

1992 PROGRAM SITES



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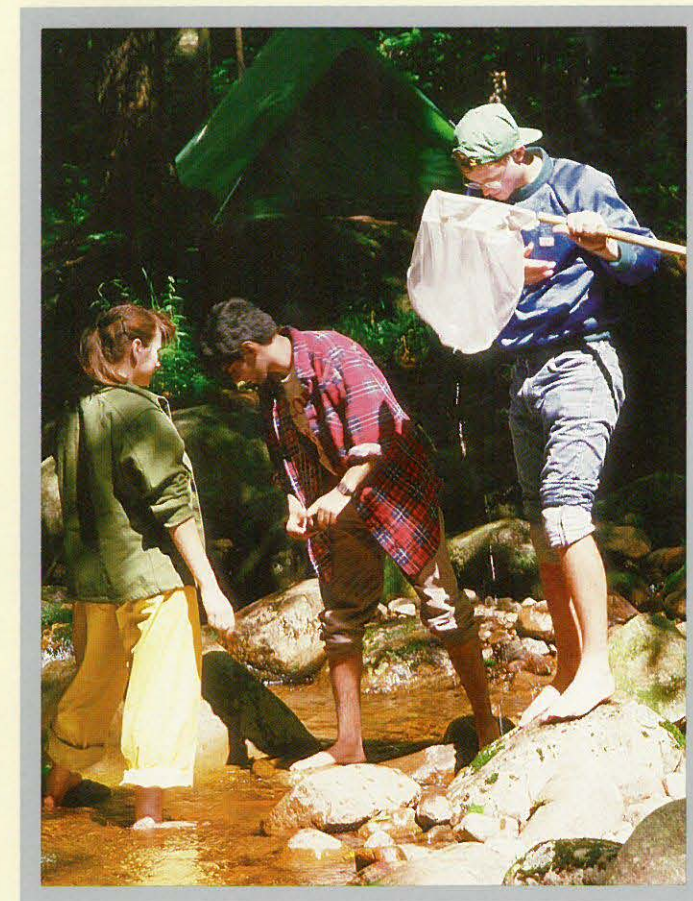
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THE SCHOOL FOR FIELD STUDIES

1992 ANNUAL REPORT



The mission of The School for Field Studies is to provide highly motivated young people from the U.S. and abroad with an excellent practical education in environmental studies, in order that highly motivated young people may become more environmentally literate/aware as well as make immediate and future contributions toward the sustainable management of the world's natural resources.

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The School for Field Studies

16 Broadway
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The School for Field Studies admits students of any sex, religion, race, color, national and ethnic origin to all the rights, privileges, programs, and activities generally accorded or made available to students of the School and does not discriminate on the basis of sex, religion, race, color, national or ethnic origin in the administration of its educational policies, admissions policies, scholarship and loan programs, and other School-administered programs. SFS is an equal opportunity institution.

Cover photo: Bill McComas

1991-1992 CURRICULUM

THE CENTER FOR MARINE MAMMAL STUDIES

Site: Baja, Mexico

Fall and Spring Semester Programs:
Marine Mammal Biology & Conservation
Summer Courses: (June 16 - July 15;
July 22 - August 20)
Ecology of Sea Lions

THE CENTER FOR MARINE RESOURCE STUDIES

Site: Turks and Caicos Islands, Caribbean

Fall and Spring Semester Programs:
Marine Ecology and Management
Summer Courses: (June 16 - July 15;
July 22 - August 20)
Coral Reef Management

THE CENTER FOR RAINFOREST STUDIES

Site: Australia

Fall and Spring Semester Programs:
Biogeography: Patterns of
Ecological Diversity
Summer Course: (June 25 - August 6)
Tropical Reforestation

THE CENTER FOR SUSTAINABLE DEVELOPMENT STUDIES

Site: Costa Rica

Fall and Spring Semester Programs:
Studies in Sustainable Development

THE CENTER FOR WILDLIFE MANAGEMENT STUDIES

Site: Kenya

Fall and Spring Semester Programs:
Wildlife Ecology and Management
Summer Courses: (June 16 - July 15;
July 22 - August 20)
Wildlife Management

SUMMER SATELLITE COURSES

Session I: June 16 - July 15;
Session II: July 22 - August 20

1. Ecology of the Asian Elephant

India (June 24-August 5)

2. Ecology of Killer Whales

British Columbia

3. Primate Ecology and Conservation

Costa Rica

4. Landscape Ecology: Designing Parks for Preservation

Colorado Rockies

5. Ecology of Endangered Sea Turtles

Costa Rica

6. Tropical River Ecology

Belize

7. Conservation of Endangered Species

Hawaii

8. Ecology of Bald Eagles and Other Endangered Birds of Prey

Montana

9. Tropical Cloud Forest Ecology

Costa Rica

10. Biology and Behavior of Bottlenose Dolphins

North Carolina

THE SFS PROMISE

It is our hope that each student involved in an SFS program will:

- experience the opportunity to make a meaningful personal contribution toward improving the condition and/or sustainable management of the natural resources of the community in which they are studying;
- acquire an approach to problem-solving and decision-making that involves identification and comparison of alternative courses of action and consideration of the social, ethical, political, and biological implication of each;
- develop an integrated understanding of conservation issues that emanates from a case-based study of:
 - a. ecology;
 - b. applied science and research techniques;
 - c. resource management;
 - d. the role and implications of the cultural context, including the political and economic implications; and
 - e. the inter-relationships of the above;
- experience opportunities for personal growth and achievement, including:
 - a. the opportunity to function productively as part of a group;
 - b. the challenge to achieve at his or her maximum personal potential;
 - c. the opportunity to pursue and realize extraordinary achievement; and
 - d. the opportunity to accept responsibility for his or her personal learning and growth.

Letter from the Chairperson and the President

The Earth Summit in Rio de Janeiro brought welcome attention to many aspects of the environmental crises we face. This conference made clear, however, the futility of relying solely upon government agencies to effect change, either globally or locally. As a result, we each are faced with the need to personally make our best contribution possible toward the improvement of our common environment.

This critical understanding is the core of the SFS mission. Our students are given both the opportunity and the skills to contribute to pressing environmental solutions. They come away empowered with a sense of what is possible and the conviction that their participation is relevant and productive. As Charles Montgomery, a recent alumnus noted: *"My SFS program taught me in a hands-on way how to work with people, not against them, to achieve the equilibrium that exists in nature... Now my dreams have changed, and I only hope that I can pass on the things I have learned to others, and contribute to the conservation of the planet."*

At the same time, the Rio Conference was a call for an environmentally-literate world leadership. A new order of facilitators is desperately needed to create the level of change now foreseen by many around the world. SFS continues to take on this challenge by investing in one of the most crucial "natural" resources available to future generations: the education of young people. And we consistently receive applications from extraordinarily talented young people from over 160 colleges and universities throughout the country who we are confident will someday be filling this leadership vacuum.

Many of our questions about the state of the environment are not just about ecology. Many are about economics — about making short term sacrifices today in order to gain long term sustainability. Many are about politics — about acting on the realization that our interests extend beyond our own national boundaries. By recruiting faculty members from the fields of conservation biology, resource economics and development, we provide the broad-based foundation our students need to assess complex problems. In our Center for Marine Mammal Studies, for example, we've just hired a Marine Resource Conservationist whose focus is on policy-making, as well as an Ecological Anthropologist. We have enlisted a Resource Economist as well as a Social Scientist in our Costa Rica Center. We have also recruited an accomplished manager as Vice President for Programs, Kathy Abbott, the former Deputy Commissioner of the Massachusetts Department of Environ-

mental Management. She is joined by six year SFS veteran Dr. Robert Singer (Director of Academic Affairs and Marine Programs), who recently returned to SFS.

