subjects in Parisian gardens, not in Canada (Dickenson 1998:78–81). Soon, however, French explorers were providing first-hand observations of birds (Allen 1951:503–507, Ainley 1995) and other animals and plants (Chartrand et al. 1987). Especially noteworthy were two physician-naturalists, Michel Sarrazin (1659–1734) and Jean-François Gaultier (1708–1756). Sarrazin first went to Quebec as a surgeon in 1685, later returned to study medicine in Paris, and came back to Quebec as a physician in 1697 (Vallée 1927, Rousseau 1957:152–155, 1969). He became a corresponding member of the Académie Royale des Sciences, and for 20 years he sent herbarium specimens back to Paris; they are still in the Muséum d'Histoire Naturelle. Sarrazin's manuscript list of Canadian plants is reproduced photographically by Vallée (1927:257–273). Five of Sarrazin's letters to Réaumur are also extant and are published by Vallée (1927:217–232). Gaultier made "observations botanico-météorologiques" at Quebec which he sent to the Académie royale des Sciences from 1744 to 1750; they were published in the Académie's *Histoire* (Boivin 1974). He also compiled an inventory of the important plants and animals of Quebec in 1749 at the request of the governor-general, Roland-Michel Barrin dela Galissonière, and this was made available to Pehr Kalm (see below). In the rich sugar colony of Saint Domingue (Haiti) France even had a learned society (1784–1792), until a slave revolt drove out the French (McClellan 1992).

Various French explorers published travel accounts, often including natural history observations. A good example was the Jesuit professor Pierre-François-Xavier de Charlevoix (1682–1761). He left Paris to teach in Quebec, 1705–1709, and returned in 1720–1722 to explore the Great Lakes and then go down the Mississippi (Hayne 1974). His two volumes of travel accounts were not published until 1744, as part of his *Histoire et description générale de la Nouvelle France* (six volumes). The travel volumes were translated into English in 1761 and reprinted in 1923. Noteworthy is his Chapter V, on beaver, which runs to 18 pages in the 1923 edition (Charlevoix 1923, I:139–156), though the last two pages compare beaver and muskrat. His precise anatomical data came from a memoir on beaver anatomy by Sarrazin published by the Académie Royale des Sciences (1704; discussed and partly quoted in Vallée 1927:106–112). Charlevoix's account seems mostly reliable, excepting his information from the medical and theological faculties at Paris that beaver could be eaten as fish because of its scaly tail.

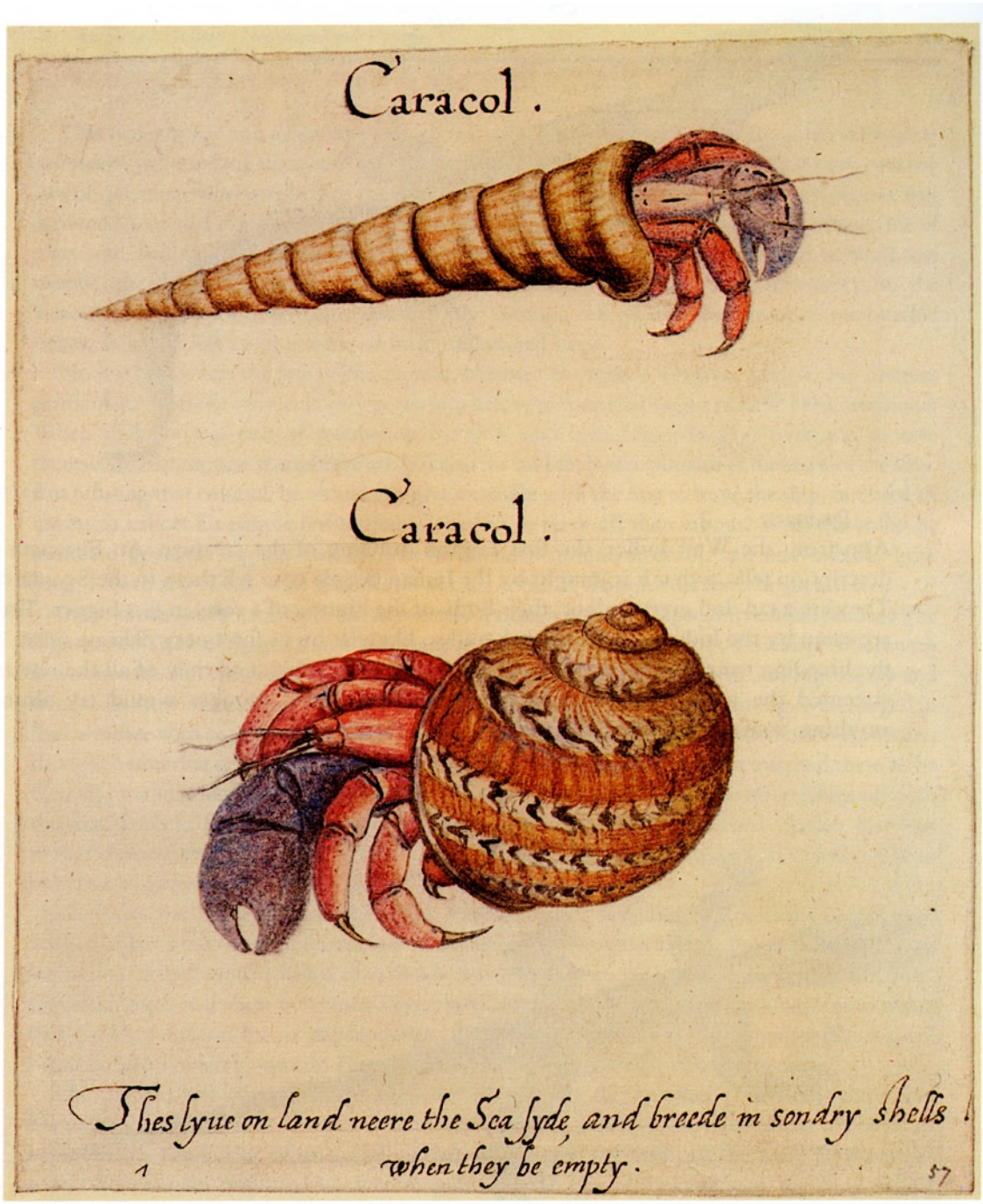
British military and political victories in America enabled its colonial science to develop more extensively than its rivals. Basalla identified three stages of colonial science: (1) inventory science by Europeans who published their findings in the mother country, (2) colonials educated partly in the mother country conducted similar studies, which were mostly published in the mother country, and (3) independent science, usually precipitated by a political break with the mother country, in which former colonists developed their own science education, institutions, and publications. There was some overlap between stages one and two. For example, the Reverend John Banister (1650–1692) was born in England, but became a colonial naturalist when he settled in Virginia in 1678 (Ewan and Ewan 1970). Yet other European naturalists continued to explore America and returned home to publish their findings throughout the 1600s and 1700s.

In 1585 Sir Walter Raleigh sent an English colony to Roanoke Island, North Carolina, but its members became discouraged and returned home with Sir Francis Drake in 1586. In 1587 Raleigh tried again and sent along mathematician–astronomer–surveyor Thomas Hariot (1560–1621) and also the artist John White (died about 1593) as governor. Hariot later published *A Brief and True Report of the New Found Land of Virginia* (1588, 1955) which described the colony's climate and resources for prospective settlers. White made skillful paintings of Indians, birds, fish, crabs, and insects. Thomas Penny acquired four of White's insect illustrations, which were later published in Thomas Mouffet's *Insectorum* (1634:61, 88 [98], 112) and in its English translation, *The Theater of Insects* (1658: 936 , 967, 978.) (I discussed Mouffet's work in part 12, Egerton 2004*a*:29–30.) Four of White's illustrations were also reproduced by Mark Catesby (see below and Raven 1964).

John Lawson (about 1650–1711) was possibly an apothecary (Stearns 1953:335), who sailed to America for adventure on 1 May 1700 (Lawson 1967:7). In December the Lord Proprietors of Carolina appointed him to make a survey of the colony's interior, which he did, accompanied by five Englishmen and four Indians. It lasted from 28 December 1700 to 23 February 1701, and he estimated they covered 1000 miles; a modern estimate is 550 miles (Lefler 1967:xv). This exploration provided information for his map of North and South Carolina, which he published in *A New Voyage to Carolina, Containing the Exact Description and Natural History of that Country* (1709). A modern map indicating his route and his own map are both included in the most recent edition of his book (Lawson 1967:x, xxxviii).

From acquaintances in Charles Town (Charleston, South Carolina) Lawson learned that James Petiver, whom we met earlier (Allen 2004, Egerton 2005:309, 2006:117), collected natural history specimens, published lists of those received and the names of the senders, and provided some assistance to worthy collectors (Stearns 1953:257–264, 1970:305). Lawson sent him a letter on 12 April 1701 (printed in Lawson 1967:267) telling of his interest in collecting specimens for Petiver. This project was one incentive for collecting the information found in his book's extensive discussion of plants and animals (Stearns 1970:306–315). Lawson devoted almost 25 pages (1967:96–120) to the trees, shrubs, and vines of Carolina. He was unconcerned about whether they were native or introduced, although most were native. He emphasized their uses but did not limit himself to utilitarian comments. For example, he identified three kinds of honeysuckle—which grew respectively in moist ground, clear and dry land, and in swampy woods—their only use being to beautify nature. His long discussion of the kinds and uses of oak trees included "Turkey-Oak," whose only known use was to provide food for turkeys.

Aside from his map, his only illustrations were of seven mammals, three snakes, and a turtle shell. The bear is catching a fish, the raccoon is using its tail as bait to catch a crab, and a coiled snake is charming a squirrel out of a tree. He did not explicitly relate his illustrations to his text, which created some ambiguity, since the illustrations are not very precise. What kind of snake is charming which kind of squirrel? And in his illustration (Fig. 2), what kind of cat is attacking which kind of deer?



5 *Land Hermit Crabs*
These charming little drawings were probably made in the West Indies, though White uses them for decoration in his Virginia fishing scene.

Fig. 1. John White's painting of purple-clawed hermit crabs (*Coenobeta clypeatus*) of the West Indies living in borrowed shells of *Turritella varigata* (upper) and of *Natica canrena* (lower). Hulton and Quinn 1964, I:70, II: Plate 5.

Fig. 2. An ambiguous cat species attacking an ambiguous deer species. Lawson 1967:128.

He discussed four kinds of cat—panther, cat-a-mount, wild cat, tiger—which presumably are species now called cougar, lynx, bobcat, and jaguar, and he discussed three kinds of deer—elk, stag, and fallow deer—which presumably are only elk and white-tailed deer. The cat most resembles a bobcat, and the antlers resemble those of elk more than white-tailed deer. Bobcats are known to kill fawns, and also adult white-tailed deer in winter; whether they kill adult elk is less certain.

Lawson discussed 27 kinds of "beasts" (mammals), though his list mentions two sorts of unspecified rats and two sorts of unspecified mice, 129 kinds of birds, 42 kinds of saltwater fish (including whales, porpoises, and dolphins), 20 kinds of freshwater fish, 20 kinds of shellfish, and 22 kinds of "insects," which were reptiles, with additionally unspecified frogs and worms listed as "insects"; there were no actual insects listed under that heading. Here is a sample of his accounts of birds, on the Carolina parakeet (Lawson 1967:146–147):

> *The Parrakeetos are of a green Colour, and Orange-Colour'd half way their Head. Of these and the Allegators, there is none found to the Northward of this Province. They visit*

us first, when Mulberries are ripe, which Fruit they love extremely. They peck the Apples, to eat the Kernels, so that the Fruit rots and perishes. They are mischievous to Orchards. They are often taken alive, and will become familiar and tame in two days. They have their Nests in hollow Trees, in low, swampy Ground. They devour the Birch-Buds in April, and lie hidden when Weather is frosty and hard.

Encouraged by Petiver, he intended to write even more on American natural history when he returned there after publishing his book in London. He wrote a rather long letter from North Carolina in 1710 to Petiver outlining his plans (Lawson 1967:269–272), but those plans failed because he was killed by Tuscarora Indians in 1711. However, what he had already accomplished was considerable for the time: "the first major attempt at a natural history of the New World" (Feduccia 1985:8; see also Allen 1951:461–463). His most recent editor devoted more than two pages to a discussion of authors who plagiarized Lawson's book (Lefler 1967:lii–liv).

Mark Catesby (1682–1749) was from a comfortably middle-class family, and he became interested in natural history through his acquaintance with John Ray (Frick and Stearns 1961:9), who lived not far from the Catesbys. Although not university educated, Mark Catesby became the greatest British natural history explorer of his time (Stearns 1970:315). One of his sisters, Elizabeth, married physician William Cocke; he took her to Virginia, where he developed a successful practice and became a prominent politician. It was convenient, therefore, for Mark to travel to Virginia to collect plants for English patrons and stay with the Cockes (Allen 1951:470–473, Brigham 1998:95–96). He arrived there on 23 April 1712 and did not return to England until October 1719. He was constantly exploring and observing plants and animals under natural conditions, but his only records of his findings were drawings of some plants and animals and the plants, alive or dried, which he sent to his patrons. However, he had been successful in what he had undertaken, and at a meeting of the Royal Society on October 19, 1720 the newly appointed governor of South Carolina, Francis Nicholson, offered Catesby a pension of 20 pounds a year to "Observe the Rarities of the Country for the uses and purposes of the Society" (Frick and Stearns 1961:18, Meyers and Pritchard 1998:6). This time he was committed to making written observations. He reached Charles Town on 23 May 23 1722 and stayed in the Carolinas until January 1725, when he went to the Bahama Islands for about a year before returning to England in 1726.

Upon arriving in South Carolina, Catesby "unexpectedly found this country possessed not only with all the animals and vegetables of Virginia, but abounding with even a greater variety" (Catesby 1985:137). In other words, his earlier experiences in Virginia provided a rich background for his new endeavor. His first year was spent on the coastal plain, where most colonists lived, but he later ventured into the piedmont and mountains with Indian porters and guides. Aside from collecting plants and animals, he enjoyed hunting "buffalo, bears, panthers, and other wild beasts" (Catesby 1731–1743:unnumbered "Preface," 1985:137). The inventory natural history of the colonial era was never limited to identifying and describing species. His introductory discussion (Catesby 1731–1743:i–xvi, 1985:137–151) described the geography, climate, soil, rivers, and Indians of the Carolinas. He drew upon both his own observations and Lawson's book, though only acknowledging the latter source when discussing Indians (Feduccia 1985:8). Catesby's interest in placing species within their natural surroundings was symbolized by his very impressive color plates in *The Natural History of Carolina, Florida and the Bahama Islands* (1731–1743 [1729–1747]), the great majority of which have animals and plants portrayed together that are found together in nature. His 220 plates illustrate 109 birds, 33 amphibians and reptiles, 46 fishes, 31 insects, 9 quadrupeds, and 171 plants. Both his birds (Feduccia 1985) and his plants (Howard and Staples 1983) are identified and discussed by modern specialists. Publication of his *Natural History* was the major project of his life after he returned from America in 1726; it took 20 years to produce the book. He was a self-taught artist who learned how to engrave his il-

lustrations, and he also hand-colored them, with some assistance (Dickenson 1998:148–152). The work appeared periodically in sections of 20 plates plus text, 1729–1747, although the title pages of the two volumes give publication dates as 1729 and 1743. He was invited to the Royal Society to exhibit the first part on 22 May 1729, and he also exhibited later parts at subsequent meetings. It was on the basis of this achievement that he was voted a member of the Society on 26 April 1733 (Frick and Stearns 1961:37–38). All illustrations in Volume I are by Catesby, but he lacked enough of his own illustrations to fill Volume II. He borrowed copies of John White's illustrations from Sir Hans Sloane and plagiarized four fish (catfish, remora, globe or puffer fish, and gar, on plates 23, 26, 28, and 30, respectively), a land crab (plate 32), the Bahama iguana (plate 64), and the swallow-tail butterfly (plate 97) (Feduccia 1985:6). Also, with the artist's permission, Catesby based plates 61 and 85 on plant drawings by Georg Dionysius Ehret, and he combined Ehret's drawings with his own on nine plates (Meyers 1997:23–23, 27, note 83).

In 1768 King George III bought a version of Catesby's *Natural History* that was bound in three volumes instead of two and was illustrated not with Catesby's 220 etched plates but with his 263 actual illustrations, either watercolor or pen and ink. This set is in the library of Windsor Castle, and in 1997 more than 50 of these original illustrations became the foundation for a traveling exhibition that toured five museums in two years. The illustrations displayed also became the basis for a book that reproduces and describes them, and compares the originals to the published illustrations (McBurney 1997).

Catesby's second plate shows the "Fishing Hawk" (Osprey) clutching a fish it has caught, and his first plate shows a Bald Eagle catching in midair a fish it has forced an Osprey to drop.

Fig. 3. Bald Eagle stealing fish from Osprey. Catesby 1731–1743, I: Plate 1.

This was his best action picture. Artistically, one of his best illustrations is of a very lifelike Blue Jay calling from a branch of smilax with berries.

Fig. 4. Blue Jay on smilax. Catesby 1731–1743, I: Plate 15.

His account of the Blue Jay is limited to a physical description, but his account of smilax is ecologically interesting (Catesby 1731–1743, I:15)

> *This plant is usually found in moist places; it sends forth from its root many green stems, whose branches overspread whatsoever stands near it, to a very considerable distance; and it frequently climbs over sixteen feet in height, growing so very thick, that in summer it makes an impenetrable shade, and in winter a warm shelter for cattle. The leaves are of the color and consistence of laurel, but in shape more like the bay, without any visible veins, the middle rib only excepted.*
>
> *The flowers are small and whitish. The fruit grows in round clusters, and is a black berry, containing one single hard seed, which is ripe in October, and is food for some sorts of birds, particularly this jay.*

Catesby described and illustrated the Passenger Pigeon and Carolina Parakeet, which are now extinct, and the eastern subspecies of the Prairie Chicken, called the Heath Hen, which is also extinct, and the Ivory-billed Woodpecker, which is practically extinct.

