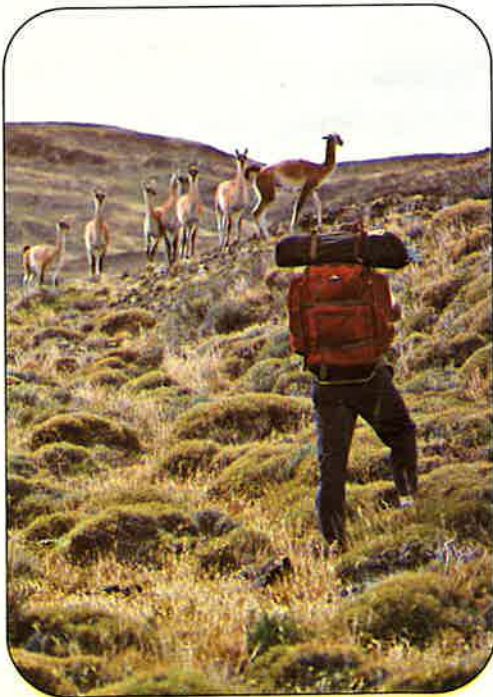


The School for Field Studies

1981 Expeditions



The School for Field Studies is a non-profit organization based in Boston, Massachusetts. Our purpose is to provide young people interested in the geophysical world with experientially-based curricula in the ecological and environmental sciences. We are an alternative school founded on the philosophy that the educational process should involve the active participation of the whole person and promote his or her intellectual, physical, social and emotional growth. Our program of field expeditions is designed to express and implement this philosophy. Our students will experience the challenge of reaching out for new horizons and the thrill of discovery.

SFS Expeditions: Training in Research, Fieldwork and Expedition Skills

The School for Field Studies currently sponsors three-to-four week field expeditions for advanced high school and college students to wilderness areas around the world. Our hands-on learning-by-doing approach to science combines experience and learning in an unusual way. The programs are designed to train students to be members of a field team. The focus on **training** — in scientific research, fieldwork, and outdoor skills — is unique. The opportunity for both learning and personal growth is unequalled.

Research

A major goal of each expedition is to increase the participating student's knowledge in a scientific discipline (such as marine botany, rain forest ecology, or archaeology) and to provide him or her with training in the methodology of that discipline. Each expedition has a specific research goal as well. Active participation in the research is the medium through which students learn about the subject matter. Thus, students acquire training in science as a method of inquiry and as a means of problem-solving as they contribute their services in furtherance of the research goal.

In all research projects, the scientific method is applied. The problem is presented; observations are made; specimens are collected; tests are conducted; data are compiled; hypotheses are formed and tested; conclusions are drawn and the way is pointed to further investigation. Students gain first-hand experience in a science and a chance to understand it as a profession.

Fieldwork

The outdoors is a natural laboratory for research. Students are trained in the skills and techniques of fieldwork which require self-discipline, long hours, concentration and perseverance. As members of a team effort, students must assume important responsibilities. The performance of each individual is crucial to the ultimate success of the entire project. Students learn to live and work together because they share a common objective. As a result, they also experience the rewards of their work and the satisfaction that comes from being a contributing member of a group effort, meeting the challenges, overcoming the hardships, completing the job, being involved in something bigger than themselves.

Expedition Skills

Training in outdoor skills is an integral component of each expedition. Students live, work, and travel in isolated and remote areas of wilderness. Living conditions are often primitive. SCUBA diving, climbing, mountaineering, canoeing, kayaking, and map reading are among the skills which are taught — to insure safe travel in and out of the wilds as well as to limit each expedition's impact on the environment. Practicing and exercising outdoor skills also provide an exciting form of recreation and present an opportunity to explore spectacular environments and natural wonders.

Expedition Leaders

Our expedition leaders are scientists, outdoorsmen, and university educators with years of experience in research and in the field. Above all, however, they are **teachers** who reflect and implement the School's commitment to training young people. They are accomplished leaders, enthusiastic about sharing their work, experience and expertise with their students.

Students

Our students will be an enthusiastic, motivated, and diverse group. They will be individuals seeking pre-professional training, a supplement to classroom learning, and a chance to explore special interests. The minimum age is 16. There is no maximum age, but the majority will be between the ages of 17 and 26. More than 200 students will be selected to participate in our 1981 expeditions. The ratio of students to leaders will be 6 to 1.

Expedition graduates will return home with an enhanced appreciation of the earth, sea and wildlife of their world and with a better understanding of the environment and their relationship to it.

School for Field Studies

Box 171, Prudential Center
Boston, Massachusetts 02199



"At night, I slept under the coconut trees under a moonlit sky and listened to soft breezes of whispering wind. As I looked toward the endless horizon, I thought of how far away from home I was, and in the same thought, of what a vast world I had yet to discover and of the things I can learn from other people."

Vu Truong, Rain Forest Ecology Expedition to Belize, 1980

"It was one of the best experiences of my life. Pushing myself beyond all previous limits, seeing the African wildlife and experiencing the Tanzanian culture were the rewards."

Jamie Schnitzer, Mountaineering and Wildlife Conservation Expedition to Tanzania, 1979

"In going on the expedition, I gained many skills. . . I learned the skill of backpacking. I learned how to climb safely, how to navigate and to show my position on a map. . . . Being exposed to different types of animals taught me how to respect them (I was a stranger in their land), how to approach them, and how not to disturb them."

Andy Jaffee, Brooks Range, Alaska, 1980

SFS was incorporated in 1980. Many of our 1981 projects will be the continuation of past efforts conducted by our faculty.