Our gains this year have been substantial:

- Enrollment increased for the 12th year in a row, by 13% this past year.
- Our operating budget increased 30% over last year, and produced a positive balance of over \$100,000. Our total fund balances increased over 60%.

- Our newest Center in Costa Rica opened with a full enrollment of 48 students, half of which were provided by the five member schools of the Consortium for Sustainable Development Studies.

- We are thrilled to welcome **Brandeis University** and **Scripps College** as to the ranks of SFS Affiliates.

Now in our 13th year, SFS continues to impart to our students the essential understanding that whole ecosystems — including their human inhabitants — rather than

their individual parts are the basic units of value. Our graduates recognize that humanity cannot live forever on the inherited capital of Ice Age groundwater, irreplaceable agricultural soils, and the micro organisms, plants, and animals that are integral elements of these vital ecosystems. Coming from diverse backgrounds, our students work together with a common urgency for knowledge, and leave with a practical education they can immediately put to use.

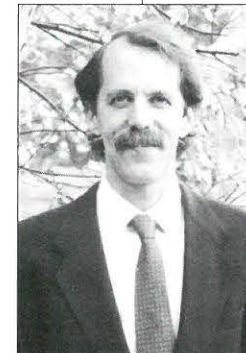
The challenge before SFS is significant: to enable young people to assume a responsible, informed, and active role in relation to their local and regional environments. In order to do this effectively, we must continue to raise funds to secure permanent campuses for three of our Centers, to fully implement our practical approach to education, and to find the financial support for the many qualified students who are facing the twin pressures of a poor economy and major cutbacks in federal financial aid.

With your help, we are confident that these challenges can be met. We trust you share our pride in the School's successes, and our humility in the face of the efforts required to reach our potential. We look forward to meeting the challenges ahead of us, as we confront the change needed to regain a sustainable and sustaining environment.

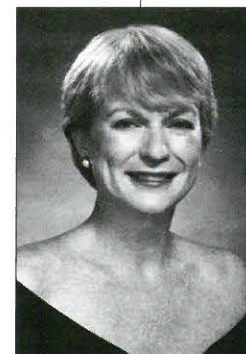
Sincerely,

James L. Elder, Jr.
James L. Elder, Jr.
President

Terry L. Andreas
Terry L. Andreas
Chairperson



James Elder



Terry Andreas

Photo: Barry Camer

Photo: Bachrach Studios

The SFS Center for Marine Mammal Studies, Mexico

The SFS Center for Marine Mammal Studies, the world's first year-round field program offering undergraduate training in marine mammal conservation, is situated in the Bay of La Paz on the Sea of Cortez. This location in Baja California harbors an extraordinary year-round diversity and abundance of marine mammal species. Six species of cetacean are present, from Brydes Whales, to greys and finbacks to the stunning Blue Whale; and three species of pinnipeds (Harbor Seals, California Sea Lions, and Elephant Seals) can also be found. These mammals, unusually sensitive to human impacts, are under increasing stress from growing human activity in the region, including tourism. In cooperation with local scientists, the Center is making significant contributions to the formation of management policies in this resource-rich area.

round photo-identification project of resident Bottlenose Dolphins, which in turn will enable us to study family structure, group behaviors, and their responses to stress from boating and pollution. This dolphin pod is one of only a few other marine mammal populations worldwide where individual members have been identified.

We have previously studied the resident California Sea Lion population, which has a rookery on the offshore island of Los Islotes, for two years during the fall and spring semesters. Our new summer program, *The Ecology of Sea Lions*, enabled us to complete a study of their life cycle during the summer pupping season. (This course also enabled us to increase the Center's annual enrollment from 56 to 88). Our faculty and students assisted local expert Dr. David



Our research in the Bay of La Paz directly contributes to and supports ongoing work of Mexican scientists concerned with conserving the marine mammals around the region. Photo: Lorayne Meltzer

Testimony to the quality and value of SFS research efforts was provided at the XVII Reunion Internacional para el Estudio de Los Mamíferos Marinos en Mexico, an international research conference held in La Paz in April. Conference attendees discussed pamphlets created by SFS research teams outlining strategies for implementing guidelines to insure minimum tourist impact on resident marine mammals. SFS staff and students presented three poster entries, one of which, "The Effect of Tidal State on the Number of Hauled Out Individuals and Activity Budget of California Sea Lion (*Zalophus californicus*)," was awarded top honors for "Best Student Poster".

The Center continues to enjoy a supportive relationship with the administration, faculty, and students at the Autonomous University of Baja California Sur (UABCS) in La Paz. The Center's Research Advisor, Jorge Urban, is on the faculty of UABCS. With the generosity of the **Homeland Foundation**, we have added new materials to the library, supported three Mexican students on Center programs with full scholarships, and improved our field equipment. Our search to acquire a permanent campus for the Center continues — escalating land prices in this area make this a difficult task, but it is a top priority for the 1993 fiscal year.

Based on my SFS experience in Baja, I understand the struggle of the developing countries of the world to balance pressing economic needs with limited natural resources and fragile ecosystems. This has become an international wrestling match in

Latin America, and certainly a critical situation in Mexico.

— Elisabeth Mowris
Davidson College

Photo: Lorayne Meltzer



Our research has three specific objectives: (1) to continue to collect baseline data on diversity, distribution and abundance of marine mammal species in the Bay of La Paz, (2) to assess the affects of human disturbance on local marine mammal populations, and (3) to collect base-line ecological data in the Bay of La Paz. SFS students and staff worked on several important research initiatives during 1992. The first was the completion of a year-

Auriolles of the Centro de Investigaciones Biológicas in a measuring and tagging study of pups as well as a study of the effects of human presence on behavior.

Finally, our repetitive cruise surveys of the large whales in the area have indicated a pattern that may be dependent upon the movement of prey species — which in turn are influenced by global scale events such as the El Nino current.

The SFS Center for Marine Resource Studies: Turks and Caicos

Recent decades have brought tremendous challenges to marine resource managers. Humankind is rapidly depleting ocean resources worldwide, a problem particularly critical in the Caribbean. Many fishing practices have led to depleted stocks, and are also destroying non-target species. Pollution, industrial debris, and recreation are damaging the sea-

to the breath-taking corals and fish of the reef/wall system, plunging to a depth of 6,000 feet within half a mile of shore, this archipelago offers a full range of habitats. Mangrove islands and inland salt pans (*salinas*) provide further diversity and harbor birds including osprey and flamingos. Some of the most special habitats have been designated marine sanctuaries, including the area

surrounding the Center known as the *Admiral Cockburn Land and Sea National Park*.

The 113 participants in semester and summer programs at South Caicos focused much of their academic and research attention on the following case studies: Shellfish fisheries (conch and lobster); Fin-fish fisheries; and Tourism and Development. These

topics provide rich material for lectures and research. Besides ongoing monitoring projects, some new projects included the first study of natural predation on hatchery-reared conch, the beginnings of a hydrographic map of the Caicos Bank, and a study of the potential for developing a sport Bonefish industry. The host community of Cockburn town has welcomed our presence on the island, and our students in turn have hosted the science fair at the high school, taught swimming, and challenged the high school team to basketball (to date, South Caicos: 3 wins — SFS: 1).

Our positive relations with local agencies, most notably the *Department of Fisheries* and the *National Parks Department*, include sharing equipment and personnel and helping them to meet their research goals. Representatives of most agencies were present at a two day symposium in mid-May at which spring semester students presented their directed research findings. Student presenta-



Students find the interaction with our host communities one of the most rewarding aspects of SFS programs. In South Caicos, SFS students learn about the way people use their marine resources by working closely with the Island's government officials, fishermen, teachers, and school children. Photo: Beth Bader

grass beds, mangroves, and coral reefs, and are rendering critical habitats unsuitable for sustainable use by fish and humans.