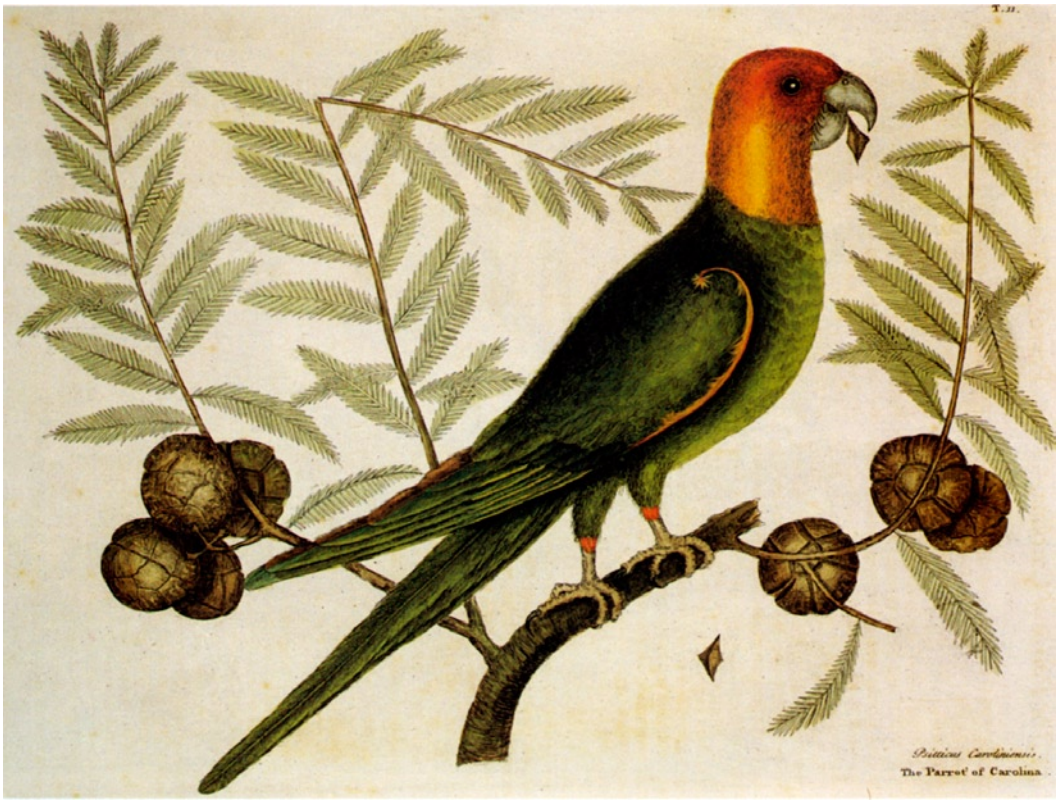


Fig. 5. Carolina Parakeet and bald cypress. Catesby 1731–1743:Plate 11.

Here is part of his account of the Carolina Parakeet, omitting his description of it, which is longer than Lawson's, quoted above (Catesby 1731–1743, I:11):

> *They feed on Seeds and Kernels of Fruit; particularly those of Cypress and Apples. The Orchards in Autumn are visited by numerous flights of them; where they make great destruction for their Kernels only: for the same purpose they frequent Virginia; which is the furthest North I ever heard they have been seen. Their Guts are certain and speedy poison to Cats. This is the only Parrot kind in Carolina: some of them breed in the Country; but most of 'em retire more South.*

In Lawson's account quoted above, he claimed that the parakeet hibernated in winter. Despite John Ray's dismissal of this notion in the 1670s (quoted in Egerton 2005:306), it remained a popular idea during the 1700s, but was also rejected by Catesby, who had known Ray. Catesby's skepticism was based not merely on Ray's judgment; while in the Bahamas he found evidence that when rice-birds (Bobolinks) disappeared from Carolina, they had merely flown south (Catesby 1731–1743, I:14, 1985:126)

> *In September 1725, lying upon the deck of a Sloop in a Bay at Andros Island, I and the Company with me heard, three nights successively, Flights of these Birds (their Note being plainly distinguishable from others) passing over our heads northerly, which is their direct way from Cuba to Carolina; from which I conceive, after partaking of the earlier crop of Rice at Cuba, they travel over sea to Carolina, for the same intent, the Rice there being at that time fit for them.*

This observation was buried in a natural history book where it might not have received wide notice, but he also wrote a more general and detailed article on bird migration, which was published by the Royal Society (Catesby 1747). Catesby's contributions were important enough to earn him the title of "founder of American ornithology"(Allen 1951:463–478).

Probably the best educated explorer-naturalist who came to America in the 1700s was Pehr Kalm (1716–1779), who studied under Carl Linnaeus and became a professor at the University of Åbo in Finland (Granit 1973). In 1748, the Royal Swedish Academy of Sciences sent him to North America to collect useful plants that could survive in Scandinavia. On the way, he stopped in London, visited the Royal Society and met Catesby on 21 April, and visited his home on 23 May, where Catesby advised him on collecting and preserving plants and animals in America (Kalm 1892:17, 51–52, 118–119, Frick and Stearns 1961:47–48). Kalm reached Philadelphia in September and left for home in February 1751. Although his Swedish sponsors expected him to spend most of his time in Canada, he preferred the Philadelphia region. The city was the intellectual center of America, and there was a Swedish colony nearby in New Jersey, where he found a wife. He did journey to Canada twice, in 1749 and in 1750, but his discoveries were more important to natural history than to Scandinavian agriculture and forestry (Skottesberg 1957). This trip was the great adventure of his life, and he spent much of his time afterwards publishing his travel journal and related scientific articles. His Swedish *En Resa til Norra America* (three volumes, 1753–1761) was translated into German (three volumes, 1754–1764), English (three volumes, 1770–1771), and Dutch (two volumes, 1772). A French travel book (Rousselot de Surgy 1768) was also based largely on Kalm's book. Two of the three sets of dried plants that he collected are preserved at the Linnean Society of London and at the University of Upsala, and are listed by Juel and Harshberger (1929); the list includes 60 species new to science.

Kalm's observations on American plants and animals supplemented those by Lawson and Catesby, being made significantly farther north than theirs. Since I previously discussed some of his observations of ecological interest from his travel book (Egerton 1976:313–314, 1977), here I discuss four of his six articles (one on Pennsylvania's natural history and climate, two on animals, and three on plants) translated into English. The first article, published in a Swedish journal in 1749, was a letter on his trip from London to Philadelphia and his first impressions of America in 1748. He was very impressed with the greater variety of plants in Pennsylvania than in Scandinavia. The fact that shells were found in rock strata, revealed when wells were dug, convinced him that the coastal plain had once been under the sea and that "the water is subsiding yearly in this part of the world" (Kalm 1943:173). Members of the Royal Society of London had asked him to investigate why plants from North America grown in Europe bloom so late that their seeds seldom ripen. Kalm concluded that the reason was difference in climate (1943:174).

> *The heat here is usually dreadful during the summer and lasts further into autumn. The months of September and October are neither hot nor cold and tend to be the loveliest of the year…September resembles most closely the month of July in Sweden and October the month of August. There are seldom cloudy days. The winds are rarely strong. The weather is usually calm or the breeze is mild. . . . During these months and late in the autumn, if it can be so called, most plants are at their best.*

He obviously considered climatic data as among the most important he should collect, and he included daily weather reports in his book from August 1748 (a month before his arrival) until January 1750 (Kalm 1937, II:738–769).

In May 1749 large numbers of the 17-year locust (cicada) emerged from their subterranean abodes, shed their nymphal cases, and then crawled up trees to await the drying of their wings. A man digging a pit re-

Fig. 6. Pehr Kalm after he returned from America.

ported the nymphs at a depth of 12 feet. Kalm did not know what they ate underground, but some speculated that they ate dirt. The noise the adults made was so loud that no one could miss their time of appearance. They had previously appeared in 1715 and 1732, but further away they appeared in different years. He left for Canada before they disappeared, but he was told they had stayed about six weeks, then disappeared. While they were abundant, they were eagerly eaten by swine, chickens, forest birds, particularly shrikes, and Indians. Kalm thought this species was probably the same as Réaumur described from France in his *Mémoires pour server à l'histoire des insectes*, V: Memoir 4. Kalm carefully observed egg-laying (Kalm 1953:140–141):

> *The insects slit the fine moist bark of small branches with the ovipositor, which later penetrated deep into the branch, depositing eggs or other material. As a result, large numbers of branches dried up. A type of mucus is deposited on the branch by the ovipositor at the time of penetration. Although the bark on the young twigs of nearly all trees may be slit, the insects seem to prefer that of oak and apple. The ovipositor can not penetrate thick rough bark. The year following the infestation, large quantities of branches died and fell to the ground because of this bark injury. I could detect no other damage, but some said entire trees dried up. This might well happen to young trees where all the bark is tender and can be penetrated by the ovipositor. Permanent damage might result if too many young twigs on a large tree were destroyed just before a hot spell, or a long dry one.*
>
> *It is generally believed that the insect shreds the bark in order to deposit eggs. I can not say for certain if this is the case, although it would seem to be so.*

Kalm's article appeared in a Swedish journal in 1756 and was probably unknown in America or England. One of his Philadelphia acquaintances, John Bartram, independently sent specimens and his own observations on the same species to Peter Collinson in England, who published an article on it in 1764 with an illustration of Bartram's specimens (Fig. 7).

Impressive as the numbers of this cicada were, the numbers of Passenger Pigeons were even more impressive. They had already been described by Lawson (1967:145–146) and Catesby (1731–1743, I:23, 1985:60–62), each of whom reported that they nested farther north than he had traveled. Kalm reported in 1759 that they did nest in Pennsylvania and New Jersey, where they were especially abundant in February and March. They appeared in much greater numbers in a few occasional years, including 1729 and 1740, than usual, which Kalm attributed to two reasons (Kalm 1911:58–59):

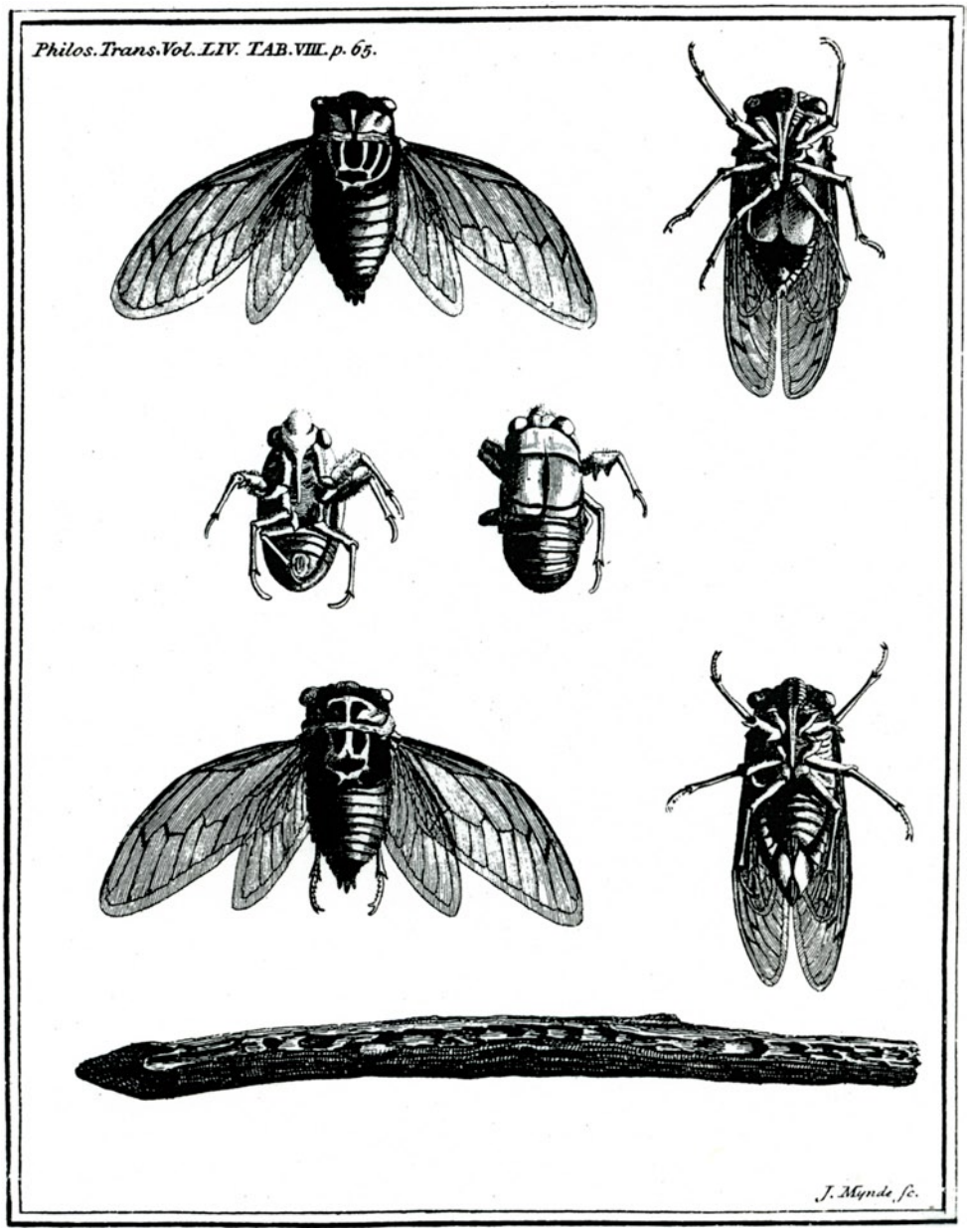


Fig. 7. 17-year locust (cicada), *Magicicada septendecim*. Collinson 1764, 54:65.

First, when there is a failure of the crop of acorns and other fruit in the places where they otherwise generally spend the winter, thus rendering their supply of food insufficient to last until the ensuing summer; and second, and chiefly, when an unusually severe winter with abundant and long remaining snow happens to occur in their customary winter haunts, thus covering the ground and making it impossible for them to secure the acorns, beech-nuts and other fruit and seeds on which they otherwise feed at this season: in such cases they are forced to leave these localities and seek their food down along the sea coast where the win-

ters, owing to the sea air, are always milder, and the ground more and earlier free from snow.

From talking to older persons, he learned that there had once been even more Passenger Pigeons in New Sweden than when he was there, which Kalm attributed to the woods being cleared, more people, and more cultivated land. When he went to Canada in June 1749, he beheld pigeon roosts that were undisturbed by humans.

They were crowded onto trees so densely that they caused even big trees to collapse. He found that the pigeons' northern boundary was determined by the northern range of oak and beech trees. Kalm listed their food seeds in Pennsylvania in the order in which

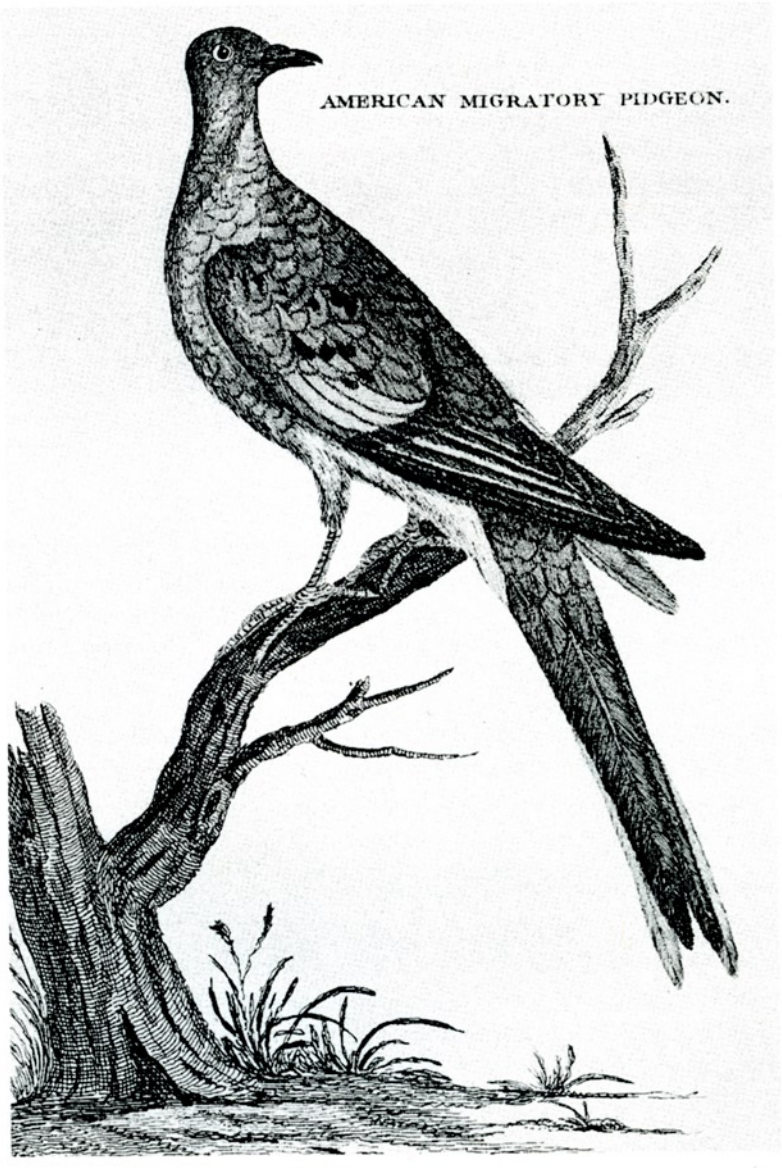


Fig. 8. Passenger Pigeon. Kalm 1937:252.

their seeds matured: maple at the end of May, elm in the beginning or middle of June, mulberries (their favorite) in early June, rye (not favored) and wheat (very favored) in midsummer, buckwheat in mid-September, and acorns in September and later. Beechnuts also matured in September, but they were sparse south of Canada. They also ate the soil at salt springs. They usually remained in Canada until snow covered their food, and returned there when the snows melted.

In the English translation of Kalm's *Travels* (three volumes, 1770–1771), the last 30% is devoted to his observations in Canada. On 2 July 1749 the governor of Fort St. Frederic showed Kalm a lengthy inventory on the plants, animals, and minerals of Canada compiled by Gaultier at the request of Governor-General Galissonière, who himself added to Gaultier's manuscript. This manuscript survives and is discussed by Bonnault (1957) and Rousseau (1966). In Quebec City he met Gaultier on 8 August, and three days later they hiked out of town to collect plants. Kalm was impressed with how seriously the Canadians took natural history.

Kalm reported in a 1776 article that the red mulberry trees (*Morus rubra*) grew from the Carolinas to Niagara, though less commonly in New York State than farther south. He found they grew in various kinds of soils, and "Scarcely any tree can be found which thrives as well on poor soil as this one," (Kalm 1950:222). Birds ate the berries and spread the seeds in their dropping—to the disgust of farmers who considered the seedlings as the worst pests in their fields. Kalm observed that when these trees grew in dense forests, they generally did not bear fruit, but the ones at the forest edge bore abundant berries. John Bartram told him that he had a red mulberry in his yard that bore only female flowers until 1750, when it bore many male flowers, but Kalm was skeptical and suspected that Bartram had not observed it closely enough before 1750. In Pennsylvania and New Jersey, this species grew leaves in early May and flowered shortly thereafter. In 1750, the berries ripened there by 10 June, but at Albany, not all berries were ripe on 10 July. Mulberries were among the first to lose leaves in the fall, and in Pennsylvania they were bare by 22 October 1750. Severe cold could kill its shoots but not its roots, which send up new shoots in the spring. Passenger Pigeons were fond of mulberries, as were Indians, who ate some while fresh but also dried some and used them later when baking bread. Kalm thought the mulberry leaves could be used to raise silkworms, but Americans thought that would be too much trouble. His articles on black walnut and butternut trees (Kalm 1942) and hickory (Kalm 1945) contain similar information.

Only a few European naturalists managed to come to America, collect specimens and observations, and return home to publish important findings, but the ones who did, including Lawson, Catesby, and Kalm, found a receptive audience among fellow naturalists and the educated general public. Among these three, Catesby's work made a strong impression because of the 220 color plates (Wilson 1978:123–185), but the plates also made it the most expensive. Consequently, Lawson and Kalm's books were more widely available. Naturalists had a keen interest in the differences between European and American species, including information on the conditions under which American species flourished. This curiosity encouraged observations on what we call ecological aspects of life histories.

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Commentary

Rachel Carson and Mid-Twentieth Century Ecology

With the obvious exception of Charles Darwin, perhaps few biologists match the influence of Rachel Carson on society and on her adopted science. That science was not the marine biology of her popular books, but the previously little-known science of ecology that was transforming itself—and would transform itself in no small part due to Carson's influence—into the science that has today become a household word. A study committee of the Ecological Society of America (ESA) on the direction of ecology in 1964 credited *Silent Spring* with creating "a tide of opinion which will never again allow professional ecologists to remain comfortably aloof from public responsibility."[1]

Although ecological histories have begun to incorporate the history of the environmental movement with that of the science, Carson's work has yet to be fully integrated into the history of ecology. It needs to be part of that history.

Rachel Carson's training in ecology

Questions about Rachel Carson's scientific knowledge base arose not just from those in the chemical industry, as was expected, but also from those in ecology. In an important review in *Scientific American*, Cornell University ecologist LaMont Cole, soon to be President of the Ecological Society of America (ESA), criticized her understanding of the "balance of nature" and of evolutionary processes.[2]

How much of an ecologist was Carson? And in what field of ecology? Neither question can be answered satisfactorily, but there are fascinating hints.

The transitional and polymorphous nature of ecology during Rachel Carson's life makes it difficult to target indicators of expertise on her part. There were no courses with any specifically identified ecological content offered at Johns Hopkins University when she attended classes there. However, without actual lecture notes or reading lists, it is difficult to exclude subject matter from a course. Three of the six-member faculty of 1929 in biology were listed as members in the ESA's first membership directory and would publish in the society's journal, *Ecology*, two doing so just prior to and during Rachel Carson's time there. She therefore had opportunity at Hopkins to be exposed to two venerable parts of ecology: animal and plant physiology.[3]

Raymond Pearl, who developed the logistic growth equation that is so fundamental to ecology, and in whose laboratory Carson finished her education at Hopkins, was not an ecologist at all, but a human biologist who pioneered the science of demography. Pearl's logistic equation, a foundation for environmental thought, never found its way into Carson's works, even by inference. Pearl did, however, exert an important influence on her through his holistic view of biology, in which biological studies served to promote understanding of the human condition. Similarly, Herbert S. Jennings, Carson's graduate examining committee chairman, was not recognizable as an ecologist, yet a 1965 compendium of ecological literature includes a paper on methodology published by him in 1904. Pearl's view—with man a part of, not apart from biology—was shared by Jennings.[4]

Given the density of ecologists—avowed or otherwise—at Hopkins, Carson had to have been exposed to ecology, but it was a different sort from the ecology that was to burst out in America after World War II, and that would be proclaimed the science of the environment essentially simultaneously with the publication of *Silent Spring*. The ideas of Frederick E. Clements, Victor E. Shelford, Charles S. Elton, and Giorgii Gause (and Pearl), which would soon be stirred together with those of others to create a new ecology, left no tracks leading through her graduate experience at Hopkins. That much is evident in examining her works and notes.

First, there is her dissertation, a thorough document of one hundred and one pages of description that strays not a single step away from the physiological development of the fish organ under study. Neither is there a hint of any ecological ideas that had to have been in the air at Hopkins.[5]

Then there is her Woods Hole experience. E. A. Andrews (of her examining committee), Jennings, and Reinhardt P. Cowles, under whom she studied marine biology at Hopkins, were regulars on its summer staff. Carson was twenty-two when she found herself in the setting of a picture-book village by the sea from which fascinatingly equipped research vessels set out. It initiated a lifelong passion in her for the seashore. And until *Silent Spring* caused her to broaden her contacts, the scientific advice she sought was often from people having a Woods Hole background. She relied on Henry Bigelow, for example, until he advised in a letter to her that he was "too ancient to keep up-to-date or even understand all the new language."[6]

As impossible as it is to establish what she might have read or heard in lectures while at Hopkins, Woods Hole presents an even greater mystery. Modern ideas of ecology were at least in the air at Hopkins based on evidence presented; there is less evidence for that quality of air at Woods Hole. Shelford, then pioneering animal ecology in the United States, called "that Woods Hole establishment" anti-ecological. Photographs of Woods Hole scientists of those days almost invariably have them posed with microscopes, and a laboratory emphasis was prominent in the topics for seminars and lectures during Carson's stays there. Shelford's remark, however, could not have described the Woods Hole of the 1920s when his student, Warder Clyde Allee, who would head what would become known as the Chicago "school" of ecology, was there doing research. Allee would go on to co-author the highly influential text, *Principles of Animal Ecology*, which came to be known among ecologists as "great *AEPPS,*" after the authors' initials.[7]

The Woods Hole "mess" provided ample opportunities for informal interactions. A spirited discussion could have had as much impact on Carson's thinking as a lecture. There were also the shelves of the Woods Hole library, which held all of the latest in ecology. Unfortunately, both the nature of her discussions and subjects of her reading are lost to us.[8]

Her early works

Scientists continue their education well beyond their formal school years. After her dissertation, Carson's books stand as the most direct testimony to her knowledge. They hint at a view of ecology that was typical of her times.

The Sea Around Us lists *Ecological Animal Geography* as further reading. This is a 1937 translation (and bowdlerization) of a 1924 work by a German animal geographer. The translators, Allee and Schmidt of *AEPPS*, liberally updated the text with ecological principles and results that were in large part their own. It is not known what Carson absorbed from *Ecological Animal Geography.* "About a fourth of the book is concerned with marine animals," she noted.[9]

The marine environment was, after all, her love. Although there are no notes made by Carson extant from *Ecological Animal Geography*, she probably would have been interested in specific species, their distribution, and their life histories, as is consistent with research notebooks that have come down to us. In preparing *Edge of the Sea*, she made 23 pages of notes on a paper in *Ecological Monographs* having to do with the species present in a tidal inlet and their distribution. In the April 1942 issue of the same journal, purchased by Carson as a single copy, parts of a report on the ecology of sand beaches in Beaufort, North Carolina, have been copiously underlined and bear occasional parenthetical remarks along margins. The section titled "Adaptations of Sand Beach Animals" is heavily annotated. It is a "who is who" and "who does what to whom" of that seashore. Unmarked by Carson is the main data table. Unmarked also is a section entitled "Seasonal Progression on Sand Beaches." Neither did Carson seem to care much for what was written about the plants in the paper. Marine organisms, what they eat and what eats them, appear to have been Carson's overriding interest in the ecology of sand beaches.[10]

Another monograph she requested was on a tidal inlet at Cape Ann, Massachusetts. The dry information in the monograph on the barnacle common in the inlet and its dog whelk predator is impossible to map to Carson's lively prose on the same subject in *The Edge of the Sea*. Its title, "A Study in Bio-ecology," however, has potential links to modern ecology. Bio-ecology was the term used by Shelford and Clements for their attempt to combine animal and plant ecology around the community concept. Recognizing the amorphous nature of ecology as spread through various academic departments, they also saw in the term a way to escape the ambiguous meaning then attached to ecology. Clements had been the champion of the *superorganism* concept of the plant community, seeing the process of succession to climax as a physiological development to a self-regulating, mature entity determined by the regional climate. Within that concept of homeostasis is the balance of nature concept.[11]

Under the Sea Wind is classic nature writing, and Carson's notes for it reflect a concern for writing technique. "What age child do editors prefer to attract?" for example, is no doubt answered in the book by the story of Scomber the mackerel. "Science explains-normal range—When pop. pressure great, many spill into new territory," "Extremes of production" noted by a figure, and the distribution of plankton into zones, however, are items in her notes that reflect the most current ecology of that time. Carson's notes and research materials for *The Sea Around Us* are heavy on physical oceanography and oceanographic research methods.[12]

A paper entitled "The Edge of the Sea," presented at an American Association for the Advancement of Science symposium, was the only purely scientific paper Carson ever gave to a professional academic organization. In it, she pursued questions such as "Why does an animal live where it does?" and "What is the nature of the ties that bind it to its world?" The questions, Carson proposed, showed progress in the science of ecology beyond the mere descriptive and into greater integration with other sciences. Carson almost parenthetically quotes without citation words of W. C. Allee, whom she identified as an animal ecologist at Woods Hole in the early 1930s. Allee was an independent investigator there in 1931, 1934, and 1936, but Carson was there in 1929 and 1932. However, Allee was a member of the corporation in 1932 and might have made a brief appearance. Thomas Park, Allee's student, arrived in Raymond Pearl's laboratory as a post-doc in 1933, but Carson's assistantship in the laboratory had ended in 1931. Whether they met or not, Allee managed somehow to exert an influence on Carson, most likely through her Woods Hole experience.[13]

Silent Spring

It is in researching *Silent Spring* that the name Charles Elton, a founder of modern ecology, first appears in her notes. His work represents one of the paths to the ecosystem concept fervently promoted by Eugene P. Odum. Although this concept was not initially favored by the Chicago school, it shared the organicism that underlay Carson's "ecological concept" in *Silent Spring*. The emphasis on energy and nutrient dynamics in the systems approach of Raymond Lindeman in combination with the radioactive tracer studies of the Odum brothers and others are what allowed an ecological explanation for the decline of raptors due to DDT use.[14]

Yet it is not Elton's classic text, *Animal Ecology*, but his less technical work, *The Ecology of Invasions*, that Carson makes note of. We know that Carson first became aware of Elton's popular—it grew out of three BBC radio broadcasts—book on invading species when she was introduced to it by E. O. Wilson while she was already working on the manuscript that was to become *Silent Spring*. Based on her notes, Carson may not have taken much more from the text than a literary device, although what remained unwritten but in her memory can never be ascertained. "Elton recalls the youth of ecology as a science by saying that only 25 years ago it was in its Neolithic age," Carson carefully typed, going on to conclude: "One has only to look about to see that, in terms of its philosophy, applied entomology is still in its Stone Age."[15]

For advice on *Silent Spring*, Carson relied heavily on Clarence Cottam, F. Raymond Fosburg, and Frank E. Egler. Wildlife biologist Cottam and botanist Fosburg described themselves as Carson's personal friends. They are not likely to have guided her through the science of ecology. In his correspondence with her, the word ecology is not to be found in advice Cottam gave her about wildlife and pesticide issues; some of this advice, such as the relationship between DDT and the decline of Bald Eagles being questionable, is itself questionable.[16]

Fosburg is a problematic figure. Although he became an active member of the ESA who urged ecologists to promote their own interests, judging from reprints he provided Carson, his knowledge of modern ecology was superficial, at best. In one, he identifies himself as preoccupied with "*human ecology.*" In another reprint sent to Carson, he proposes a definition for the term, *community ecologist*. By then community ecology had been well established as an area of ecological investigation that was absolutely not synonymous with human ecology, as Fosburg proposed for it. In still another reprint, he identifies himself as a systematic botanist having "inclinations toward ecology."[17]

Then there is Egler, a scientific maverick with an ax to grind and a decidedly not dispassionate approach to the science of his choice. A prolific letter writer—they were truly missives, in his case—he waged war against herbicide use, enlisting any and all who might help as allies in his cause and writing off as enemies all those who disagreed with him in any way. "I was once an Assoc. Prof. of Physics," he announced in a page of correspondence that could instantly be recognized as his from across the room. (His writing style could only be described as early Tom! Wolfish abetted by a recalcitrant typewriter; it let his cantankerous personality show through.) After that wartime appointment, Egler, born to a New York family of apparent means, lived the life of an independent scholar. His longest appointment was with the American Museum of Natural History in New York from 1949 to 1954. He had his own view of ecology and ecologists. "I would sooner trust an intelligent and self-educated layman, than a Ph.D in ecology who is an 'expert' in one of the fashionable specialties of the day," Egler later announced to the ESA membership. This low opinion of academics he had earlier shared with Carson in their correspondence.[18]

As in her previous books, Carson also obtained assistance by soliciting advice and reprints from appropriate specialists. For *Silent Spring*, ecologists E. O. Wilson, Paul Errington, and C. S. Holling are examples. Robert Rudd urged her to present "'good' ecology" to the public, which he identified as having biological, chemical, and sociological ingredients, but Carson focused instead in their correspondence on the details of Lady Bird Beetle collecting. She may have already known more than enough "good" ecology. William L. Brown, Jr., to whom she had communicated her hope of preparing a book on what she saw was "a serious threat to the basic ecology of the earth," sent her reprints on "general evolutionary–ecological subjects" and cautioned her about what he called the "biome concept." At that time, the biome concept to which Brown referred was that of the Clementsian "superorganism" in which the "balance of nature" could be found in its supposed homeostatic mechanisms. There was no mention of Brown's suggestion of caution in her reply. Again, it may all have been old news to her, and she had issues on her mind that were more pressing at the time—failing health and the need to master both pesticide chemistry and the physiology of carcinogenesis, for example.[19]

Ecology in *Silent Spring*

In the text of *Silent Spring* Rachel Carson's use of "ecology" is spare and more often than not used as "the ecology," or as a synonym for some more specific concept. (At times she showed a lack of comfort in the use of the term. In a letter to Egler, written well into the writing phase of *Silent Spring*, she wondered if "ecological history" was an appropriate term.) She equates ecology with "interrelationships" and "interdependence." The indirect poisoning of robins by insecticides reflects "the web of life—or death—that scientists know as ecology." This poetic but careless use of the term is stretched even more in her next sen-

tence, where she begins a discussion of "an ecology of the world within our bodies." It must be fair to say that the ecologists who reviewed her book were—much like ecologists today—squarely on the side of protecting the environment. Had they not been so, there would have been additional ammunition for pesticide manufacturers to use against Carson's professionalism.[20]

The review of *Silent Spring* written by Ray Fosburg in the journal *Ecology* was, of course, favorable. Strangely, however, he gave the opinion that the book was not intended to be a scientific report. Frank Egler perhaps sought to correct Fosburg's gaffe when he reviewed a symposium edited by Fosburg. On the pages of *Ecology*, he called *Silent Spring* "'original research' in the truest sense of the word." B. N. K. Davis took Carson to task in the pages of the *Journal of Ecology*, a publication of the British Ecological Society, for her treatment of carcinogenesis, finding those sections "hypothetical and unconvincing," but concluded after fact checking that factual errors were relatively unimportant. Davis found that the confidence Carson placed in the "ecological concept" of pest control was "not generally shared," the only remark having to do with ecology in the review. Ian Baldwin, an agricultural scientist, took umbrage in his review in *Science* with what he saw as a lack of balance and the "sarcastic and unjustified attack on the ethics and integrity of many scientific workers." Frits Went, then the Director of the Missouri Botanical Garden, praised the book in the *AIBS Bulletin*, the precursor to *BioScience*, but took little note of Carson's use of ecology in it, simply acquiescing in her having equated "ecological" with "natural."[21]

LaMont Cole's review in *Scientific American* was an important one in a number of ways. Cole was then one of the nation's leading ecologists and one of the first to touch on the practical environmental applications of general ecological principles. In *Scientific American* he was communicating to a very broad scientific audience. (The journal had not yet changed ownership and turned to the popular science format it has today. It was then an outlet for scientists to communicate their latest and most important results to scientists of all disciplines, as well as the public.) Cole's review was important enough to be revisited by Paul Ehrlich 17 years later.[22]

"As an ecologist," Cole wrote, "I am glad that this provocative book was written." He criticized it mainly for its "highly partisan selection of examples and interpretations." He found errors of fact to be "infrequent, trivial and irrelevant." He did, however, criticize her use of the idea of a "balance of nature," an idea his colleague at Cornell, William Brown, had warned her about, calling it "an obsolete concept among ecologists." He especially took Rachel Carson to task for what he saw was her misunderstanding of the evolution of insect resistance to pesticides, claiming "not for a moment" to believe "that the chemicals are producing superinsects."[23]