The SFS Center for Marine Resource Studies was established in 1985 to address these critical issues. The Center acquired its permanent site on South Caicos in 1989, and now focuses on the management of the fisheries and the conservation of marine communities in the Turks and Caicos Islands. Located south of the Bahamas, this small British Dependency hosts some remarkable marine habitats. From the shallow sandy Caicos Bank, one of the best fishing grounds for Queen Conch in the world,

tions included: patch reef studies; conch studies; fisherman and fisheries; and economic feasibility studies of alternative resources and techniques.

Work continues on several major capital projects designed to upgrade the facility. This past year saw the completion of an upgrade of the electrical system, and the coming year will be devoted to developing a plan to "green" the campus by identifying the natural resources being consumed by the Center and developing methods to conserve their use, while maintaining a strong academic program. Much of the new activity this past year has been possible due to the continuing generosity of the **Curtis and Edith Munson Foundation** and the **Laurance S. Rockefeller Charitable Trust**.



Prior to my SFS program in South Caicos, I hadn't been exposed to a culture very different from my own. It was constructive for me to understand a different way of life. It gave me a new perspective on my expectations and standards.

— Danielle Ravenelle
University of New Hampshire

Photo: Beth Bader

The SFS Center for Rainforest Studies: Australia

The greatest diversity of wildlife in Australia and the greatest concentration of primitive flowering plants in the world are found in the tropical forests of northern Queensland, Australia. Approximately half of Australia's rainforests were felled within the last century; fortunately, the remaining tracts are now protected through World Heritage site designation. While most developing countries have yet to address the problems associated with managing rainforest resources, Australia is one of



Center Director Paul Robertson is shown the progress of a tree planted a year ago by SFS students as part of the Center's ongoing reforestation research.

Photo: David Bathgate

the few countries where full scale resource management programs are being designed and implemented. The struggle now is to manage the remaining forests in a sustainable manner, given the country's social, economic, and political pressures.

In 1988, the newly created SFS *Center for Rainforest Studies* acquired a 60 hectare property contiguous with the largest block of Australia's World Heritage forest, where most of our research projects are now conducted. Our new campus and field center provide easy access to an array of both pristine and modified habitats — an ideal natural laboratory for studies in rainforest conservation.

Our goal at the Center is to train students in the complexities and challenges inherent

in tropical rainforest management. Each semester's lectures, exercises, guest speakers, and field trips were organized around three case studies: wet tropics management, reforestation, and sustainable management of Atherton Tableland resources. These were bolstered by introductions to the geography, geology, and soils of the region and an intense period of experimental design, statistics, scientific writing and paper critiquing.

In 1992, 60 highly qualified students enrolled in our two semester programs — *Biogeography: Patterns of Ecological Diversity*. An additional 31 students participated in our 6 week summer course — *Tropical Reforestation*. Altogether this comprised a 14% increase in enrollment over 1991.

Student research in 1992 focused on restoration ecology. Examples of student projects demonstrate the wealth of research opportunities at the Center:

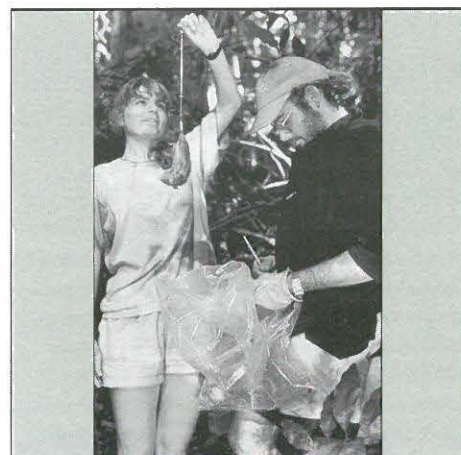
- "Patterns of Seedling Regeneration in a Secondary Acacia dominated Forest",
- "Ant Species Richness in Three Australian Rainforest Habitats",
- "Distribution of Five Species of Arboreal Possums in Forests of the Atherton Table land",
- "Activity Patterns of the Cane Toad on a Recently Constructed Dirt Road", and
- "Effects of Nitrogen Fixing Trees on Soil Quality".

Research results have been made available to research scientists at CSIRO, National Parks, and the Wet Tropics Management Authority. In addition, the Center hosted two well attended meetings for local residents and scientists to present the Center's research findings by students and faculty.

In September 1991, Dr. Paul Robertson took over as Field Director. Dr. Robertson had spent the past 16 years as an associate professor of Biology at Trinity University in

Texas and had also served as the Executive Director of Bat Conservation International.

The Center campus has been tremendously enhanced by the completion of four, eight person student dormitories, two solar powered faculty cabins, and expansion of the library to 300 volumes. Center staff are now actively promoting the Center for use as a field station and as a site for workshops, retreats and courses when available. SFS is deeply grateful to the **Archer-Daniels-Midland Company** for their continuing support of the Center, and to Center alumnus **Michael Mars** for his support in encouraging the creation of a special January course in 1993 for Australian students.



Reforestation is a relatively new concept in Australia. The plan our research group proposed provided valuable information on many of the unanswered questions of this complicated process. We also gained a lot of confidence in ourselves and a thorough understanding of how research is conducted.

— Stephen C. Burke
Allegheny College

Photo: David Bathgate

The SFS Center for Sustainable Development Studies: Costa Rica

The opening of SFS's *Center for Sustainable Development Studies* in the Fall of 1991 was the culmination a 3-year effort by SFS and the Consortium for Sustainable Development Studies (**Allegheny College, Colby College, Middlebury College, Dickinson College, and the University of Michigan**). The Consortium provides academic guidance, program development support, and technical assistance for the Center. Consortium schools also provide approximately half of the Centers' students.

In choosing the site for the Center, SFS and the Consortium members sought to create an opportunity for students to explore the concepts of sustainable development in a developing country in which significant progress is being made. Costa Rica is having some success in protecting forested watersheds while developing hydroelectric power; establishing conservation regions for the protection of biological diversity, indigenous peoples, and the culture of regional communities; controlling disease; developing sustainable agriculture practices, and restoring native ecosystems. This makes it an ideal choice for a sustainable development program.

Interest in an intermediate level, environmental field study opportunity was confirmed as the Center hosted a full enrollment of 48 students from 26 institutions during its inaugural year. Both fall and spring semesters had waitlists for admission, an unusual scenario for a first-year program. Students considered six important case studies in sustainable development issues: Land Utilization, Transnational Corporations in Agricultural Production, Wildlife Conservation, Management of Buffer Zones, Ecotourism, and the

study of Development and Socio-Political Issues in the Atlantic Zone of Costa Rica. These studies were taught by a multidisciplinary team of specialists in conservation biology, resource economics, social development, and natural resource management. The upcoming semester will incorporate a case study on the production and use of hydroelectric and geothermic energy, which has long

been expected to sustain industrial development and allow the country to move away from dependence on petrochemical sources.

The final two weeks of the spring semester were spent conducting Directed Research at the privately owned Hacienda Curu Wildlife Reserve (the site of the SFS summer satellite primate ecology program for the past three years). Eight separate student research projects were undertaken including studies of agriculture and cattle production; historical impediments to sustainable development; habitat requirements of selected wildlife species; and an assessment of the sustainability of ecotourism. One of the projects, a proposal for the sustainable development of marine resources at Curu, may lead to the establishment of a protected marine area at the reserve in the near future. Students in the spring semester compiled their findings into a 238 page research report and management

plan which was presented to the owners/mangers of the reserve.