The basis for Cole's latter criticism was an idea older than the science of ecology: that selection—artificial or natural—must be a compromise of sorts. Once called the "Matthew Kermack principle" by J. B. S. Haldane, it was then renamed the Principle of Allocation and credited to an unpublished paper by Richard Levins and Robert H. MacArthur. MacArthur was by then becoming something of a legend, whom a popular writer has called the "James Dean of ecology." His mathematically oriented evolutionary ecology was then coming into competition for supremacy in ecology with the physico-chemical ecosystem approach of Eugene Odum.[24]

In explanation, Cole used the example of the sickle-cell trait in humans, in which resistance to malaria results in anemia in the trait's possessor, fatally so to those having received the gene from both parents. Ernst Mayr would sum up the idea as "virtually all aspects of the *phenotype are a compromise between opposing selection pressures"* [italics in the original, phenotype in this instance essentially being the expression of an individual's inherited characters]. An insect that developed resistance to an insecticide would, according to the principle, necessarily have an insufficiency in something else, making the evolution of "superinsects" unlikely, if not impossible.[25]

Other than a somewhat bizarre treatment in the *Bulletin of the Torrey Botanical Club,* in which a number of seminar students at Rutgers University examined "Dr. Carson's … ecological knowledge," the reviews above are all that were published in outlets that can be identified as those typically used by professional ecologists. The Rutgers students found her ecology basically sound, but then unintentionally damned the book by calling it "propaganda." Entomologists were notably silent on *Silent Spring* in their professional journals.[26]

Paul Ehrlich's reexamination of *Silent Spring* "in light of 17 years' more experience with pesticides" sheds some light on the posture that Cole was taking "as an ecologist" towards Carson's use of their science. Ehrlich found nothing in Cole's review with which to take issue, agreeing that Carson "presented a picture of the evolution of insect resistance that showed she was not intimately familiar with the details of the evolutionary process." He utterly failed to consider new information on the mechanisms of insect resistance to pesticides that was available to him. There **were** "superinsects" out there, having resistance not only to DDT, but also to other insecticides to which they had not yet been exposed, with no demonstrable loss of fitness in other respects. Insects in Australia were found to have resistance to organochlorine insecticides, such as DDT, persisting 15 years without any selection pressure for resistance. A simple change in cuticle properties was all the trick took for certain insects. Rachel Carson had this information in front of her while writing *Silent Spring*, but the idea never appeared in the final version of the book. Ehlich's suggested revisions to *Silent Spring* were to place less emphasis on the "balance of nature" and to add that "plants and herbivores are in a 'coevolutionary race.'"[27]

Both Cole and Ehrlich must be taken to task, however, for their insistence that Carson represented pyrethrins as simple molecules. The offending passage probably reflected careless writing, rather than careless chemistry. In addition, Cole—and Ehrlich by his silence on it—can be faulted for taking issue with something Rachel Carson never said. This had to do with then current views "of what regulates the size of any population in nature." As far as *Silent Spring* is concerned, the issue is something of a red herring. Cole referred to, but did not adequately explain to the reader an argument about density-dependent mortality that cannot be taken up here without this article becoming book length. Cole was taking a stance on a raging debate that is still under dispute. That Rachel Carson had never heard of an argument that in hindsight turned out to be either untrue or irrelevant (or both) cannot stand as an indictment of her science.[28]

Cole—and then Ehrlich—displayed not errors by Carson, but an ax that had to be ground. Carson's only ecological transgression may have been in crossing into the turf of the professional ecologist.[29]

The impact of *Silent Spring* on ecology

Cole and Ehrlich were not the only ecologists who took a condescending attitude toward Rachel Carson's science in *Silent Spring*. For example, reviews of Robert Rudd's *Pesticides and the Living Landscape* contrasted Carson's "bold" and "dramatically" written popular work with Rudd's "textbook" in which personal judgment is "scrupulously" distinguished from evidence. British ecologist J. M. Cherrett smugly attributed the lack of surprise over Carson's revelations to Rudd having published on the topic since 1955 in the United States.[30]

That smugness was not justified. The 1956 position of the ESA was that "on the whole, great care is being exercised by most federal and state agencies" in the use of chemical controls. "Instances in which beneficial animals and plants have been killed are surprisingly few and usually occurred where the applicators failed to follow instructions," a study committee concluded, a few paragraphs before reporting that Rudd had sent the committee a letter emphasizing the need for more data that could be brought to bear on the issue. Heavy metal pollution was thought to be a greater threat to wildlife than DDT. The following year the conclusion on synthetic pesticides was that "when applied to agricultural crops at the dosages and in the manner prescribed by federal and state authorities, they have caused little or no losses to wildlife,"

even though acknowledging fears of conservationists and "others concerned with the preservation of our wildlife" that "such treatments will destroy nature's balance" and emphasizing the need for thorough ecological studies for large-scale projects. Both reports showed more concern about the losses of natural lands and the damming of rivers, more traditional concerns for the ESA.[31]

In 1961, a brief report by an expanded committee on applied ecology— described as having had "very rough going"—showed concern over adequate water supplies and the fire ant eradication program. In 1964, however, the ESA was sponsoring a well-attended symposium in the hope of allowing ecologists to exchange information on the "increasing problem of pesticide pollution." *Silent Spring* was the acknowledged impetus. The same year, the ESA President charged the committee on applied ecology "to formulate an ecological context for the use and conservation of natural resources." Its findings were not reassuring. Present programs were not providing the factual material needed to avoid future disasters, and students were repelled by ecology's lack of rigor. Narrow specialization, the kind that presumably missed the warnings given by Rachel Carson, was "a real dilemma."[32]

The committee further concluded: "The biological sciences traditionally served as a refuge for students who found physics, chemistry, and mathematics distasteful and were not inclined toward abstract theory. Ecology went one step further and attracted those who discovered that chemistry was also a requirement for research in physiological fields." The initial impetus for the study had come from Paul Sears in 1957—out of concern that ecologists were not providing the service to mankind they were capable of—but it did not gather real impetus until February 1964. That impetus was acknowledged by the authors to have been propelled by the publication of *Silent Spring*.[33]

A crisis was brewing in ecology. A number of ecologists in the 1950s, Sears and Egler among them, had been pushing ecologists to take stands on environmental issues. By 1963, instead of just a few voices, a Committee on Public Affairs in the ESA was appointed as "the most important action," by his own estimate, in that ESA President's term. Meanwhile, ecology's persistent identity crisis was coming to a head in the competing points of view of Odum and MacArthur.[34]

In 1964 *BioScience* gave space to Stewart Udall to urge biologists to "spread this Gospel" that Rachel Carson had presented. That same year it devoted an issue "to cover the basic concepts and ideas of ecology." Eugene Odum used it to preach a new ecology based on the ecosystem concept. Pierre Dansereau made the claim that "'ecosystem ecology' is the ecology of the future." Frank Blair blamed the primitive state of knowledge about ecosystem interactions "in part on the modesty of ecologists in seeking financial support for their research and in part on the failure of both ecologists and formulators of public policy to face up to the fact that knowledge of the interactions and interdependencies at the levels of organization with which ecology deals is essential to man's present and future welfare."[35]

The results of all of this heightened activity by ecologists are too many to fully cover in a paper of this length. One was the mistaken impression that Deep Ecology had its roots in the ecosystem concept of Eugene Odum. Another was a drive toward professionalization in ecology that was not entirely compatible with the multifaceted subject that was ecology. Still another was the peculiar identity crisis suffered by ecologists to this day having to do philosophical viewpoints of nature, environmental activism, and the need for a scientific detachment.[36]

The most important impact, however, may have been on the schism between ecosystem and evolutionary ecology. It is not until passage of the National Environmental Protection Act (NEPA) of 1969, and the fact that the character of the International Biological Program (IBP) began to be apparent, that the exact effects of *Silent Spring* on ecology became clear. Both were strongly influenced by the book and both resulted in changes to the quietly subversive science.

By having its emphasis changed from human welfare to biomes (in the current meaning of the term)

between its 1961 inception and its 1970 funding authorization, the IBP established ecology as Big Science with a big budget. The ecology was ecosystem ecology. Frank Blair no longer had to apologize for the modesty of ecologists in securing funding. The IBP funded ecology because it had the proper image to be the basic science to solve environmental problems. By then ecosystem science had been tied to Rachel Carson's "ecological concept" through the efforts of Odum, Egler, and others.[37]

Until that point, ecology had been seen to be weak intellectually, a science lacking in rigor. Ecologists themselves disparaged ecology as "a descriptive science with no real principles." However, mathematical analysis was every bit as legitimate a path to rigor as energy and nutrient analysis. Ecologists who found mathematics and the physical sciences distasteful found that they could fit their naturalistic studies into the framework being created around the work of Robert MacArthur. Ecology found itself suddenly split into two camps competing for prestige and funding, a situation that persisted into the 1980s.[38]

Besides being a force in the funding of the IBP, *Silent Spring* was also a force in the creation of NEPA legislation, an "ecological 'Magna Carta'" by which ecology was "rather suddenly thrust into a period of great individual and collective opportunity," in the words of a 1972 address by the ESA President. "Rachel Carson's book had been published a few years earlier and it was still the major topic of discussion during late 1969 and early 1970," when much environmental legislation was being enacted, according to an ecologist then serving on the White House staff. A legal and policy analyst concluded in 1972 that: "The courts have, in effect, legitimized ecology."[39]

"There was a major sea change in the ESA from the Applied Ecology Committee having little respect before the publication of *Silent Spring* to becoming very respectable," is one impression of the shift that took place from an essentially academic orientation in ecology to one of practical applications. Purists then running the Society did not think ecologists should be involved in applied problems. Indeed, a common criterion in the choice of study habitats was their relative lack of influence by man's activities. Today the Applied Ecology Section has the biggest membership of any section in the ESA.[40]

Conclusion

Circumstantial evidence presented supports the conclusion that Rachel Carson was exposed to ideas of ecology, probably as early as her Johns Hopkins experience, and kept herself up-to-date on the science as it evolved. The condescension shown by LaMont Cole and other ecologists toward Carson's ecological knowledge can be interpreted as an attempt to protect their professional turf. Time has vindicated Carson on many of their criticisms. Cole, for example, pointed out that honey bees faced a more difficult threat to survival from the old, nonsynthetic pesticides than from DDT. He attributed Carson's "bias and oversimplification" to "what it takes to write a best seller." We now know, however, that synthetic pesticides do not exactly lead to peace of mind in the honey bee hive.[41]

The grudging acceptance of Carson's ecological expertise may have had to do with the condition of the science at the time. A science insecure about its status had suddenly found itself promoted to a highly visible role in solving environmental problems before it had developed the body of knowledge and tools to fill that role. Indeed, before it had come to terms with what it actually was as a science. Ecologists were still trying to sort out whether ecology was a general point of view, a specific predictive science, or an arcane set of descriptive terms and data. And if it was on the verge of becoming a predictive science, there was little agreement on what that science would be like. Would it be physiological? Ecosystem oriented? Or would it return to its roots in the working out of evolutionary adaptations? It had not been a time to have what appeared to be an outsider communicating to the public what ecology was.

Ecology was to undergo other wrenching controversies over methodology and identity; *Silent Spring* merely exacerbated a conflict that had already been brewing between ecosystem and evolutionary ecology.

It is a field not without controversy even today, some of which may be traced back to the publication of Silent Spring. In the general terms of its transition from an arcane, academic science of natural environments to one in which more members of the ESA consider themselves as applied scientists, and even theoretical research is often on global issues, Rachel Carson's influence has been considerable.[42]

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Endnotes

1 Richard S. Miller, "Summary Report of the Ecology Study Committee with Recommendations for the Future of Ecology and the Ecological Society of America," *ESA Bulletin* 46 (1965): 71.

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DEPARTMENTS

Public Affairs Perspective

Congressional Staff Get Their Feet Muddy with Wetlands Scientists

Staff from Congressional offices rolled up their shirtsleeves and plunged into the world of wetlands research during a three-session science course.

Sponsored by the Ecological Society of America (ESA), the Society of Wetland Scientists, and the American Society for Limnology and Oceanography, the course focused on the fundamentals of wetlands science, and featured both classroom and field study.

The first two sessions were held inside, classroom-style, in lecture format but with plenty of time for informal give-and-take discussion and questions. Ben LePage, an ecologist at the URS Corporation and Chair of the SWS Education and Outreach Committee, presented an introduction to wetland science, addressing competing scientific and legal definitions of wetlands, wetland functions and historical losses of wetlands. He drew on examples from his work with corporate clients and local governments to answer staff questions about how to classify wetlands and how to effectively restore wetland hydrological function.

Ben LePage discusses wetland functions with Congressional staffers.

Amy Jacobs, a wetlands ecologist at the Delaware Department of Natural Resources and Environmental Control, continued with a discussion on the interactions between people and wetlands. She illustrated the services wetlands provide to society, threats to wetlands, and case studies of the actions people are taking to restore, create, and preserve wetlands. Staff questions ranged from the differences in function between restored and created wetlands, to tips for engaging constituent landowners to take a broader view of wetland services.

A field trip to freshwater wetlands and salt marshes of the Chesapeake Bay topped off the course. ESA member Pat Megonigal, a wetland biogeochemist at the Smithsonian Environmental Research Center, led the course activities, together with colleagues Tom Jordan and Dennis Whigham, also ESA members.

Staff saw firsthand the differences in the structure and ecological function between natural and created freshwater wetlands in a suburban develop-

Congressional staff measure the elevation of wetland sediments in a tidal salt marsh.

ment near Annapolis, Maryland. They learned to distinguish anaerobic wetland soils from upland soils, inspected a riparian buffer within an agricultural landscape, and kept a close eye out for wetland wildlife.

Moving on to a tidal salt marsh, Congressional staff investigated how scientists are measuring wetland elevation with cutting-edge instrumentation. They discussed how wetland elevation may respond to sea-level rise and rising atmospheric carbon dioxide levels.

Staff appreciated the rare opportunity to learn hands-on and directly from practicing scientists. In the coming months, Congress will increasingly need an understanding of wetland functions and services as it considers legislation to clarify federal wetlands regulation in the wake of the Supreme Court *Rapanos* and *Carabell* decisions in June 2006. ESA and SWS plan to follow up with future wetlands activities, and to continue providing educational courses and briefings on the most current ecological science to policy makers.

Public Affairs Perspective

BEST MAMAS CONTEST

ESA's Public Affairs Committee announces a contest for the best MAMAS (Maxims, Analogies, Metaphors, Anecdotes, Similes) to communicate ecological knowledge

First Prize:	Full refund of Memphis Annual Meeting registration
Second Prize:	One year ESA membership and online subscription to journals
Third Prize:	ESA t-shirt and travel mug
Best Student Prize:	One-year ESA membership, includes Frontiers journal

Background:

Explaining the complexity of ecological systems to policy makers and the public is challenging for ecologists. The Ecological Society of America's Public Affairs Committee is hosting an evening session that will address the use of analogies, metaphors, anecdotes, etc. to explain complex ecological principles. The session will include seasoned ecologists with a flair for using MAMAS, and will center on the best submissions received via this competition.

To participate:

Entries should be no more than one page in length and should feature your favorite Maxim, Analogy, Metaphor, Anecdote, or Simile as it relates to the science of ecology. Please indicate the source (whether it is your own or if it is credited to someone else) and the context in which it has been used effectively (e.g., during a radio interview; before a Rotary Club; in a lecture hall). Submissions should include full name and all contact information. ESA student members are especially encouraged to participate in this competition.

Members of the Public Affairs Committee will presort all entries and the top 10–30 finalists will be highlighted during the Annual Meeting Evening Session, "Ecological Analogies, Metaphors, and Anecdotes" on Tuesday. Prize winners will also be announced.

The Goal:

We hope to create an online database, searchable by topic, which will be available to all ESA members for use in outreach activities. All sources of the best MAMAS will be acknowledged.

Definitions:

Maxims—a pithy statement of general wisdom, e.g. "where there's smoke, there's fire."
Analogies—comparing similarities between things otherwise unlike, e.g. "hot is to cold as fire is to ice."
Metaphors—implied comparison, e.g., "All the world's a stage."
Anecdotes—Personal experience/story.
Simile—an explicit comparison, e.g., "Her tears flowed like wine."

Maxims, Analogies, Metaphors, Anecdotes, Similes to Communicate Ecological Knowledge

Here are the winning entries of the MAMAS Contest held by the Public Affairs Committee at the ESA Annual Meeting in Memphis. Richard Pouyat, Vice President of Public Affairs, hopes to organize another one next year with the long-term goal of compiling a lexicon of sorts that all ecologists can access online. The impetus was to better equip ecologists with ways to explain the complexities of ecology and ecological systems to policy makers and the public.

Dear ESA MAMAS Contest Participants:

First off, thank you for taking the time to participate in the recently held ESA MAMAS Contest. We had about 20 people submit entries, many of them multiple. The Society's Public Affairs Committee selected the winners that were announced at the well-attended Evening Session at the ESA Memphis Meeting.

It is our hope that this is just the beginning—the Committee plans to organize a similar contest and event for next year's ESA Annual Meeting. As a contest participant, we wanted to go ahead and share the winning entries and honorable mentions with you today and have reproduced them below.

Again, thanks for participating and we hope we see the enthusiasm for this effort continue to grow.

Nadine Lymn
Director of Public Affairs

Second Honorable Mention:

Submitted by Katie Griffith (Ph.D student, University of California, Santa Cruz)

Credited to: Dr. A. Todd Newberry (Emeritus Ecology and Evolutionary Biology Professor, University of California, Santa Cruz)

On observing nature:

There are two oceans, water and air. We are benthic creatures, crawling on the bottom of the atmospheric ocean. Birds are aerial fish that swim among and over the reefs we call bushes and trees.

First Honorable Mention:

Submitted by Olyssa Starry, Water Biologist, Pennsylvania Department of Environmental Protection

On environmental challenges associated with the global nitrogen cycle:

Another tool for analyzing scientific metaphors involves investigating how they are reciprocated in science and society (Russell). Think about the social implications of calling N added to the soil "fertilizer." How do you know when you've added enough?

Third Prize:

Submitted by Candan Soykan, Arizona State University

Credited to: Lee Basnar of the *Sierra Vista Herald* and/or hydrologist Richard Koehler

An aquifer is a bank account:

Rain and snow are deposits, and water uses are withdrawals. Plants, animals, stream flow, and human uses rely on account withdrawals. When deposits exceed withdrawals, life is good. If deposits decline, then so too must withdrawals, or else the account will run out.

Second Prize:

Submitted by Ryan Utz (student, University of Maryland Appalachian Laboratory)

Credited to: Dr. Kyle Hartman, West Virginia University

On the challenges of a salmon trying to reach adulthood:

Imagine you are in your car and attempting to move from the center of Morgantown to I-68 (the interstate at the edge of town). Now let every traffic light you encounter represent a threshold in your life stage; if you hit it while it is red, you're dead, but if it's green, you progress to the next life stage. Only if you move from the town center to I-68 hitting nothing but green lights do you survive to adulthood. Those are the odds faced by a salmon fry; growing to a parr, avoiding fry predators, attaining smolt size, various stages of migration, all of these represent traffic lights. The vast majority of individuals will eventually hit a red light somewhere along the way, but a select few make it all the way and survive to adulthood. An extension of this idea (I may take credit for this) is that environmental conditions can dramatically affect your chances. Driving at night (when lights stay greener longer and traffic is low) or right after a basketball game (when traffic is horrendous) will affect your chances of making it green all of the way. These two scenarios may be likened to absence of predators, and competition due to the overcrowding of your cohort, respectively. One may easily imagine that this idea could be applied to a returning and successfully spawning adult salmon.

First Prize:

Submitted by: Bill Varettoni, (Doctoral Program, Maryland School of Public Policy, College Park)

Credited to: Bill Varettoni

On species diversity:

In explaining the role of species diversity to my 11-year-old nephew, I told him that all living things, including us, rely on each other for existence. He knew about the food chain, and pointed out that animals could always change their diet to eat something else if their "bug of choice" dies out. I told him that was true to a point. I told him ***we are all in a giant game of Jenga***. You can remove a species here, one there, and maybe get by—but the system will be less stable. But the longer you play the game while removing pieces/species, you are risking collapse."

Reports of Symposia

2006 ESA Annual Meeting

Ecological Effects of Gulf Coast Hurricanes: Short-Term Impacts and Long-Term Consequences

A symposium organized by Colin Jackson (University of Mississippi), Paul Keddy (Southeastern Louisiana University), and Gary Shaffer (Southeastern Louisiana University), at the 91st ESA Annual Meeting in Memphis, Tennessee, focused on the "Ecological effects of Gulf Coast hurricanes: short-term impacts and long-term consequences."

Hurricane Katrina made landfall in southeastern Louisiana and coastal Mississippi on 29 August 2005, becoming the costliest and one of the deadliest storms in U.S. history. The impacts of Hurricane Katrina on human communities along the Gulf Coast have been well documented. Initially, the storm produced high winds and storm surges that destroyed many of the coastal towns in Mississippi. Surging waters through the Mississippi River-Gulf Outlet and along the south shore of Lake Pontchartrain breached levees and caused flooding of all low-lying areas of New Orleans. Four weeks later, on 24 September 2005, Hurricane Rita made landfall in southwestern Louisiana, and while the second storm's impact on human communities was less than that of Katrina, Hurricane Rita caused appreciable economic damage. Obviously these storms also dramatically affected ecological communities: storm surges of salt water flooded coastal marshes and swamps; winds in excess of 100 mph felled forests; and Lake Pontchartrain itself was stressed as floodwaters were pumped out of New Orleans. A year later it was possible to look back more thoroughly at the ecological consequences of these storms and offer insights into how ecological knowledge might help mitigate damage from future Gulf Coast hurricanes.

This symposium, organized by Colin Jackson (University of Mississippi), Paul Keddy (Southeastern Louisiana University), and Gary Shaffer (Southeastern Louisiana University), focused on the "Ecological effects of Gulf Coast hurricanes: short-term impacts and long-term consequences".

While the Gulf Coast refers to the United States coastline along the Gulf of Mexico from Florida to Texas, the area most impacted by Katrina and Rita was the northern Gulf Coast, which includes the states of Louisiana, Mississippi, and Alabama, and this region was the main focus of the symposium. Hurricane landfall on the northern Gulf Coast is hardly a new occurrence. Hurricanes Betsy (1965) and Camille (1969) caused extensive damage and are still remembered by many in coastal Mississippi and Louisiana. Numerous other hurricanes and tropical storms have moved across the region since then, and the recorded impact of hurricanes in this region goes back to at least 1717. During that year a major hurricane was partially responsible for the shift of the capital of French Louisiana from Mobile, Alabama, to a new city located between the Mississippi River and Lake Pontchartrain: New Orleans.

New Orleans, Louisiana, and the importance of coastal wetlands in hurricane damage mitigation

When New Orleans was founded, the city was built on ground that was above sea level. However, as the city grew, it expanded into reclaimed wetlands, which as John Day (Louisiana State University) describes, have in some places subsided by >5 m. When tidal surges southeast of the city reached 6 m during Hurricane Katrina, levees in the eastern part of New Orleans were overtopped. Combined with the failure of levees that protect the city from Lake Pontchartrain, this resulted in flooding of roughly 80% of the metropolitan area. Louisiana's coastal wetlands provided much of the original protection from tidal surges, but these wetlands are disappearing. Day noted that >25% of the state's coastal wetlands were lost during the 20th century. Much of Louisiana's coastal wetlands loss has been exacerbated by human activities: the construction of shipping channels such as Mississippi River-Gulf Outlet (MRGO) and the laying of pipelines and other infrastructure for the Gulf of Mexico oil industry. Channelization of the Mississippi River so that it no longer connects to its delta plain or moves throughout the landscape is one of the major problems. Day suggested that reconnecting the river to its floodplain, through major freshwater diversion efforts, should be a cornerstone of effective coastal restoration, and is vital if the storm buffering capacity of coastal wetlands is to be recovered. The closure, or at least restriction, of channels such as MRGO is essential. Flow in MRGO reached 2 m/s as this channel funneled surging water towards New Orleans during Katrina. Day stressed that the timing of these restoration actions is critically important. With rising energy costs and an increased likelihood for future major storms and sea-level rise with global climate change, if restoration efforts are not made in the near future, it will be too late to save both Louisiana coastal wetlands and the city of New Orleans.

Gary Shaffer (Southeastern Louisiana University) noted that cypress–tupelo swamps are particularly effective at buffering both storm water surges and winds, and if allowed to flourish under favorable conditions, can achieve heights of 10 m in a decade. Analysis of specific habitat loss following Hurricanes Katrina and Rita suggests that swamps dominated by bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*) were much less severely impacted than other ecosystem types, such as bottomland hardwood forests or open marsh. In some areas the difference is particularly marked, as in the Pearl River Basin in southeastern Louisiana and southwestern Mississippi. This area was directly in the path of Hurricane Katrina, and while bottomland hardwood forests suffered up to 80% wind throw, cypress–tupelo swamps were left relatively intact. Shaffer agreed with Day that efforts to rebuild the northern Gulf Coast must emphasize the role of coastal wetlands in storm-damage reduction. Bald cypress–tupelo swamps are essential in any coastal wetland restoration strategy, as they appear much more resistant to high winds and storm surges associated with hurricanes than freshwater or brackish marsh. That said, cypress–tupelo swamps are not immune to the effects of hurricanes and tropical storms, and are particularly sensitive to saltwater inundation. A few days exposure to salinity levels in excess of 5 ppt can severely stress these systems, often to the point where they may not recover. This is where freshwater diversion strategies become critical. Shaffer estimated that by diverting water from the Mississippi River, along with increasing other sources of freshwater such as treated wastewater, it would be possible to restore several hundred thousand hectares of coastal cypress–tupelo swamp in Louisiana alone. Much of this area is former cypress swamp that has degenerated into marsh or open water due to a combination of saltwater intrusion and extensive cypress logging in the early 20th century. However, with frequent pulses of freshwater these areas could once again become thriving cypress–tupelo

swamp and serve as a vital line of defense against future hurricane damage.

Long-term consequences of hurricanes and other disturbances on forests along the Gulf Coast

Bill Platt (Louisiana State University) addressed the importance of considering both the physical effects of hurricanes (high winds) and changes arising from storm surges of saltwater on coastal ecosystems. These two factors are enough to disassemble existing coastal ecosystems and promote shifts in species distributions. Platt suggested that in contrast to inland ecosystems, where hurricanes can stimulate regeneration of the existing plant community, major hurricanes such as Katrina and Rita may spur landward regeneration in ecosystems in many coastal areas. Coastal regions show changes in plant communities over small spatial scales, and moving a few meters inland often provides enough of an elevation change to see a succession from submerged communities to coastal saltmarsh to freshwater marsh to forest. Ongoing sea level rise can shift this spatial distribution landward and inhibit the regeneration of coastal communities. In essence, the high winds and saltwater inundation associated with major hurricanes serves as the catalyst that can push coastal ecosystems into new cycles of development, which are reinforced by long-term changes in the environment associated with global climate change and sea level rise. Platt's group has been testing these ideas in the Weeks Bay National Estuarine Research Reserve along the Alabama Gulf Coast. This site is characterized by transitions from low-lying estuarine marsh to upland hardwood forest and was impacted by high winds and extended storm surges associated with both Hurricane Ivan (2004) and Katrina (2005). Initial surveys show that that recovery is occurring through the growth of plant species that were previously lower down in the coastal elevation gradient, and through colonization by disturbance-following species that were not present prior to Hurricane Ivan. A particular concern is the increased appearance of Chinese tallow (*Sapium sebiferum*), a fast-growing exotic species that seems particularly capable of invading hurricane-impacted areas. Platt reported that with increased disturbance from hurricanes and tropical storms it is possible that this invasive species may soon become dominant in Gulf coast forest ecosystems.

While Platt's work addressed the interactions of hurricanes with sea level changes, Heather Passmore, a student of Platt's at LSU, has been examining the interplay between hurricanes and fire. Lightning-induced fires are a frequent, large-scale disturbance in savanna-forest landscapes of the southeastern United States; ecosystems subject to disturbance from both fire and hurricanes can show changes in species composition and community structure that would be different from those expected for each disturbance alone. Passmore has developed a conceptual model of hurricane–fire interactions that predicts a potential for great variation in these interactions across the landscape. Interactions are much more likely to occur in savannas than in forests, but are more unpredictable in ecotones where these systems meet. It is in these ecotones that Passmore experimentally tested the hypothesis that the effects of lightning-season fires on the structure and composition of the plant community would differ depending upon whether hurricanes preceded the fires. Passmore manipulated two of the major impacts of hurricanes on these systems, canopy disturbance, and an increase in organic matter on the forest floor that would serve as fuel for fires by removing canopy trees and increasing fuel loads. Higher fuel loads resulted in hotter fires, which in turn reduced the overall density and species richness of woody plants in manipulated plots. This strongly suggests that hurricane disturbance results in more locally intense fires in these systems, which can reduce overall hardwood density. Passmore notes that this lower plant density could result in decreased competition and encourage the establishment of pines and other fire-resistant species in savanna–forest ecotones. Over longer time periods, these interactions between hurricanes and fire are likely to result in landscape-level changes in savanna–forest ecosystems along the northern Gulf Coast.

The initial impacts of Hurricanes Katrina and Rita on coastal forest ecosystems

Stephen Faulkner (USGS National Wetlands Research Center) agreed that hurricanes have major

impacts on the structure and function of coastal forest ecosystems, both in the short and long term. His estimates suggest that $>34 \times 10^6$ m^3 of timber was destroyed or damaged during the combined onslaught of Hurricanes Katrina and Rita, which affected 450,000 ha in Louisiana alone. Confirming what Shaffer had previously observed, Faulkner asserted that plots in the Pearl River Basin that were dominated by bald cypress–tupelo swamp showed much lower mortality than other areas. These observations are similar to those reported for forests surrounding Lake Verret in southern Louisiana, an area that was impacted by Hurricane Andrew in 1992. Faulkner monitored vegetation density and vigor in the Pearl River floodplain at weekly intervals following Katrina and compared the findings to ongoing studies in the same system from 1989 to 2003. Overall, the system now shows below-average vegetation density and health, with the worst areas being the bottomland hardwood forests that were most affected by Katrina. One short-term impact of hurricanes on forest communities is that they generate a large pulse in litterfall. In contrast to the usual litterfall at the end of the growing season, during Katrina this litter consisted of live foliage and likely represented an immense pulse of organic matter to the soil. Hurricanes also promote shifts in forest structure that can change the availability of foraging substrates used by migratory birds, and the impacts of Katrina on Pearl River bottomlands appear to correspond with a shift in migratory bird use from these areas to adjacent upland forests.

Robb Diehl (University of Southern Mississippi) stressed the importance of considering how hurricanes and associated habitat destruction can affect migratory bird populations. Much of the North Atlantic hurricane season coincides with fall bird migration, and major storm systems often develop when bird migration over the Gulf of Mexico is at its peak. Little is known of how hurricanes and major storm systems can affect birds during migratory passage. Diehl raised an important question: Is migratory passage suspended or delayed during major storm events, or is bird migration temporarily shifted to the west to avoid more hazardous routes over the Gulf of Mexico? Such a shift in migratory patterns could allow migrants to potentially take advantage of favorable northern winds to the west of storms, but would result in major shifts in the distribution of birds in coastal landscapes during stopover. Migrants might avoid coastal landscapes immediately preceding and following major storms, which would confirm Faulkner's observations of shifts in migrants from bottomland forests in the Pearl River Basin to the upland forests situated further inland. Diehl has examined radar imagery that shows birds scattered throughout this landscape for over a month after the impact of Katrina, while up until two days before they were still tightly clustered in bottomland forests. The loss of some vegetation types might be so severe that birds may be slow to return to these habitats even after multiple seasons. Indeed, some bird populations may never return, if the impacts of hurricanes are enough to promote long-term changes in plant community structure.

The future of human communities along the Gulf Coast

While human communities along the Gulf Coast have a long history of being impacted by hurricanes, extensive growth of these communities, coupled with changing sea levels and loss of coastal wetlands, have exacerbated these impacts to the level of those seen in the aftermath of Hurricane Katrina. Paul Keddy (Southeastern Louisiana University) believes that two processes are responsible for the current state of both New Orleans and the Gulf Coast in general. First, as human populations in the region have grown, settlements that were originally restricted to higher ground have expanded into areas that were historically floodplains and wetlands, necessitating the construction of levees to protect these settlements. Second, this expansion, coupled with increased industrial development, has degraded these wetlands and accelerated the rates of coastal wetland loss. As other researchers in the symposium emphasized, it is these very wetlands that historically have protected both human settlements and Gulf Coast ecosystems from the floods and winds associated with hurricanes. While Keddy was sympathetic to the plight of human populations along the Gulf Coast (and he himself is a resident of the area impacted by Katrina) he asserted that ultimately some

of these problems arise from irrational decisions made by the citizens of Louisiana and other states.

Keddy noted that at the federal scale, citizens have elected an administration that encourages and supports the exploitation of ecosystems, while simultaneously denying that global climate change and sea level rise are occurring. More regionally, citizens of New Orleans and other areas of Louisiana have made irrational decisions regarding land use. Keddy emphasized that this is by no means a special case, and that history is full of human irrationality that has led to major ecological consequences. The American dust bowl and the collapse of the Canadian cod fishery are prime examples of situations where rational decisions made by the electorate could have averted or at least minimized environmental disasters. Looking back from a historical viewpoint, Keddy observed that those human communities clearly selected development trajectories that would clearly become catastrophic in the long term. The question arises as to what trajectory the development of the northern Gulf Coast will take in the aftermath of Hurricane Katrina: one determined by existing policies and tradition, or a willingness of the populace to adapt to the dynamic nature of coastal ecosystems.

Impacts of Hurricane Rita: the forgotten storm?

While the ecological consequences of Hurricane Katrina were addressed in detail by a number of participants, the impacts of Hurricane Rita were less clear. The contrast between the two hurricanes is interesting: Katrina came ashore in southeastern Louisiana and coastal Mississippi, while Rita came ashore in southwestern Louisiana close to the Texas border (encouraging the evacuation of much of the city of Houston). Because of the terrible impacts of Katrina on New Orleans, less attention has been paid to the impacts of Rita, which affected a more rural, less developed part of the coast. Much of this coastline consists of the Chenier Coastal Plain, an area characterized by vast stretches of emergent marsh that includes the Sabine National Wildlife Refuge and Rockefeller Wildlife Refuge, some of the most biologically diverse wildlife areas in the US. Immediate impacts from Rita on these areas include the deposition of large amounts of debris from coastal communities and offshore oil rigs, which was washed ashore, and still clogs the bayous and canals of these systems. In Sabine NWR alone, almost 1500 containers of hazardous materials have been identified, potentially containing 350,000 gallons of hazardous liquids and gases. However, these impacts are relatively minor when the effects of long-term flooding and saltwater intrusion associated with Rita are considered.

Andy Nyman (Louisiana State University) has worked on the wetlands that were impacted by Hurricane Rita and has been monitoring the changes in the Rockefeller Refuge. These areas are usually dominated by saltmeadow cordgrass (*Spartina patens*), and, as with the savanna areas studied by Platt and Passmore to the east, are most frequently disturbed by fire. Nyman notes that fires in the area only have modest impacts belowground, so while early successional genera such as bulrushes (*Schoenoplectus*) increase after such as disturbance, within a single growing season the community returns to one dominated by *S. patens,* which regenerates from belowground biomass. Prolonged flooding in the aftermath of Rita appears to have killed both above- and belowground *S. patens* biomass, so that the typical postdisturbance successional trajectory in these systems has been altered. These effects were likely compounded by severe drought conditions for the first half of 2006. Whether these systems return to their former state, or are further impacted by erosion and future tropical storms, remains to be seen.