SFS is very grateful to the **Frese Foundation** for their three-year grant which contributed essential start-up funds for the Center.



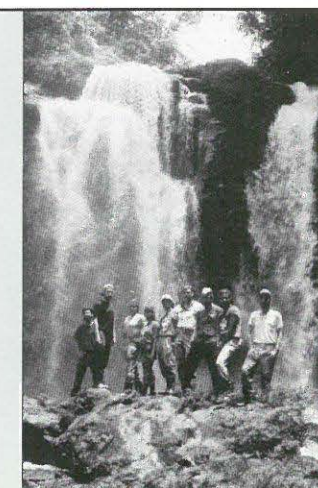
These students are learning about the impact of agricultural production and social development in the Central Plateau region of Costa Rica, one of the case studies used to explore the country's efforts to balance development and the environment.

Photo: Chris Vaughan

I had studied Latin America and sustainable development for three years, but the difference between studying a subject and living it is a totally different type of education. SFS has helped me shed my "developed nation" perspective and realize a developing perspective — a subtle change, but a change I will never lose or forget.

— Paul Kurtz
Drew University

Photo: Chris Vaughan



The SFS Center for Wildlife Management Studies: Kenya

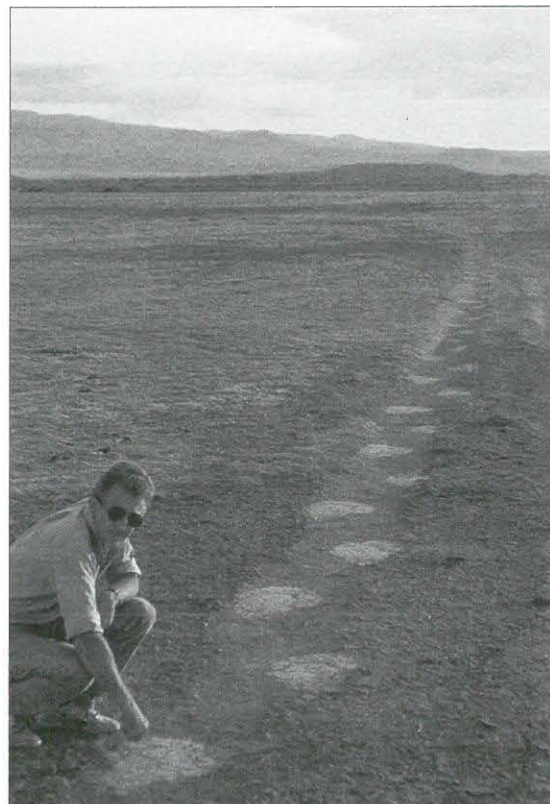
Once described as small islands of settlement in a sea of wildlife, East Africa now qualifies as islands of wildlife in a sea of people.

Kenya has one of the highest birthrates in the world. It also contains the world's most renowned wildlife reserves. Not long ago, wildlife was viewed by Kenyans as a source of livestock and crop destruction, or a net liability. Today, however, the government and people of Africa are increasingly aware that wildlife attracts millions of tourists every year, thereby providing massive infusions of foreign exchange. And as a food source, indigenous wildlife has the potential to feed millions of hungry people more efficiently than domestic species and without their negative environmental impact.

At our *Center for Wildlife Management Studies*, students have been given since 1981 a unique opportunity to learn about some of the wildlife management options available to developing countries such as Kenya. Isolated national parks often alienate local people because they yield few local benefits; we are attempting to understand ways to make necessary compromises beneficial to both sides of the conflict. Under-

standing the needs and beliefs of the people who are most affected by wildlife conservation programs is an important component of wildlife management. As a result, we have been increasing the study of cultural ecology within the Center's wildlife management programs.

A record enrollment of 98 students participated in Center programs, 58 on two *Wildlife Ecology and Management* semester programs and 40 on two, month-long summer *Wildlife Management* courses. Students in the fall and spring semester programs generated a total of 17 directed research projects, several of which are likely to be published after review. One of the most exciting research projects is the scientific and sociological study of dung as an alternative fuel source. Demand for fire wood is resulting in a landscape stripped of trees, increasing soil erosion, and a disappearing wildlife habitat. Our study determined that the fuel efficiency of dung is equal to or better than wood. However, it is now clear that the attitudes of local people to its use are negative and will



Dick Garstang, Field Director for SFS Center for Wildlife Management Studies, points out elephant footprints against the backdrop of a devastated Amboseli National Park.

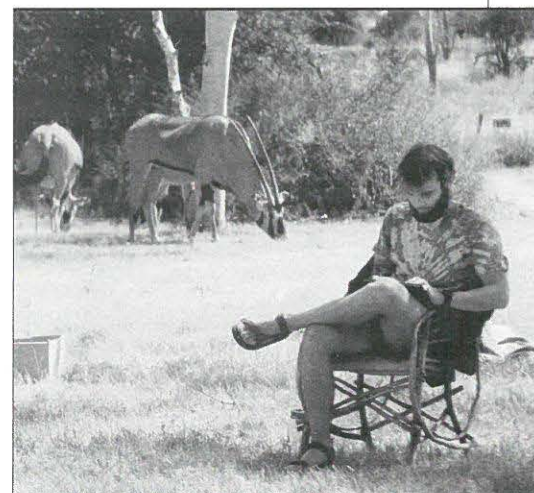
Photo: Peter Copolillo

require education to change.

Our graduates experienced an intensive look at wildlife as a sustainable component of development, and helped to improve the tools available to wildlife managers.

The academic year at the Center saw the arrival of a new Field Director, Dick Garstang. Mr. Garstang has brought to the Center his commitment and enthusiasm arising from over twenty years of experience in African wildlife management issues.

The Center's physical plant was improved in 1992 by the addition of a generator, four additional computers, and solar panels for faculty housing, thanks in part to the generous support of the Washington D.C. Chapter of the **Safari Club**.



I was awarded a Fulbright Grant to study in Bolivia, but chose first to participate in SFS to broaden my education. The one-semester SFS program was as valuable as two years of traditional study; plus it had a great effect on my future plans.

— **Bret Gustafson**
Tulane University

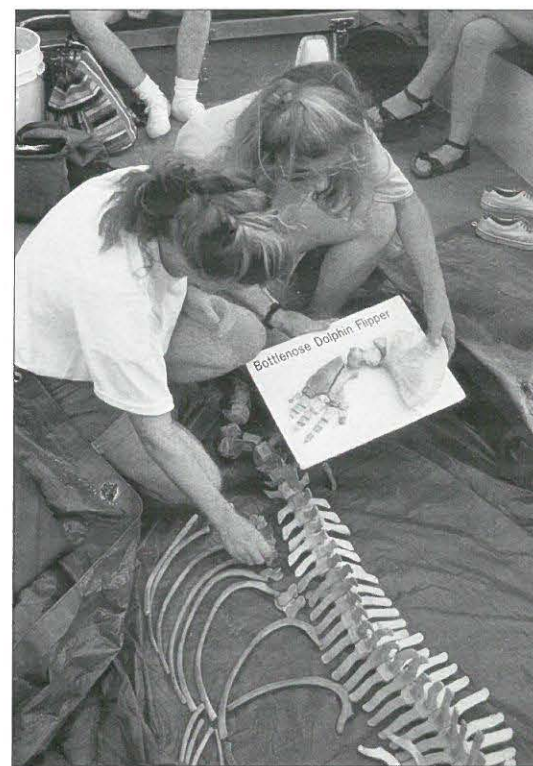
Photo: Weaver Whitehead

Satellite Program

SFS's summer courses at "satellite" sites provide students with a broad range of course topics while offering SFS the opportunity to mount shorter-term research efforts at environmental "hot-spots" worldwide. Summer satellite programs are college accredited, and attract both science and non-science majors who want a short but intense learning experience in the field of environmental studies.