Ecologists and Gulf Coast hurricanes: what we've done and what we should be doing

The symposium on the impacts of Gulf Coast hurricanes was one of the opening sessions at the ESA meeting, but as the meeting closed, a separate presentation addressed a very fundamental issue that the symposium lacked: Exactly what ecological research has been done on the impacts of hurricanes, and what gaps in our knowledge need to be addressed. Julie Whitbeck (University of New Orleans) reviewed the ecological literature for research on the effects of hurricanes on forest ecosystems. Whitbeck reported that

almost 300 scientific papers on the ecological effects of hurricanes on forests were published from 1978 to 2006, almost half of which are research studies on the impacts of specific storms. More than one-fifth of these studies focused on the impact of Hurricane Hugo (1989), largely because it affected the Luquillo LTER site in Puerto Rico. Whitbeck noted that research on the impacts of hurricanes on the continental United States accounts for just 21% of these studies, and only 7% of the publications addressed the impacts of storms on the Gulf Coast. Whitbeck proposed an agenda for ecological hurricane research that would improve our understanding of how these storms have shaped the organization and ecology of hurricane-impacted systems, explore the impacts of hurricanes at different scales, and predict whether current changes in both landscape use and storm intensity are likely to change the impacts of these storms. Instead of reactive studies to the impacts of specific storms, we need a proactive research plan that encompasses a wide geography of sites (both within the United States and worldwide), long-term studies, standardized experimental designs and methods, and collaboration with meteorologists, social scientists, and geologists, among others. Within this proactive framework, Whitbeck suggested that plans should be in place for opportunistic reactive studies when hurricane disturbance occurs at a site. The impacts of Hurricanes Katrina and Rita are likely to stimulate ecologists in the Gulf coast region to consider these ideas carefully. However, the development of a research agenda to address the ecological impacts of hurricanes along the Gulf Coast, or elsewhere, would also need a parallel funding agenda from federal and state agencies; whether such funding is available remains to be seen.

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What Makes an Ecological Icon?

A symposium organized by Aaron Ellison (Harvard Forest) and Paul Dayton (Scripps), at the 91st ESA Annual Meeting at Memphis, Tennessee, August 2006.

Progress in science occurs as new theories are developed and subsequently revised in light of empirical data that challenge hypotheses derived from the theories. Scientific theories and hypotheses are developed, and data are collected, *by individuals* (and collaborative groups); their ideas and results are disseminated to the broader community in publications, both technical and non-technical. Some of these individuals become icons; their work is well known and they achieve recognition for their substantive contributions through extensive citation of their published work. Others are cited rarely, if ever, and they fade into obscurity. At a time when the availability of academic jobs continues to decline, while the number of new Ph.Ds in ecology continues to increase and the Annual Meetings of the Ecological Society of America (ESA) take on the aura of a job fair *cum* meat market, it seemed timely to ask why some ecologists achieve iconic status for their work, but others are quickly forgotten, even if the latter published the same ideas or data before the former. Further, losing the historical context for our work, and the disappearance from contemporary literature of carefully garnered data and results, can lead to unnecessary repetition of research, slowing progress in the field and wasting scarce resources.

In the symposium, "What makes an ecological icon?" a group of seven ecologists and historians discussed individuals—some well known, some forgotten—who made substantive contributions to the development of fundamental ideas in ecology, including the following: the concept of food webs; invasive species and community assembly; the ecosystem concept; nonequilibrium dynamics; and the value of conservation and preservation. Both during their formal presentations and in the lengthy discussion following the symposium, the speakers also addressed how current norms of scholarship and publication, and mechanics of web-based literature searches and journal-imposed rules for citations inadvertently encourage contemporary researchers to ignore historical antecedents and duplicate past work.

Fig. 1. Charles Elton (1926). Photo used with permission.

Food webs and invasive species are central topics around which much of contemporary community ecology revolves. Models of how complex networks are structured have reinvigorated theoretical investigations of food web structure (e.g., Pascual and Dunne 2006), and the increasing rates of spread of nonindigenous species provide unfortunate opportunities to empirically test these models as food webs are restructured following novel introductions. If asked, most ecologists would trace the origin of food web theory and studies of invasive species to Charles Elton (Fig. 1). His "food cycle" of Bear Island (Summerhays and Elton 1923: Fig. 2) was reprinted in his 1927

text *Animal Ecology*. It was subsequently reproduced widely and is often held up as the first food web, although it is pre-dated by similarly illustrative diagrams published by Pierce et al. (1912) and Shelford (1913), among others. Elton's other influential book, *The Ecology of Invasions by Animals and Plants* (Elton 1958) is generally considered to ground most contemporary research into the causes of successful species introductions and the impacts of invasive species. But both food web ecology and invasion biology have deeper roots.

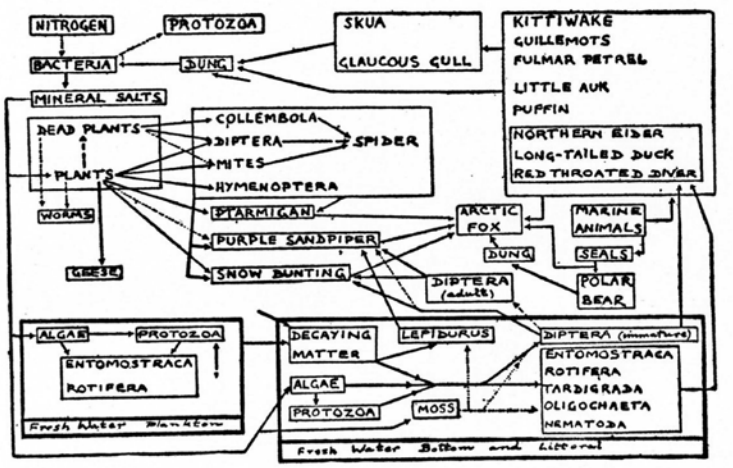

Fig. 4.—Food-cycle among the animals on Bear Island, a barren spot in the arctic zone, south of Spitsbergen. (The dotted lines represent probable food relations not yet proved.) The best way to read the diagram is to start at "marine animals" and follow the arrows. (From Summerhayes and Elton.[25])

Fig. 2. Elton's "food cycle". From S.V. Summerhays and C.S. Elton (1923).

Frank Egerton (Fig. 3), a historian of science whose articles on the History of Ecology have been appearing in nearly every issue of the *ESA Bulletin* since 2001, traced the development of the food web concept back to the early 18th century and the writing of naturalist Richard Bradley (1718, Part 3:60-61)

> … Insects which prey upon others are not without some others of lesser Rank to feed upon them likewise, and so to Infinity; [that] there are Beings subsisting which are not commonly visible may be easily demonstrated…in a Microscope.

This concept was popularized by Jonathan Swift (1733: lines 341-344):

> So, Nat'ralists observe, a Flea
> Hath smaller Fleas that on him prey,
> And these have smaller yet to bite 'em,
> And so proceed *ad infinitum.*

Jonathan Fisher, a fifth-year graduate student at the University of Pennsylvania, illustrated more quantitative antecedents to food web research, including an extended discussion of the work of Harold Colton (Fig. 4), a student at Penn in the early 20th century, and a faculty member there until 1926. Colton was a founding member of the ESA (ESA 1972) and authored a paper on competition and predation in the rocky intertidal (Colton 1916) that covers much the same ground

Fig. 3. Frank Egerton. Photo by Liana J. Cooper (c) The Journal Times (Racine, WI), and used with permission.

Fig. 4. H. S. Colton (ca. 1916) from the Museum of Northern Arizona collection (No. 7422). Reprinted with permission.

as more well-known icons of the intertidal (e.g., Menge and Sutherland 1976; see the comprehensive review by Fisher 2005). An abstract of Colton's paper was published in *Science* in 1916, and many of his other papers on intertidal biology were widely cited. In modern times, he is better remembered for his archaeological research in the desert southwest (Miller 1991). His work on intertidal food webs, however, is generally forgotten

Colton's work is particularly intriguing because his food web lacks the European green crab, Carcinus maenas, which is now an invasive species in Maine where Colton studied (as well as elsewhere in the United States); trawling the historical literature could provide crucial data that can be used to provide baselines from which to assess the impacts of other current invasions. Jim Carlton, Director of the Williams-Mystic Maritime Studies Program (Williams College and Mystic Seaport) discussed how the baseline requirements of successful invasion—including entrainment, transport, and spread of species during emigration; discharge, survivorship, reproduction, and establishment during immigration—the unification of which in "invasion biology" is attributed to Elton (1958), can all be found in earlier books, notably those by Guthrie-Smith (1921), Clark (1949), and Lindroth (1957). Although Elton's book is generally considered a foundational text, Carlton illustrated that it was really a selective set of case studies (neither Guthrie-Smith's, Clark's, nor Lindroth's work was even cited by Elton). It was well received because unlike the others, it was short, well-written, and appeared at a time when concern about environmental change was taking off. Elton also popularized his work through radio broadcasts, popular writings, and public lectures. While our results and theories will be more accessible and widely read if our papers are written clearly and concisely, an unfortunate lesson of Carlton's talk is that selective citation and incessant self-promotion can lead to iconic status, whether or not it is well deserved.

Important work by notable ecological icons may also be forgotten. G. Evelyn Hutchinson (Fig. 5) is well known to ecologists; the niche as *n*-dimensional hypervolume (Hutchinson 1957) and constant size-ratios among competitors (Hutchinson 1959) laid the foundation for a vast amount of ecological research in the 1960s and 1970s that was focused on equilibrium dynamics (both papers were reprinted in Real and Brown's *Foundations of Ecology* collection [1991]). Saran Twombly, a program director at NSF and Hutchinson's last graduate student, explored in detail the roots of *nonequilibrium* theory in Hutchinson's work (especially Hutchinson 1953). This work is virtually unknown to contemporary ecologists, although tests of Hutchinson's nonequilibrium theories pervade the limnological literature (e.g., Reynolds 1980/1984, Sommer 1985). Hutchinson's relatively obscure style of writing (clearly evident in his 1978 textbook), his uninformative (to search engines) titles (e.g., Hutchinson 1957, 1959), and the tireless promotion by his students of equilibrium theory (e.g., MacArthur and Wilson 1967) together likely led to the disappearance of Hutchinson's nonequilibrium ideas from the general ecological literature.

Another example can be found in the life and work of Victor Shelford (Fig. 6). Shelford, whose early work on food webs (1913) was discussed above, was the Founding President (1916) of the ESA. Less well known among ecologists is his role 30 years later in

the founding of The Nature Conservancy (TNC), a role that is now recognized by TNC's Victor Shelford Award for Science in Conservation (ironically restricted to past or current TNC employees). Sara Tjossem, a historian of science at Columbia University, reviewed Shelford's career and highlighted the origins of the (still ongoing) tensions within the ESA membership between "basic" ecological science and environmental advocacy. As ESA President, Shelford established (and chaired) a committee on preservation, to carry out an ecological resource inventory of the U.S., and to initiate and carry out action concerned with the preservation of hundreds of natural areas. Part of his motivation was to preserve areas in undisturbed condition as benchmarks for future ecological research. But by the 1930s, the leadership of the ESA had focused the Society's activities on basic research and removed both political and financial support from environmental advocacy and land protection. In response, Shelford founded the Ecologist's Union (1946), which was reorganized and renamed in 1950 as The Nature Conservancy.

One of Shelford's students was Eugene Odum, who along with his younger brother Howard (Tom) Odum (a Hutchinson student) are considered the founders of ecosystem ecology, the roots of which can also be traced to Hutchinson's student Ray Lindeman's (1942) paper on food webs! Historian Joel Hagen (Radford University) delved into the personalities of the Odum brothers, exploring the cultural and scientific context and timeline of their most influential work, which was in many ways a progressive response to the co-incident ascendancy of rampant individualism in America (exemplified by the work of Ayn Rand [1965], Barry Commoner [1966] and the presidency of Ronald Reagan) and of reductionism in ecology (e.g., Williams [1966] and Dawkins [1976]). Hagen has explored the conceptual roots of ecosystem ecology elsewhere (Hagen 1992); in his symposium presentation he argued that the Odum brother's broader ideas—of emergy, holism, and social progressivism—have been lost to ecosystems ecology, which focuses more narrowly on cycling of nutrients and energy. Hagen further argued that the ecosystem concept remains marginalized within ecology as a whole. Although many ecologists may dispute this point, the relatively low number of papers on "ecosystem ecology" published in the ESA journals and the continued split between "population and community" ecology and "ecosystems" ecology by federal funding agencies lend credence to Hagen's argument.

Fig. 5. G. Evelyn Hutchinson as a student in 1920 collecting the meadow spittlebug, *Philaenus spumarius*, Cherryhinton Chalk Rt, Cambridge. Both this photo and that of Elton (Fig. 1) attest to the decline in the quality of ecologists' attire since the early 20th century! Photograph from the G. Evelyn Hutchinson Papers, image 6290; Manuscripts and Archives, Yale University Library, used with permission.

So why are some individuals remembered while others are forgotten? Why are some contributions rapidly catapulted into widely cited paradigms while

Fig. 6. Victor Shelford (1940).

others remain buried and unread in the pages of our journals? Should current upstarts aspire to iconic status? In his wide-ranging talk, Paul Dayton explored these central questions of the symposium by peering through the lenses of norms of scholarship, the peer review process, and dynamics of citation. A central nugget, attributable to Lamarck (1984 [1809]:404), is that

> Men who strive in their works to push back the limits of human knowledge know well that it is not enough to discover and prove a useful truth previously unknown, but that it is necessary also to be able to propagate it and get it recognized.

This sentiment is encapsulated in the well-known maxim, "publish or perish" (which, given the overwhelming flood of literature, would be more aptly stated, "keep publishing or vanish"). But as we have seen, publishing is clearly not enough; others must read what we write and cite it. Scholarship demands that the burden of reading the literature is on each scientist, but reading is also not enough. We not only read the literature, but in our choices of citations, we propagate some ideas and prune others. With a metaphor that would be familiar to most ecologists, David Hull (1988:376–377) suggested that

> If science is a selection process, transmission is necessary. Disseminators are operative in this process. Perhaps they do not get the ceremonial citations that patron saints do, but they are liable to get much more in the way of substantive citations. . . . To the extent that disseminators substitute their own views for the patron saints whom they cite ceremoniously, they are functioning as germ-line parasites—the cowbirds of science.

(This parasitism process is modeled quantitatively by the economists Myong-Hun Chang and Joseph Harrington [2006], using analysis of social networks that are similar to methods being independently developed and used by food-web ecologists [see papers in Pascual and Dunne 2006]. How can we (or should we) reduce the influence of these cowbirds?

New articles in ecology are being published at an ever-increasing rate. More and more, we rely on title and keyword searching of electronic indices and tertiary reviews (such as those found in *Trends in Ecology and Evolution* or *Annual Reviews of Ecology, Evolution, and Systematics*) to keep abreast of the literature in our ever-narrowing subdisciplines. Even the most extensive online databases, such as ISI's Science Citation Index (Web of Science), do not cover all sources or the temporal span of modern ecology. Many journals, including outlets for new findings as well as review journals, limit the number of citations per article, discourage citing articles >10—15 years old, and/or encourage citation of articles published in the journal to which the paper is submitted (a strategy intended to increase a journal's impact factor). All of these trends should be resisted. Journals that limit the number of

citations per article usually provide options for on-line appendices, in which more extensive citations can, and should, be placed and discussed. Writers of reviews should make it known to journal editors, and especially our students, that ecology's roots extend back more than a decade. Impact factors are notoriously unreliable (Anonymous 2002), and we should neither concern ourselves with them nor encourage their use in making decisions about publication outlets, much less hiring decisions.

As Jonathan Fisher suggested, we should all try to resurrect unappreciated classics. This can be done by consciously using data from, and appropriately citing, relatively unknown but useful books and papers; try to cite one such paper in each article you write. As Fisher illustrated in his review of rocky intertidal ecology in the early 20th century (see also Fisher 2005), many of these may be in foreign languages, the reading of which poses a problem for students who no longer have to master a second language as part of their graduate education. These can be translated using Google Translate ‹http://translate.google.com›, and if they are in the public domain (as most works >50 years old are), posted on the Web. At the same time, we should (re)read, and encourage our students to read, well-known classic papers, such as those in Real and Brown (1991). Ecologists know that current ecological processes and dynamics are controlled or constrained by land-use history and past ecological events (e.g., Foster and Aber 2004). Similarly, contemporary ecological thought is bounded and shaped by the work of individuals who have come before us. Ecologists would do well to remember George Santayana's oft-quoted aphorism, "[t]hose who cannot remember the past are condemned to repeat it" (Santayana 1905–1906:284). In times of rapid ecological and environmental change, we do not have the time or resources to continually repeat the good work that has already been done.

Acknowledgments

I sincerely thank Paul Dayton, the symposium co-organizer; and Jim Carlton, Paul Dayton, Frank Egerton, Jonathan Fisher, Joel Hagen, Sara Tjossem, and Saran Twombly for their thoughtful contributions to the symposium. Any misrepresentations of their work in this essay are my responsibility.

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Urban Food Webs: Predators, Prey, and the People Who Feed Them

A prevailing image of the city is of the steel and concrete downtown skyline. The more common experience of urban residents, however, is a place of irrigated and fertilized green spaces, such as yards, gardens, and parks, surrounding homes and businesses where people commonly feed birds, squirrels, and other wildlife. Within these highly human-modified environments, researchers are becoming increasingly curious about how fundamental ecological phenomena play out, such as the feeding relationships among species. While food webs have long provided a tool for organizing information about feeding relationships and energy flows through natural habitats, they have not been applied to urban ecosystems until recently (Faeth et al. 2005).