In 1992, 269 students participated in 30 and 42 day satellite programs at ten sites around the world. Twenty-six faculty, supported by 15 interns, led programs in:

- *Biology and Behavior of Bottlenose Dolphins/North Carolina*
- *Ecology of Bald Eagles and Other Endangered Birds of Prey / Montana*
- *Tropical River Ecology /Belize*
- *Landscape Ecology /Colorado Rockies*
- *Ecology of Killer Whales / British Columbia*
- *Ecology of Endangered Sea Turtles /Costa Rica*
- *Ecology and Management of the Asian Elephant /India*
- *Conservation of Endangered Species /Hawaii*
- *Primate Ecology and Conservation/ Costa Rica*
- *Tropical Cloud Forest Ecology / Costa Rica*



The 1992 satellite curriculum explored three new topical environmental issues:

In Hawaii, SFS students on teams led by Dr. Leonard Freed of the University of Hawaii and well-known ecologist and author Dr. Stuart Pimm researched the demographics of highly endangered bird species on the islands of Kauai and Hawaii, and considered factors which may be leading to their extinction. Data, including valuable pre-hurricane information from our study site on Kauai, are being shared with federal and state officials responsible for managing these birds and their threatened ecosystems.

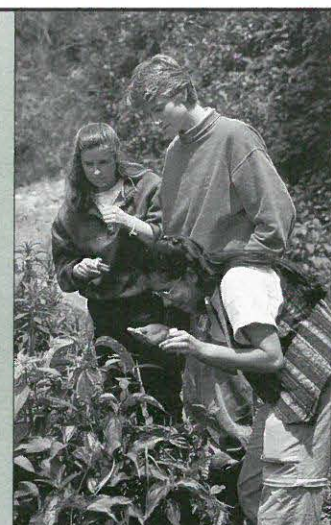
In southern India, participants in *Ecology and Management of the Asian Elephant* had the opportunity to work with international Asian elephant expert Dr. R. Sukumar on the problem of competition for natural resources between wild elephants and humans. SFS students began an analysis of the impact of elephant activity on forest vegetation. SFS's research is part of a long-term effort by scientists in India to develop sustainable man-

Teamwork in scientific activity and daily life is an integral part of the SFS educational model. Photo: Robert Benedetto

agement approaches for the Asian Elephant.

SFS alumna Naomi Rose was the senior faculty member on the *Ecology of Killer Whales* program in which students researched the impact of human activity on killer whales in the Johnstone Strait of northern Vancouver Island. Their data will contribute to studies by the Provincial Department of Parks and scientists from the University of British Columbia, who are trying to develop policies to regulate human activities in this important orca feeding area.

Among the many highlights of this summer's research findings were the discovery of two new beetle species by the *Tropical Cloud Forest Ecology* teams in Costa Rica, and the documentation of white-faced capuchins using plants for medicinal purposes by the *Primate Ecology and Conservation* team.



I fear that if I don't contribute to the problem-solving of our environmental crisis, my children won't know the wonders in nature. I am grateful to my SFS sponsor for giving me the opportunity to study resource management, and hope someday that I too can help give students this opportunity.

— **Theresa Melnick**
Dickinson College

Photo: Bill McComas

Admissions

Full enrollment during the inaugural year at The **Center for Sustainable Development Studies** in Costa Rica spurred our total semester enrollment to an impressive 35% increase: a total of 275 students participated in semester programs at the five Centers in 1991-92. Semester enrollment now accounts for 40% of our total enrollment, up from 33% last year. With a total of 62% of all participants enrolled in all Center programs (semester and summer), we made good progress toward our goal of becoming primarily a Center-based operation. An additional 270 students participated in summer programs at 10 satellite sites around the world.

Overall SFS enrollment increased by 13% to 705 students from over 300 secondary schools, colleges and universities. The schools which provided the most of students in 1991-92 were: **Tufts, Brown, Harvard** and **Denison Universities**, the **Universities of Vermont, Rhode Island** and **Miami, Davidson, Colby, Amherst, Middlebury** and **Dickinson Colleges**, and **Stuyvesant High School**. Participants in 1991-92 hailed from 45 of the United States,

as well as from Puerto Rico, Kenya, Australia, Germany, Sweden, Mexico, Canada, and Italy.

An increasing number of participants are dependent on receiving financial assistance in order to participate in an SFS program. Through the generosity of a growing number of scholarship donors, SFS was able to provide scholarship assistance totaling \$165,000 to 180 students, a full 26% of our total enrollment.

We are particularly grateful to **The Merck Family Fund**, which made another significant contribution to the Merck Family Revolving Student Loan Fund this year. This Fund was the principal source for loans to 194 students totaling \$175,000. (For many semester participants, this aid was supplemented with assistance from their home schools or from government sources).

We are very proud of our scholarship recipients. For example, Victoria Franjul, a high school student from New York City, became the first recipient of a joint scholarship supported by **The Explorers' Club** and SFS. Victoria participated in the *Ecology of*



The 2nd Annual SFS Affiliates Meeting. (left to right) Dave Firmage, Verna Case, Attila Klein, Dan DiResta, Tom Vawter, Todd Livdahl, Julie Mulroy. Photo: Noah Fleischmann

Bald Eagles course in Montana. We also continued our efforts to include students from the host countries in which we work. Three students nominated by **The Universidad Autonoma de Baja California Sur** (our sponsoring institution in Mexico) attended SFS programs as scholarship recipients this year. Isabel Victoria Salas Rodarte and Susana Comacho added an invaluable local perspective to the *Marine Mammal Biology and Conservation* semester program at **The Center for Marine Mammal Studies** in Baja. Roccio Marcin Medina joined an SFS summer research team in Vancouver to study the *Ecology of Killer Whales*, adding a deeper international dimension for all involved with that course.

THE SFS AFFILIATE PROGRAM

The number of SFS Affiliate Schools grew to 16 as the membership welcomed **Scripps College** and **Brandeis University** in 1992. Students from Affiliate Schools accounted for 10% of the total enrollment in SFS programs with each member school sending an average of four participants. One of the highlights of the year was a very productive Annual Affiliates meeting. Representatives from **Brandeis, Clark** and **Denison Universities**, **The University of Miami**, and **Colby, Wells** and **Davidson Colleges** met at SFS Headquarters in Beverly, Massachusetts with SFS Head-

quarters and Center staff to lend their constructive ideas to curriculum development.

We would like to take this opportunity to acknowledge and thank the sixteen Affiliate Representatives whose time, advice, commitment and energy contribute to the increasing success of the Affiliate Program. Their efforts ensure that their students are able to maximize the SFS experience both in and out of the classroom.

Kerry Woods	<i>Bennington College</i>
Attila Klein	<i>Brandeis University</i>
Joseph Koonce	<i>Case Western Reserve University</i>

Todd Livdahl	<i>Clark University</i>
David Firmage	<i>Colby College</i>
Verna Miller Case	<i>Davidson College</i>
Juliana Mulroy	<i>Denison University</i>
Janet Wright	<i>Dickinson College</i>
Matt Hils	<i>Hiram College</i>
Ray Heithaus	<i>Kenyon College</i>
Donald Scott	<i>Lang College/New School for Social Research</i>
Don Kaufman	<i>Miami University</i>
Jack Osborn	<i>Scripps College</i>
Neil Ringler	<i>SUNY College of Environmental Sciences and Forestry</i>
Dan DiResta	<i>University of Miami</i>
Tom Vawter	<i>Wells College</i>

Home Schools of SFS Participants

The following is a partial list of the home schools of SFS participants. Many of these schools have accepted or awarded credit for SFS programs. Because each school has its own procedures which can change, past credit does not guarantee future credit.