At a symposium presented at the 2006 Ecological Society of America meeting, 10 speakers assembled to present and discuss "The Urban Food Web: How Humans Alter the State and Interactions of Trophic Dynamics," in a symposium organized by Paige Warren, Chris Tripler, Chris Lepczyk, and Jason Walker. A key feature of urban environments, as described in the symposium, is that human influence may be en-

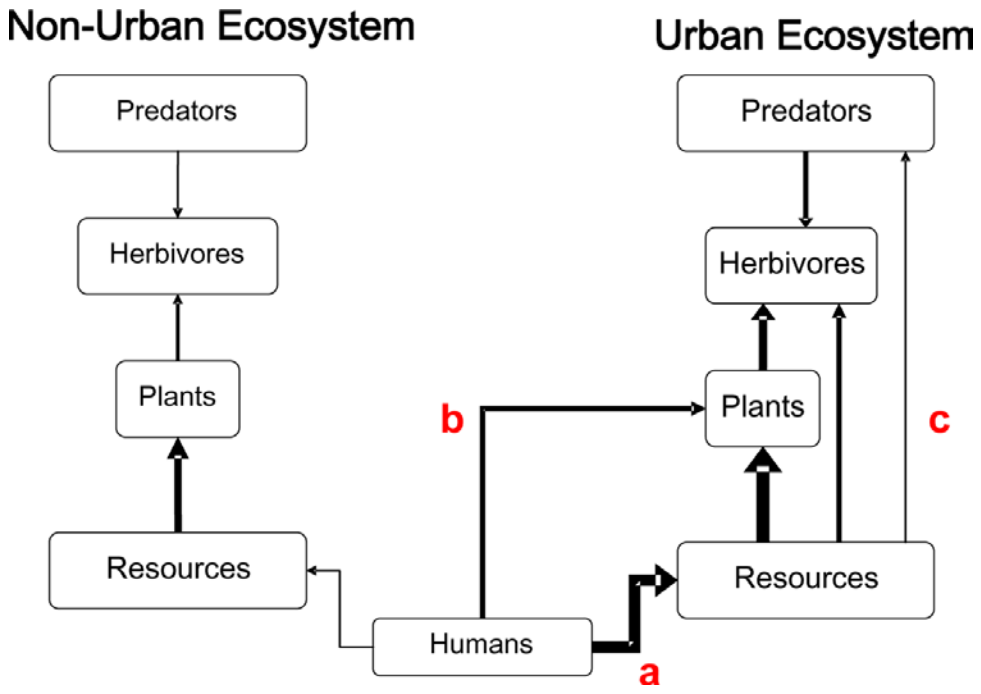

Fig. 1. A generalized model of trophic dynamics in urban vs. non-urban terrestrial systems (modified from Faeth et al. 2005). Humans alter both systems, but in urban environments, human influences are more profound and include (a) enhancement of basal resources like water and fertilizer, and (b) direct control of plant species diversity and primary productivity, leading to strong bottom-up controls. Humans also (c) directly subsidize resources for herbivores and predators either through intentional feeding or unintended consequences of other activities (e.g., garbage, landscape plantings), leading to enhanced top-down control for some taxa and reduced top-down controls on others (see Fig. 2).

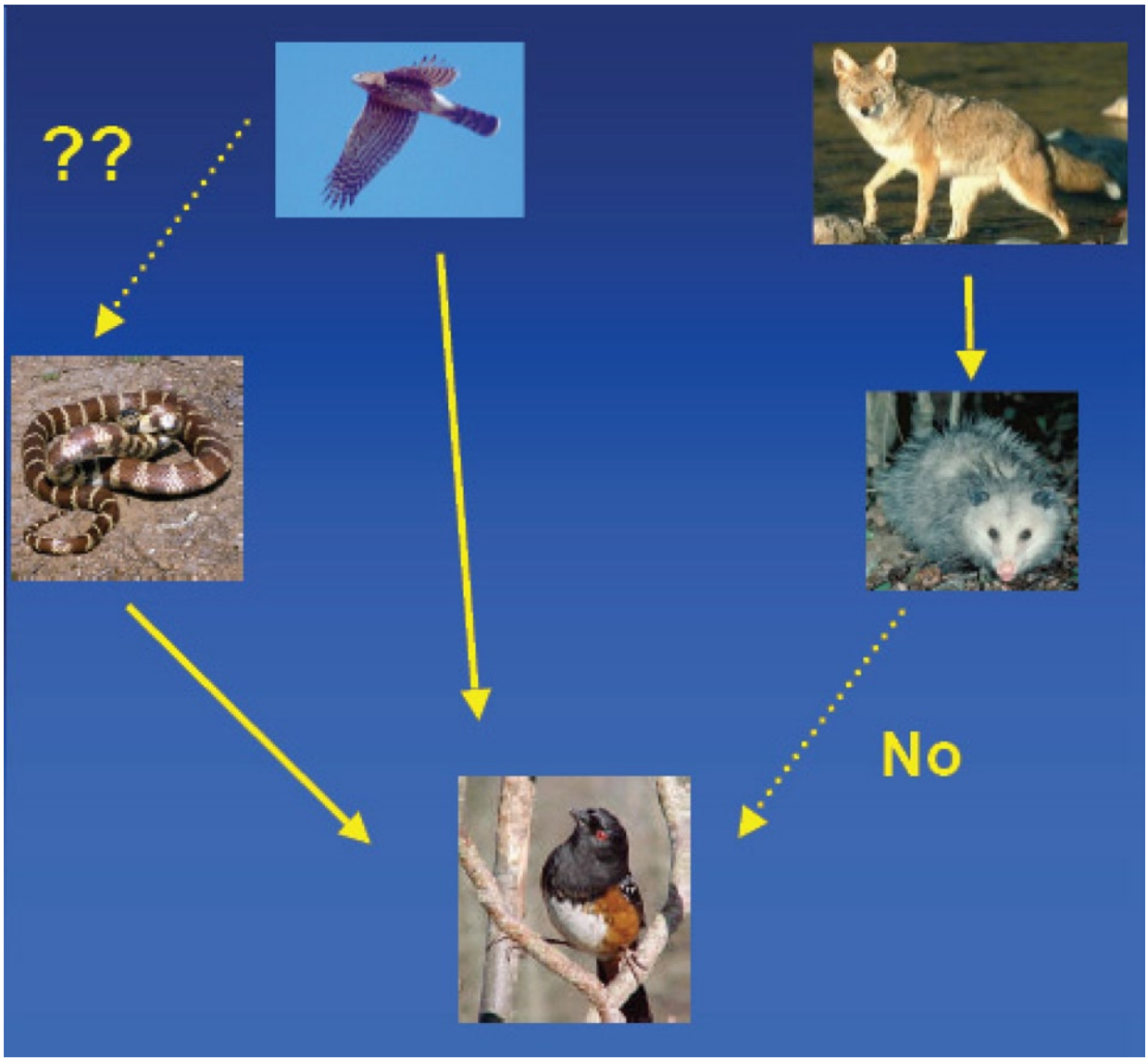

Fig. 2. Putative food web for coastal sage scrub fragments in San Diego, California, from work by Doug Bolger, Jay Diffendorfer, Eric Walters, Michael Anguiano, Dana Morin, and Michael Patten. In smaller, more urbanized fragments raptors increase and snakes decrease, yielding no net change in bird reproductive success. They find a strong connection of raptors and snakes to birds but weak or no connections between mesocarnivores and birds.

countered in any of the pathways of urban food webs, from bottom to top (Fig. 1). Within this system, humans alter and enhance resources and directly influence vegetative biodiversity and primary productivity. Similarly, at higher trophic levels, humans, both directly and indirectly, extirpate some consumers and predators and introduce other, often exotic ones. This fundamental reshaping of the food web in cities leads to altered trophic dynamics, which speakers at the symposium say are often not predictable even with detailed knowledge of species distributions.

Urban systems would appear at first to be driven by bottom-up dynamics, Stanley Faeth stated. His experiments, however, showed that urban arthropod populations on a common native plant species were

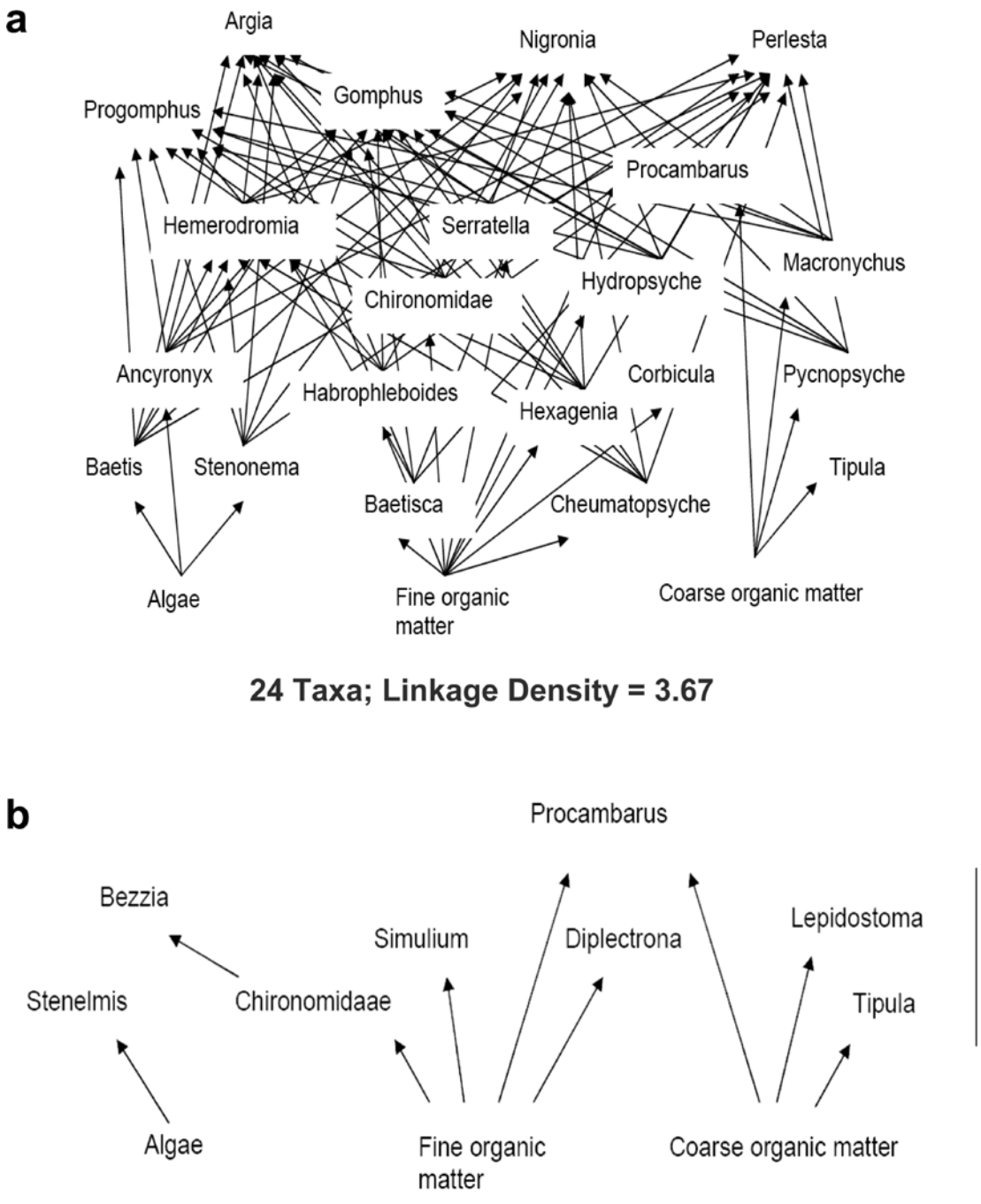

Fig. 3. Putative food webs for (a) Keg Creek, a non-urban reference stream in the Georgia Piedmont, and (b) a stream flowing through a neighborhood in Peachtree City, Georgia, with a mean property value of $388,900. The webs were constructed from data on species occurrence rather than gut content analysis (Overmyer et al. 2005). Species were assigned to functional feeding groups and position in the food web based on information in the literature (J. L. Meyer and S. L. Eggert, *personal communication*).

Fig. 4. Aerial photo of an abandoned village site in the Aleutian Islands region. The enhanced productivity of the village site produces the vivid green area. Rounded dimples within the site are house pits, each marking where a semi-subterranean house once stood. Photo courtesy of Herbert Marschner.

also strongly influenced by top-down control by bird predators, even in unmanaged desert remnant sites. Doug Bolger and his colleagues observed that top-down controls of predator–prey dynamics in San Diego, California, were not the ones that had been previously predicted (Fig. 2). Specifically, avian nesting success in coastal scrub remnants did not decrease with increasing urbanization, as expected. If anything, some birds performed better in the smaller, more urbanized fragments. Other presenters described similar surprises in empirical work ranging from modern cities and suburbs to ancient, abandoned village sites in the remote Aleutian Island region.

Profound influences of humans

To say that humans influence urban food webs is nearly tautological. According to several speakers, however, the profound extent of human influence in urban environments has not yet been fully appreciated by ecologists. Jason Walker showed that plant assemblages in urban sites in Phoenix, Arizona, could not be predicted by any of the factors that affect plant communities in surrounding desert, such as soil nutrients and elevation. Instead, factors such as land use and landscaping design (e.g., mesic vs. xeric) were better predictors of plant assemblages within the urban sys-

Fig. 5. Elevated productivity and human subsidies produced elevated densities of many animal species. In squirrels, high densities lead to low wariness of humans and high levels of aggression. The photo shows squirrels in Lafayette Park, Washington, D.C., where squirrels reach the "highest densities known in the world" according to Tommy Parker, with >40 squirrels/ha.

tem. Judy Meyer noted that in urban streams the effects of human development are consistent enough to identify an "urban stream syndrome." She found that this syndrome is associated with reductions in food web complexity in urban streams, an effect that appears to be greater in neighborhoods of higher property values (Fig. 3). Covariation in aspects of food web structure and human socioeconomic characteristics was raised by many speakers. Paige Warren and Chris Lepczyk focused on bird feeding by humans, an activity that, as other speakers showed, has broad ramifications throughout the food web. Lepczyk's landowner survey research showed that the majority of people across a rural-to-urban gradient feed birds, whereas Warren found that neighborhoods vary in the propensity of people to feed birds based on lifestyle characteristics. Furthermore, both Lepczyk and Warren's surveys found that people intentionally plant vegetation to attract birds and wildlife, including fruit plants, which can both directly and indirectly influence both primary production and consumers. The most striking example of human influence, however, was Nancy Huntly's work on abandoned village sites in the Aleutian Islands of Alaska. She and her colleagues have found consistent differences in plant and animal diversity and community composition within vs. outside of village sites, differences that have remained stable after >1000 years of abandonment (Fig. 4).

A growing picture of urban food webs

Consistent patterns of human influence emerged in terrestrial systems from the disparate studies presented. Strong bottom-up influences were common across

the studies; humans commonly subsidize resources, generating elevated productivity. Eyal Shochat presented evidence that the elevated productivity is associated with higher competition for resources, and ultimately, reduced species diversity, in contemporary urban habitats. In the case of aquatic systems, however, basal resources in urban streams are frequently being impoverished. Predator diversity is often but not always decreased in both terrestrial and aquatic systems, and middle trophic level organisms may experience reduced predation. However, as Doug Bolger and colleagues showed, reticulate food web structure and predator compensation make top-down and bottom-up controls difficult to predict (Fig.2).

Increased population density and altered behavior of urban-adapted animals complicates the effects of shifting productivity and predator communities. Density-dependent behaviors influence predator–prey dynamics, and altered foraging efficiencies may lead to elevated levels of competition. Tommy Parker described the "urban wildlife syndrome," a suite of behavioral characteristics exhibited by many animal species that colonize urban–suburban areas. These characteristics include reduced wariness of humans and increased aggressiveness, both of which are highly density dependent in the gray squirrels he studied (Fig. 5). Human subsidies for squirrels might alter competitive interactions and vulnerabilities to predation. This behavioral syndrome may act as a filter, said Shochat, excluding native species that cannot adapt to the more competitive urban communities. Several questions remain. Does reduced predation risk mediate the decreases in wariness and increases in aggression and foraging efficiency? Or are the altered behaviors simply density-dependent consequences of the increased populations produced by human resources subsidies? Parker noted that several aspects of the urban wildlife syndrome are correlated with resource availability at both habitat and landscape scales. Regardless, it is clear that changes in animal behavior lead to complex responses to altered resource levels.

Differences among studies provide tantalizing questions to be addressed. For example, productivity–diversity relationships differed among the studies, with lower diversity in highly productive habitats within Phoenix and Baltimore, but higher diversity on the highly productive abandoned villages in the Aleutians. Such contradictory findings reflect the broader debate over diversity–productivity relationships in ecology.

Importance of understanding urban food webs

All speakers agreed that altered trophic dynamics in urban environments hold important consequences for conservation of biodiversity, human health, and our broader ecological understanding. Focusing attention on food webs and trophic dynamics can provide insights for conservation biology and environmental management. For example, management to reduce feral cat predation may not have as large an effect as was previously thought on the stability of populations of coastal sage scrub birds (Fig. 2). Furthermore, Meyer noted that urban fishing is an important form of subsistence for many city residents, placing humans squarely within the urban food web. There are immediate human health consequences, she pointed out, for understanding the flow of pollutants through the simplified food webs of urban streams. Finally, Jonathan Chase's concluding remarks laid out opportunities for enhancing basic understanding of trophic dynamics through the study of urban food webs. Topics raised by the speakers, such as predator compensation, diversity–productivity relationships, and effects of predator diversity on food web dynamics, are generally unresolved issues in ecology. Urban environments offer ecologists places where human influences have produced new combinations of species interactions, changes in food web connectivity, and extreme values of productivity, both high and low. The consequences of these alterations are not simple and require an expansion of empirical and theoretical studies to evaluate the impacts and roles of humans in urban food webs.