Albion College	Fort Lewis College
Allegheny College •	Framingham State College
Alma College	Franklin and Marshall College
American University	Franklin Pierce College
Amherst College	Gettysburg College
Augsburg College	Green Mountain College
Barnard College	Guilford College
Barry University	Hamilton College
Bates College	Hampshire College
Bennington College ••	Harvard College
Berea College	Hiram College ••
Boston College	Humboldt State University
Boston University	Huntingdon College
Bowdoin College	Huron College
Brandeis University ••	Indiana State University
Brown University	Indiana University
Bryn Mawr College	Ithaca College
Bucknell University	Kansas State University
California Lutheran University	Kent State University
Carnegie Mellon University	Kenyon College ••
Case Western Reserve University ••	Knox College
Clarion University	Lang College, New School for Social Research ••
Clark University ••	Lehigh University
Colby College •••	Lewis and Clark College
College of the Atlantic	Macalester College
College of St. Thomas	Marlboro College
Colorado College	McGill University
Colorado School of Mines	Merrimack College
Connecticut College	Miami University ••
Cornell University	Middlebury College •
Dartmouth College	Mitchell College
Davidson College ••	Mount Holyoke College
Denison University ••	Mount Union College
Dickinson College •••	Muhlenberg College
Drake University	New York University
Drew University	North Carolina State University
Duke University	Northeastern University
Eastern Michigan University	Northern Kentucky University
Emory University	Northwestern University
Evergreen State College	Oberlin College
	Ohio State University
	Ohio University
	Ohio Wesleyan University
	Oregon State University
	Pacific Lutheran University
	Pennsylvania State University
	Pomona College
	Prescott College
	Providence College
	Purdue University
	Randolph Macon College

Saint Lawrence University	University of Michigan •
Saint Michael's College	University of Minnesota
Saint Olaf College	University of New Hampshire
Salem College	University of North Carolina
Scripps College ••	University of Pennsylvania
Shimer College	University of Pittsburgh
Simon's Rock of Bard College	University of Puerto Rico
Skidmore College	University of Rhode Island
Smith College	University of Southern Indiana
Southern Connecticut State University	University of Southern Maine
Stanford University	University of Utah
Stockton State College	University of Vermont
S.U.N.Y. College of Environmental Sciences and Forestry ••	University of Victoria
Trenton State College	University of Wisconsin
	Vassar College



Learning from each other, meeting deadlines, and actually writing a management plan was difficult, but very educational and gratifying. SFS gave us a taste of what real life resource management is all about, concepts that can be applied to managing any resource.

— Caren Eckrich
Texas A&M University

Photo: Bill McComas

Trinity College	Villanova University
Trinity University	Virginia Polytechnic Institute and State University
Tufts University	Washington University
Tulane University	Wellesley College
Union College	Wells College ••
University of Alberta	Wesleyan University
University of California/Berkeley	Whitman College
University of California/Los Angeles	William Smith College
University of California/Santa Cruz	Williams College
University of California/San Diego	Wittenberg University
University of Cincinnati	Xavier College
University of Colorado	Yale College
University of Connecticut	
University of Iowa	
University of Kansas	
University of Maryland	
University of Massachusetts	
University of Miami ••	

• Sustainable Development Studies Consortium
•• SFS Affiliate School
••• Member of both

Financial Report

SFS experienced remarkable growth again in Fiscal Year 1992, for the second year in a row. The opening in September 1991 of the School's fifth permanent center, the **Center for Sustainable Development Studies** in Costa Rica, led to a 20% increase in student field days and a concomitant 25% rise in total revenues and additions. This program growth and several significant donations to the School's plant fund together produced an increase of total fund balances of 61%.

The School made substantial progress toward its goal of controlling expenditures and reducing operating deficits accumulated in previous years. This year's operating budget surplus of \$163,000 helped to keep down the operating (Current Unrestricted Fund) fund deficit, which rose only because of changes in the accounting for student loans.

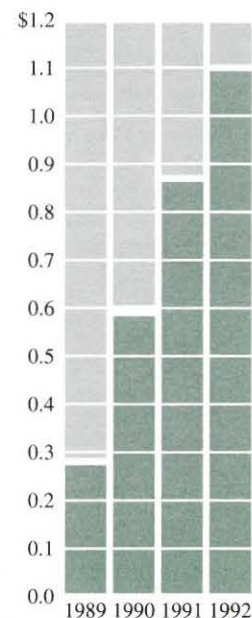
In order to present more clearly the status of the School's loan activities, all loan receivables were consolidated into the Loan Fund. As a result of these

accounting changes, additional efforts to improve loan collections, and donation income, the fund balance of the Loan Fund increased dramatically in FY92. The School plans to continue its efforts to manage its Loan Fund receivables so as to increase the number of loans it can offer students in the coming years.

FY92 Plant Fund investments totaling \$178,460 included construction of new solar-powered faculty housing units at the **Center for Rainforest Studies** in Australia, creation of a computer room/library and a major rewiring project at the **Center for Marine Resource Studies** in South Caicos, as well as boats, library materials, and research equipment for the Centers and several satellite programs. In addition, the School focused on improvements to computer resources at the Centers, Headquarters, and for the satellite programs, as these investments lead both to improved productivity and better program quality.

PLANT FUND BALANCES

(in millions of dollars)

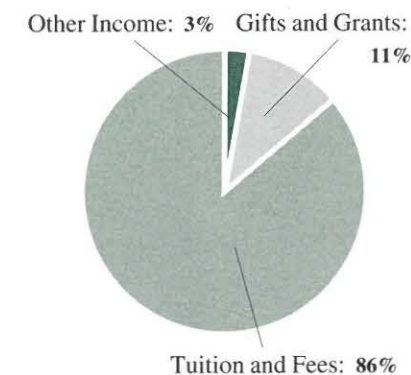


BALANCE SHEET AUGUST 31, 1992

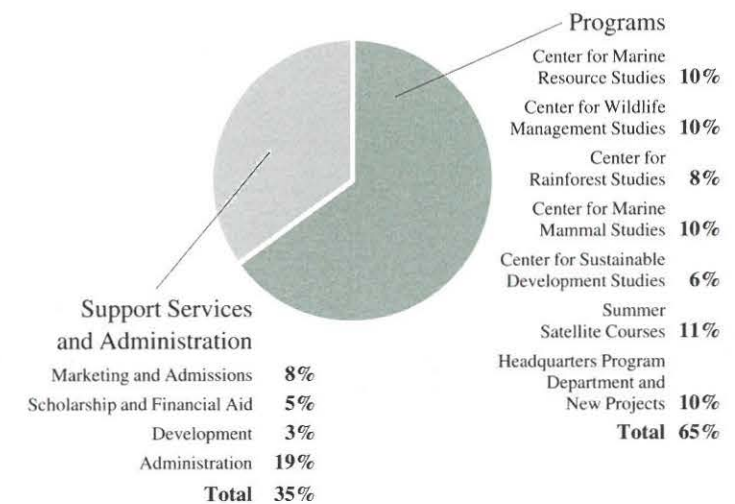
(with comparative totals for 1991)

	CURRENT UNRESTRICTED FUND	CURRENT RESTRICTED FUND	LOAN FUND	PLANT FUND	TOTAL 1992	TOTAL 1991
ASSETS						
Cash and short-term investments						
at cost which approximates market	\$ 1,025,567	33,398	71,895	267,283	1,398,143	802,409
Investments	1	—	—	—	1	—
Tuition receivable	52,308	—	—	—	52,308	13,499
Grants receivable	—	—	—	—	—	15,000
Loans receivable (net of allowance for doubtful accounts)	—	—	183,697	—	183,697	188,727
Advances to course sites and other assets	260,782	—	—	—	260,782	323,849
School plant, net	—	—	—	1,066,232	1,066,232	991,297
TOTAL ASSETS	\$1,338,658	33,398	255,592	1,333,515	2,961,163	2,334,781
LIABILITIES AND FUND BALANCES						
Accounts payable and accrued liabilities	\$ 188,560	23,672	—	—	212,232	188,262
Student deposits and deferred tuition	1,386,210	—	—	—	1,386,210	1,175,216
Notes payable	—	—	—	225,658	225,658	267,226
TOTAL LIABILITIES	1,574,770	23,672	—	225,658	1,824,100	1,630,704
FUND BALANCES (DEFICIT)						
Unrestricted	(236,112)	—	127,192	264,883	155,963	(143,994)
Restricted	—	9,726	128,400	—	138,126	124,000
Net investment in plant	—	—	—	842,974	842,974	724,071
TOTAL FUND BALANCES (DEFICIT)	(236,112)	9,726	255,592	1,107,857	1,137,063	704,077
TOTAL LIABILITIES AND FUND BALANCES (DEFICIT)	\$1,338,658	33,398	255,592	1,333,515	2,961,163	2,334,781

TOTAL REVENUES

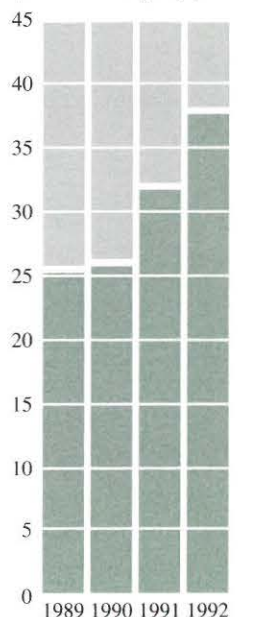


EXPENSES (operating funds)



STUDENT FIELD DAYS

(in thousands of days)



STATEMENT OF CHANGES

IN FUND BALANCES YEAR ENDED AUGUST 31, 1992

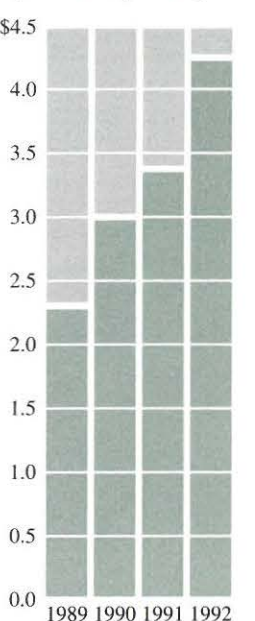
(with comparative totals for 1991)

	CURRENT UNRESTRICTED FUND	CURRENT RESTRICTED FUND	LOAN FUND	PLANT FUND	TOTAL 1992	TOTAL 1991
REVENUES AND OTHER ADDITIONS						
Educational and general revenues	\$3,548,154	—	—	—	3,548,154	2,731,790
Private gifts, grants, and contracts	103,838	55,137	20,000	264,595	443,570	372,990
Expended for plant facilities	—	—	—	178,460	178,460	235,395
Retirement of indebtedness	—	—	—	18,936	18,936	18,934
Net proceeds from sale of plant facilities	—	—	—	1,263	1,263	20,500
Other	92,398	—	—	22,732	115,130	56,333
TOTAL REVENUES AND OTHER ADDITIONS	\$3,744,390	55,137	20,000	485,986	4,305,513	3,435,942
EXPENDITURES AND OTHER DEDUCTIONS						
Educational and general expenditures	\$3,480,631	61,011	—	—	3,541,642	2,782,505
Expended for plant facilities	—	—	—	178,460	178,460	235,395
Interest on indebtedness	—	—	—	30,763	30,763	34,696
Retirement of indebtedness	—	—	—	18,936	18,936	18,394
Net cost of plant facilities sold	—	—	—	—	—	33,471
Depreciation	—	—	—	98,726	98,726	76,260
Allowance for doubtful loans	—	—	4,000	—	4,000	7,000
TOTAL EXPENDITURES AND OTHER DEDUCTIONS	3,480,631	61,011	4,000	326,885	3,872,527	3,188,261
TRANSFERS AMONG FUNDS — ADDITIONS/(DEDUCTIONS)						
Mandatory debt transfer	(49,699)	—	—	49,699	—	—
Transfer to loan fund	(135,405)	—	135,405	—	—	—
Transfer to fund depreciation	(98,726)	—	—	98,726	—	—
TOTAL TRANSFERS	(283,830)	—	135,405	148,425	—	—
NET INCREASE (DECREASE) FOR THE YEAR	(20,071)	(5,874)	151,405	307,526	432,986	247,681
FUND BALANCES (DEFICIT) AT BEGINNING OF YEAR						
	(216,041)	15,600	104,187	800,331	704,077	456,396
FUND BALANCES (DEFICIT) AT END OF YEAR	\$(236,112)	9,726	255,592	1,107,857	1,137,063	704,077

Copies of KPMG Peat Marwick's complete audited financial statements available upon request.

TOTAL REVENUES

(in millions of dollars)



Development

On behalf of this year's SFS graduates, we gratefully acknowledge and thank the many individuals, corporations and foundations whose generous contributions in FY1992 amounted to \$211,300 for the SFS Annual Fund and \$232,000 for Capital, providing \$443,000 in essential financial support to SFS students and programs.

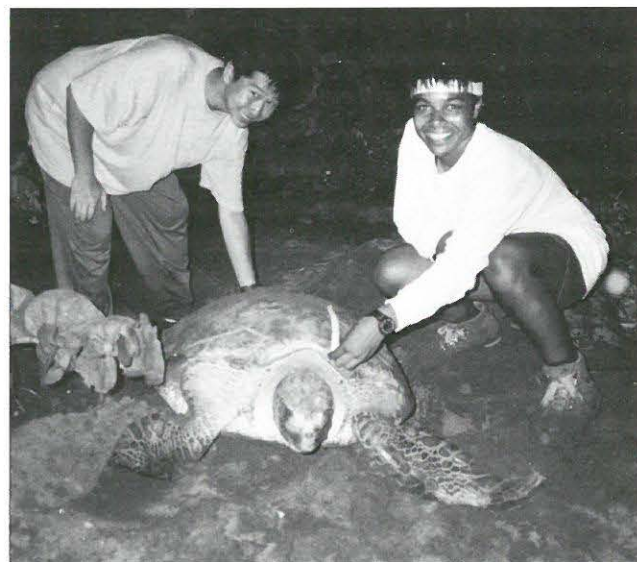
In addition to the contributors identified in the preceding reports, we'd like to give recognition to several SFS Benefactors who have made unrestricted gifts and grants to the School.

Special thanks goes to the **Andreas Foundation** for their eleven years of support of the School's general operating expenses and the SFS Scholarship Fund. The Foundation also made a special \$120,000 Challenge Grant to the School's Capital Fund this year.