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Summary of the Closing Plenary Lunch

Annual Meetings of the Ecological Society of America commence with the Opening Plenary Session, Welcome Mixer, and the Scientific Plenary and Awards Ceremony. These events set the stage for the coming week by introducing the meeting's theme, familiarizing participants with the local culture, reuniting old friends and colleagues, and honoring recent contributions to the field. However, the oral and poster presentations, symposia, workshops, scientific field trips, and special sessions are so numerous that it is impossible for participants to leave the Annual Meeting with a summary of everything that occurred. In an effort to summarize the week's events and formally conclude the meeting, the Closing Plenary Lunch was added to the schedule in 2003. The Closing Plenary Lunch features a panel of prominent senior ecologists who provide their insights into what the meeting has meant to them and what we may expect from the future. Questions and comments from participants are encouraged. Participants dine at small tables, with prominent ecologists and ESA leadership serving as table hosts. This is an especially excellent opportunity for graduate students to meet prominent ecologists and ESA leadership on a more intimate level than might otherwise be possible.

The 2006 Closing Plenary Lunch was held at 11:30 am on Friday, 11 August, and featured a panel of five prominent ecologists: Joan Ehrenfeld, Lars Hedin, Alan Covich, Svata Louda, and Steward Pickett. (Osvaldo Sala was also scheduled to speak, but had to leave the meeting early due to increased security measures at U.S. airports). Many of the remarks focused on the meeting theme, "Icons and Upstarts in Ecology," and the discussions were especially insightful because the panel comprised experienced, senior ecologists who were qualified to comment on changes that they observed in the field. Steward Pickett noted that the theme was unusual because it was provocative, and people actually paid attention to it. Indeed, people did pay attention, and the Closing Plenary featured extended discussions around the definitions of "icon" and "upstart." Joan Ehrenfeld cited the Oxford English Dictionary, which defines an icon as "a person or thing regarded as a representative symbol, especially of a culture or movement; a person, institution, etc., considered worthy of admiration or respect," and an upstart as "one who has newly or suddenly risen in position or importance; a newcomer in respect of rank or consequence; a parvenu." Steward Pickett stressed that icons and upstarts should not be used to refer to people, because this reinforces the myth that science is done by individuals. Thus, there seemed broad agreement that icons are the ideas, concepts, and approaches that represent the field of ecology, while upstarts are new ideas, concepts, and approaches that offer an alternative and challenge the current icons. Upstarts can eventually become icons themselves, and this cycle of icons and upstarts is the mechanism that drives scientific progress.

Upstart ideas, concepts, and approaches are risky, however, and this unfortunately restricts their prevalence in ecology. Svata Louda pointed out that a scientist has two options upon finding unexpected results. The first option is to somehow make the results agree with existing icons (e.g., discard data or recast the question), or the results can be used to challenge the assumptions of the icons. This can lead to the creation of an upstart, and Louda suggested that this type of risky science be more encouraged at ESA, because it leads to new questions and hypotheses and has the potential for a major advance.

The 2006 Annual Meeting demonstrated a substantial increase in the sophistication of questions and approaches, as noted by Lars Hedin. Questions are being asked, not in isolation but in a broader perspective, and the sessions featured a broad diversity of approaches and a good linking of theory and data. We are also seeing a coming of age of new tools. Stable isotope techniques, for example, were formerly found only in stable isotope sessions, but we are now seeing these techniques being used in sessions focused on a range of topics.

ESA is approaching its 100th Annual Meeting, and there were concerns and recommendations raised by both panel members and participants in the ensuing discussion. Kerry Woods noted that there are many constituencies within ESA that are not represented in the Annual Meeting sessions, ESA journals, or ESA administration, all of which are dominated by large research institutions. For example, David Ehrenfeld suggested that natural history is receiving less attention than in the past, both at the Annual Meeting as well as in ESA journals. However, Program Chair Kiyoko Miyanishi pointed out that the content of both the Annual Meeting and ESA journals are based on submissions from the Society's constituency, and encouraged ESA members to submit session proposals or manuscripts. There was also discussion on how to better link ecological research with allied fields, such as the geosciences. Lars Hedin pointed out that many of the topics addressed at ESA are also being addressed by groups like the American Geophysical Union. An up and coming challenge for ESA will be to reach out and encourage interdisciplinary collaborations with these allied fields.

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Society Section and Chapter News

Canada Chapter Newsletter

Chapter officers

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Vice chair: Karen Yee, University of Calgary ‹yeeka@ucalgary.ca›

Secretary/Treasurer: Beatrix Beisner ‹beisner.beatrix@uqam.ca›

Chapter Home page: ‹ http://www.esa.org/canada/›

2006 ESA Memphis meeting

The business meeting and mixer were held 7 August at the Marriott Hotel. Approximately 20 members attended. Karen Yee chaired the meeting in the absence of Ken Lertzman. Current membership is 176 for the Chapter. "The Ecological Consequences of Genetic Diversity," co-chaired by Marc Johnson and Randall Hughes, was sponsored by the Chapter. Members were encouraged to contact the Chair or Vice-Chair if they would like a symposium endorsement for the 2007 meeting in San Jose, California.

The Chapter is in the final stages of developing a web site section updating members on recent developments in Canadian science policy. Focus topics will include wetlands, endangered species, environmental site assessments, fisheries and oceans, and climate change. Members are encouraged to contact elected officers if they would like to have further topics addressed. The Chapter is working in partnership with the Environmental Law Club and Dr. Nigel Bankes from the Faculty of Law at the University of Calgary on this initiative.

The Chapter plans to help sponsor 2007 regional meetings such as the Ontario Ecology and Etiology Colloquium and the Pacific Ecology and Evolution Conference. Members planning to attend either of these meeting are encouraged to contact Canada Chapter elected officers for financial and administrative support if they are willing to serve as a liaison between regional meeting organizers and the Canada Chapter.

A closer affiliation with Partnership Group for Science and Engineering (PAGSE) and the Canadian Society of Ecology and Evolution (CSEE) were discussed by E. A. Johnson. In addition, members are encouraged to suggest workshops that they would like to see organized by the Canada Chapter.

Respectfully submitted,
Beatrix Beisner
Secretary/Treasurer
E-mail: ‹beisner.beatrix@uqam.ca›

Southeastern Chapter Newsletter

Chapter Officers

Chair: Frank Gilliam (2006-2008) ‹gilliam@marshall.edu›

Vice-Chair: Neil Billington (2005-2007) ‹askdrb@troy.edu›

Secretary/Treasurer: Howard Neufeld (2006-2008) ‹neufeldhs@appstate.edu›

Web-Master: Mark Mackenzie ‹mackenzi@forestry.auburn.edu›

Chapter Home page: ‹http://www.auburn.edu/seesa/›

2006 ESA Meeting

The Chapter convened its traditional Brown Bag Lunch on 9 August 2006, in Memphis, Tennessee. Formal fundraising for the Elsie Quarterman–Catherine Keever Award for Best Student Poster was discussed. Members also were encouraged to submit symposia proposals for the 2007 meetings of the Association of Southeastern Biologists and Ecological Society of America. Proposals seeking endorsement of the Chapter should be sent to Frank Gilliam ‹gilliam@marshall.edu› by 13 September 2006. Alan Covich, 2006–2007 President of ESA, congratulated our chapter for its activity and strong involvement of both academic and agency ecologists and proposed us as a model for other regional chapters of ESA. ESA wants to establish regional chapters throughout the United States by its 100th anniversary in 2015. Each chapter would form a knowledge partnership with its region and act in both transfer of knowledge and rapid response. Ideas of problems and issues in the Southeast that our chapter could address should be sent to Frank Gilliam ‹gilliam@marshall.edu› by 1 March 2007.

2007 ASB Meeting

The 68th Annual Meeting of the Association of Southeastern Biologists will be held 18–21 April 2007 at the Columbia (South Carolina) Metropolitan Convention Center, hosted by the University of South Carolina. The deadline for titles and abstracts of papers and posters is 1 December 2006. Information regarding the meeting, and title and abstract submission is available at ‹http://www.asb.appstate.edu/› (Click the link for the 2007 meeting to download ASB_2007_Call.pdf). Titles and abstracts to be considered for the Eugene P. Odum Award for Best Student Paper must be sent to the program chair, David Lincoln ‹lincoln@biol.sc.edu›, and the Odum Award Committee Chair, Danny Gustafson ‹danny.gustafson@citadel.edu›. Titles and abstracts to be considered for the Elsie Quarterman–Catherine Keever Award for Best Student Poster must be sent to the program chair, David Lincoln ‹lincoln@biol.sc.edu›, and the Quarterman-Keever Award Committee Chair, Mike Held ‹mheld@spc.edu›.

Membership renewal and award support

Please remember to renew your membership in the SE chapter when you renew your ESA membership. Your donations to the Quarterman-Keever Fund and the Eugene P. Odum Fund support our chapter's student awards at the ASB meetings.

Keeping in touch

Check the Chapter Home page: ‹http://www.auburn.edu/seesa/› for updates and additional information. Join the Southeastern Chapter of ESA LISTSERVER: To join the listserver, send a message to majordomo@mail.auburn.edu with "subscribe scesa" in the body of the message. Please send news or announcements to ‹scesa@mail.auburn.edu› for distribution to the listserv, or to ‹neufeldhs@appstate.edu› for inclusion in the next quarterly newsletter.

Respectfully submitted,
Howard Neufeld
Secretary/Treasurer
E-mail: ‹neufeldhs@appstate.edu›

MEETINGS

Meeting Calendar

Third Biennial Conference of the International Biogeography Society

The International Biogeography Society

The conference will be held in the Canary Islands on the island of Tenerife, 9–13 January 2007. Invited symposia will feature talks on maritime connectivity, island biogeography, Quaternary biogeography in the Holarctic, climate-based models as tools to separate historical from environmental effects on species distributions, and ecographic rules and biogeography in the eyes of the general public. All attendees are invited to submit abstracts for poster presentations. The conference will also include workshops, field excursions, and social events. Registration, contact, and additional information may be found at ‹www.biogeography.org›

Katherine F. Smith, Institute of Ecology, University of Georgia, Athens, GA 30602, (706) 542-6420, Fax: (706) 542-4581, E-mail: smithk@uga.edu ‹http://kfgsmith.googlepages.com/home›

Evolutionary Change in Human-altered Environments: An International Summit

The conference will be held 8–10 February 2007 at the Institute of the Environment, University of California, Los Angeles; it is being organized by Thomas Smith and Louis Bernatchez.

Human activities are affecting the evolutionary processes that generate and maintain biodiversity. Climate change and deforestation are facilitating the evolutionary jump of animal diseases to humans. Fish farming has resulted in the spread of poorly adaptive genes to the wild. Introductions of exotic species are impacting native species and limiting their ability to adapt.

In response to this developing crisis, we are convening an international summit of evolutionary biologists, conservation practitioners, and policy makers to synthesize current knowledge and to begin to develop plans to mitigate the effects. The summit will feature talks from >40 leading evolutionary biologists, as well as poster presentations and working groups. A central goal of the summit is to bring the discussion beyond academic boundaries to frame real-world solutions to these problems. The deadline for poster abstracts is 1 November 2006. For more information and to submit an abstract for a poster go to:

‹http://www.ioe.ucla.edu/ctr/ioesymposium.html›

The Ecological Society of America's

92nd Annual Meeting

Joint meeting with
The Society for Ecological Restoration

August 5–10, 2007
San Jose, California

For more information visit
‹http://www.esa.org/sanjose/›

INSTRUCTIONS FOR CONTRIBUTORS

DEADLINES: Contributions for publication in the *Bulletin* must reach the Editor's office by the deadlines shown below to be published in a particular issue:

Issue	Deadline
January (No. 1)	15 November
April (No. 2)	15 February
July (No. 3)	15 May
October (No. 4)	15 August

Please note that **all material** for publication in the *Bulletin* must be sent to the *Bulletin* Editor. Materials sent to any address except that of the Editor, given below, must then be forwarded to the Editor, resulting in delay in action on the manuscripts. Send all contributions, **except those for Emerging Technologies, Ecology 101, Ecological Education K–12, and Obituaries/ Resolutions of Respect** (see addresses below), to E. A. Johnson, *Bulletin* Editor-in-Chief, Department of Biological Sciences, University of Calgary, Calgary, Alberta T2N 1N4 Canada. (403) 220-7635, Fax (403) 289-9311, E-mail: bulletin@esa.org.

MANUSCRIPT PREPARATION: The manuscript should be submitted as a WordPerfect or Microsoft Word (for Mac or DOS) manuscript, preferably as an e-mail message attachment to bulletin@esa.org. E-mailed photographs and diagrams must be in .tif or .eps format. Other forms of electronic copy (text embedded in e-mail messages, diskettes sent by post) or hard copy can be submitted if absolutely necessary. If formatting could be troublesome (e.g., tables, European alphabet characters, etc.), hard copy also should be sent via fax to E.A. Johnson at (403) 289-9311, or via post. Hard-copy manuscripts should be double-spaced, with ample margins. Plain formatting must be used on hard-copy and electronic manuscripts. PLAIN FORMATTING consists of a single font of a single size, left justification throughout, line spacing the same throughout, and up to three different weights of headings. Other formats will not be accepted for publication. The author should THOROUGHLY PROOF the manuscript for accuracy, paying special attention to phone and fax numbers and web site and e-mail addresses, which are frequently incorrect.

COVER PHOTOGRAPHS: The photo should illustrate ecological processes or an ecological research design. The cover of the July, 2004 issue is a good example. It helps if the colors in the photo are bright, although black and white photos are considered if they are well composed with good contrast.

If you would like to submit a digital file, submissions can be small jpegs (72 dpi) but if the image is selected for a cover the final image must be 300 dpi and at least 7 inches wide and 5 inches high. E-mail the file as an attachment to the Editor of the *ESA Bulletin* at bulletin@esa.org. Or send a single 5 x 7 or 8 x 10 photo to the *Bulletin*. On an accompanying photocopy, give your name, address, a photo legend up to 100 words, and, if the photo describes a paper in ESA or in another journal, the literature citation or title of the accepted manuscript. If you wish unused photos to be returned please include a self-addressed return envelope.

LETTERS TO THE EDITOR AND COMMENTARIES: Please indicate if letters are intended for publication as this is not always obvious. The *Bulletin* publishes letters, longer commentaries, and philosophical and methodological items related to the science of Ecology. There are no page limits but authors may be asked to edit their submissions for clarity and precision. Previously published items from other sources can be republished in the *Bulletin* if the contributor obtains permission of the author and the copyright holder, and clearly identifies the original publication.

MEETING ANNOUNCEMENTS: Submit a brief prose description of the upcoming meeting, including title, a short paragraph on objectives and content, dates, location, registration requirements, and meeting contact person's name, street address, and phone/fax/e-mail address. Please do not submit meeting brochures in the expectation that the Editor will write the prose description; he won't. Compare the publication deadlines above with the meeting deadlines to be sure the announcement will appear in time.

MEETING REVIEWS: The *Bulletin* publishes reviews of symposia and workshops at the annual ESA meeting, as well as important and appropriate meetings that are unrelated to the annual ESA meeting. The reviewer should strive for a synthetic view of the meeting or symposium outcome, i.e., how the various presentations fit or conflict with each other and with current scientific thought on the topic. Review length is open, although about four double-spaced pages should be enough to capture the essence of most meetings.

The following advisory items are provided to help focus your review.

a) Meeting title, organizer, location, sponsoring organizations?

b) What were the meeting objectives, i.e., what scientific problems was the meeting organized to solve? Who cares (i.e., what was the relevance of this scientific problem to related ones under examination)?

c) How well did the meeting meet the objectives? Were there specific papers delivered or roundtables/ discussion groups that were exemplary in reaching the objectives? You may concentrate the review on only the outstanding papers to the exclusion of all others, or give a comprehensive view of all presentations/ meeting activities, or examine a selection of papers that neither describes all, nor focuses on a very few.

d) What new was discussed? What previously weak hypotheses were strengthened, confirmed or supported? Were any breakthroughs, or new or innovative hypotheses presented, that forced participants to rethink current concepts?

e) Was there anything else important that the meeting accomplished that may not have been part of its explicit objectives?

f) What subjects relevant to the meeting objectives were missing or left out? Did the scientific components of the problem that were included produce a strong slant or serious void by virtue of blind spots by the organizers, failure of invitees to appear, or similar difficulties?

g) Are there plans for a proceedings issue or meeting summary document, and if so who is editing it, who is publishing it, and when is it planned to appear (i.e., where can interested folks learn more about the meeting?)

EMERGING TECHNOLOGIES: Submissions for this section should be sent to the Section Editors in charge of the section: Dr. David Inouye, Department of Biology, University of Maryland, College Park, MD 20742. E-mail: inouye@.umd.edu; or Dr. Sam Scheiner, Div. of Environmental Biology, Natl. Science Foundation, 4201 Wilson Blvd., Arlington, VA 22230. E-mail: sscheine@nsf.gov

ECOLOGY 101: Submissions should be sent to the Section Editor in charge of this section: Dr. Harold Ornes, College of Sciences, SB 310A, Southern Utah University, Cedar City, UT 84720. E-mail: ornes@suu.edu

ECOLOGICAL EDUCATION K–12: Correspondence and discussions about submissions to this section should be sent to Susan Barker, Department of Secondary Education, 350 Education South,, University of Alberta, Edmonton, Alberta T6G 2G5 Canada. E-mail: susan.barker@ualberta.ca
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FOCUS ON FIELD STATIONS: Correspondence and discussions about submissions to this section should be sent to E. A. Johnson, *Bulletin* Editor-in-Chief, Department of Biological Sciences, University of Calgary, Calgary, Alberta T2N 1N4 Canada. (403) 220-7635, Fax (403) 289-9311, E-mail: bulletin@esa.org.

OBITUARIES AND RESOLUTIONS OF RESPECT: Details of ESA policy are published in the *Bulletin*, Volume **72**(2):157–158, June 1991, and are abstracted below. The death of any deceased member will be acknowledged by the *Bulletin* in an Obituary upon submission of the information by a colleague to the Historical Records Committee. The Obituary should include a few sentences describing the person's history (date and place of birth, professional address and title) and professional accomplishments. Longer Resolutions of Respect, up to three printed pages, will be solicited for all former ESA officers and winners of major awards, or for other ecologists on approval by the President. Solicited Resolutions of Respect will take precedence over unsolicited contributions, and either must be submitted to the Historical Records Committee before publication in the *Bulletin*.