General operating support was also pro-

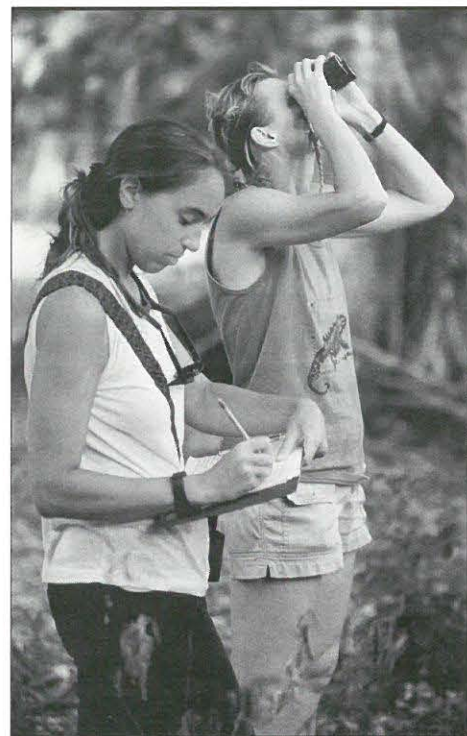
vided by a significant grant from the **Charles Engelhard Foundation** whose ongoing commitment to SFS has contributed significantly to the development and expansion of SFS programs.

The School also gives special thanks to several individuals for their continuing and substantial contributions in 1992. Thanks to **Allen & Company, Astra Davis**, the trustees of **The Roy A. Hunt Foundation**, **Margarette and Marlen Johnson**, the **Weld Foundation** and the individuals listed below, SFS was able to provide its students with a curriculum that addresses the key environmental issues of our time.



SFS programs incorporate hands-on, problem-solving field methods which stimulate students to learn and to retain what they learn.

Photo: Susan Baryanek



Through your generosity, I was able to work toward a better understanding of crucial environmental issues, and to do my part in solving them. I've learned a great deal about myself and what I can accomplish.

— Michael J. O'Malley
Wesleyan University

What I learned at SFS will help me to understand pressing environmental issues here in the States, and will enable me in my career in environmental law to approach problems with the proper perspective. Thank you for allowing me to participate in such an incredible learning experience.

— Thad Florence
Lawrence University

In many ways my semester in Kenya has permanently altered my outlook on the world around me. Thank you for your generous contribution that allowed me to study with SFS.

— Lara J. Teal
Davidson College

Photo: David Bathgate

1992 Contributors

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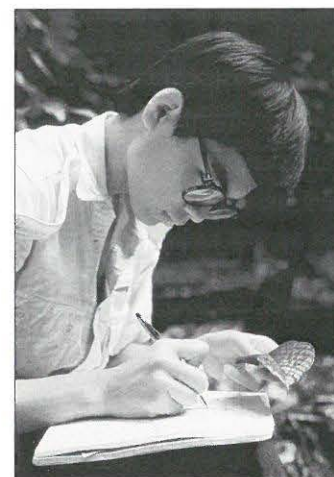


Photo: Weaver Whitehead



Photo: Anne Palace

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A highlight of the course for me was a visit to a primary school near Mt. Kenya. The students were very talented, and their enthusiasm for our visit touched me very much. We formed a special bond by learning from each other, a bond which is essential in understanding other people.

—Britt Barland
University of Puget Sound

Photo: John Hurley

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• Gifts in Kind



Contributions to the SFS Scholarship Fund help insure that qualified students will not be denied the opportunity to participate in SFS course because of financial need.

Photo: David Bathgate

Selected Research Papers Resulting from SFS Field Courses

**CENTER FOR WILDLIFE
MANAGEMENT STUDIES**

STELFOX •, J.B. 1986. Effects of livestock enclosures (bomas) on East African rangeland ecology. *African Journal of Ecology* 24:41-45.

STELFOX •, J.B. 1987. Thompson's and Grant's gazelle in relation to seasonal environments and resource use. *African Journal of Ecology* 24:111-120.

MADDEN •, D. and T. P. YOUNG •. 1992. Symbiotic ants as an alternative defense against giraffe herbivory in spinescent *Acacia drepanolobium*. *Oecologia* 91:235-238.

MILEWSKI •, A.V., T.P. YOUNG •, and D. MADDEN •. 1991. Thorns as induced defenses: experimental evidence. *Oecologia* 96:1-6.

YOUNG •, T.P. and L.A. ISBELL. 1991. Sex differences in giraffe feeding ecology: energetic and social constraints. *Ethology* 87:79-89.

**CENTER FOR MARINE
RESOURCE STUDIES**

ALMENARA-ROLDAN •, S. 1991. A comparison between two coral reef fish communities at South Caicos Island, Turks & Caicos, BWI, 1990. Presented at 2nd National Conference of Ichthyology of Mexican Ichthyological Society, March 4-9. •••

EDMUNDS •, P.J., D.A. ROBERTS •, and R. SINGER •. 1990. Reefs of the Northeastern Caribbean I. *Scleractinian* Populations. *Bulletin of Marine Science* 46(3):780-789. •••

EDMUNDS •, P.J. 1991. Extent and effect of black band disease on a Caribbean reef, 1988, 1989. *Coral Reefs* 10:161-165. •••

EDMUNDS •, P.J. and J.D. WHITMAN •. 1991. Effect of Hurricane Hugo on the primary framework of a reef along the south shore of St. John, U.S. Virgin Islands. *Marine Ecology* 78:201-204.

**CENTER FOR
RAINFOREST STUDIES**

LAURANCE •, W.F. and E. YENSEN. 1991. Predicting the impacts of edge effects in fragmented habitats. *Biological Conservation* 55:77-92.

LAURANCE •, W.F. 1991. Rainforest fragmentation and mammal extinctions in tropical Queensland: implications for nature reserve design. Presented at the Conference on Conservation Biology in Australia and Oceania.

LAURANCE •, W.F. 1990. Comparative responses of five arboreal marsupials to tropical forest fragmentation. *Journal of Mammalogy* 71:641-653.

PUTZ •, F.E. 1990. Growth habitats of climbing palms (*Calamus* spp.) in North Queensland rainforest. *Australian Journal of Botany* 38: 603-8. •••

**CENTER FOR MARINE
MAMMAL STUDIES**

BARNES •, J., J. BOOHER •, H. GRANTHAM •, and B. WEYLMAN •. 1992. Fish species off the shores of Espiritu Santo, La Partida and Los Islotes Islands, and their relative importance to the California sea lion (*Zalophus californianus*) and the fishermen of La Paz, 1991. Presented at the 17th International Meeting of Marine Mammal Studies, Mexico. •••

CALAMBOKIDIS •, J., B.L. TAYLOR •, S.D. CARTER •, G. H. STEIGER •, P.K. DAWSON •, and L. ANTRIM •. 1987. Distribution and haul-out behavior of harbor seals in Glacier Bay, Alaska.

Canadian Journal of Zoology 65:1391-1396.

COLLIER •, C., J. FRANKLIN •, A. SCHULMAN •, V. SORESENSEN •, and L. FLORES •. 1992. The effect of tidal state on the number of haul-out individuals and activity budget of the California sea lion (*Zalophus californianus*) at Los Islotes in the Bay of La Paz, 1991. Presented at the 17th International Meeting of Marine Mammal Studies, Mexico. •••

GREENBERG •, D., D.M. MORGAN, and G.D. MILLER •. 1991. Airborne vocalizations in the California sea lion (*Zalophus californianus*). Presented at the Annual Meeting of Animal Behavior Society. •••

SATELLITE PROGRAMS**Dolphin Biology and Behavior,
North Carolina**

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Victoria Thayer
(M.S./Environmental Management)

Ann Ch. Weaver
(M.S./Animal Behavior)

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Mark Wise

Ecology of Bald Eagles and
Other Endangered Birds of Prey

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Mark Kopeny
(Ph.D./Zoology)

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(M.Ed./Science Education)

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Ecology of Killer Whales

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(Ph.D. candidate/Marine Biology)

Pam Stacey
(B.S./Biology)

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Amy Gautschi (1st session)
Paul Pfluke (2nd session)

Landscape Ecology: Designing Parks
for Preservation

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