The administrative staff of SFS has been producing similar programs for over three years.

School for Field Studies 1981 Curriculum

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"Three years ago I toured Kenya on a travel/study program, and saw the glamorous, travel-poster Kenya that beckons to foreigners. This time, I was privileged to have a more intimately African view of the Kenyan game industry, as the Game Department took particular interest in our group."

Marcia Hyslop, Environmental Physiology Expedition to Kenya, 1980

"I gained an appreciation for the simple, relaxed, and quiet life led by the Caymanians. I was amazed at their generosity and friendliness. I have benefitted from my association with these people in that these traits have improved in my own personality."

Chris Huss, Marine Ecology Expedition to Little Cayman, 1980

Zoology

Where: Kenya, East Africa

When: Team I: July 2 - July 30; Team II: August 1 - August 29

Focus: To research the environmental physiology of large herbivores in East Africa



This is the second year of a research project which gives participants unique opportunities rarely allowed to outsiders or foreigners. Participants will live in game parks, work directly with members of the Kenyan Game Department in patrolling and capturing animals, and acquire hands-on experience with some of the world's largest and most exotic animals.

Kenya harbors perhaps the greatest assortment on earth of wildlife still to be seen in its natural habitat. It is a country of enormous geographic and geological interest, with terrain ranging from harsh, dry desert through arid plains, and sunny grasslands to tropical rain forests to coral reefs, and up to snow-capped high mountain peaks. East Africa is split by the great Rift Valley, perhaps the most impressive geological fault on our planet. The region is also known for its deep soda lakes, teeming with birdlife (especially pink flamingos) and its active volcanoes. Vast areas of the country have been set aside as National Parks, Game Preserves, and Sanctuaries, where an infinite number of flora and fauna can be seen, studied, and photographed. We will have the special privilege of actually living and working in this habitat.

The people of this region come from strikingly different historical backgrounds. The nomads, tribal kingdoms, Arab culture, and European influences all add to the rich heritage of the present growing, independent African nation. English is widely spoken, yet Swahili is the accepted and preferred medium of communication.

We will conduct research in the areas of population ecology, environmental physiology, and general animal behavior. Our major focus will be understanding the environmental physiology of the black rhino. East Africa is undergoing tremendous change and development which threaten a group of the largest terrestrial mammals on earth. The black rhino, the largest mammal in the equine family, is among those animals which require a great deal of research to preserve them from extinction.

In the past, the problems of catching and making measurements on animals weighing as much as a ton have made large terrestrial mammals relatively inaccessible. Equipment is now available which allows the remote monitoring of a wide range of physiological parameters, and the techniques for holding and capturing animals have been advanced to a point where the safety of all involved, particularly that of the animal, is assured.

A major portion of our work will involve research on thermoregulation and heat stress. Rhinos will be tranquilized, captured and held in boma (wooden cages) where they will be monitored and submitted to a variety of tests and measurements, including oxygen consumption, surface, nasal and rectal temperatures. Environmental tests on soil and air temperatures and light intensity will also be performed.

Our work will take us to a number of exciting sites in Kenya, such as Nairobi National Park, Nyeri, Aberdare National Park, Meru National Park, and Samburu. Each member of the expedition will be part of a team effort and will take an active part in performing all tests, taking measurements, and operating equipment. Students will gain first-hand experience in the process of scientific investigation. Field methodology, recording procedures, and the flora and fauna of East Africa will all be part of the curriculum planned for this expedition.

Outdoor skills, including wilderness navigation, basic first aid, emergency survival and back-country travel will be covered. Students will gain an appreciation for the people and animals of Africa. They will have the opportunity to accept and share responsibilities under adventurous and sometimes trying conditions. Living in a well maintained tented camp will complete the educational experience of living in Africa.

The key to exploring this part of Africa goes far beyond just viewing the most obvious attractions of

large animals and spectacular terrain; it is in learning about the interrelationships of vegetation, climate, environment, and animal life and behavior. Students interested in animal wildlife, veterinary medicine, or wildlife conservation will find this an unparalleled first-hand experience.

Leaders

Dr. Vaughan A. Langman has spent seven years in Africa, four of which were spent working and living in the bush. He also spent three years living in Nairobi and teaching veterinary physiology at the University. He has been caving and rock climbing, is fluent in two African dialects, and received his Ph.D. in Zoo Physiology. He is currently a Research Fellow at the Museum of Comparative Zoology, Harvard University.

William J. Aughton is a mountaineer, a sailor, and a traveler with extensive expedition experience. He was a paramedic with the British army for six years and has extensive experience in all aspects of emergency care. He has taught mountain rescue in Britain, Germany, and in the United States. He has directed Outward Bound courses at the Hurricane Island School for the last ten years.

Level: Team I: A Team II: B
Student fees: \$1,680
Departs from Nairobi



Zoology

Where: Galapagos Islands

When: Team I: June 28 - July 25; Team II: July 26 - August 20

Focus: To research behavioral thermoregulation and inertial homeothermy in the Galapagos tortoise



The Galapagos Islands, a remarkable chain of some 400 islands and islets, an archipelago of active volcanoes and arid, rocky terrain, lying 650 miles west of Ecuador, are one of the least explored regions of the world. The group comprises an independent biological unit, distant from the South American continent, and never attached to other land masses. Nevertheless, their native flora and fauna are derived principally from the equatorial mainland. Over thousands, if not millions of years, a few species arrived that were able to establish themselves and to evolve, isolated from those species which were unable to cross the oceanic barrier. After they gained a foothold, they adapted to local conditions, forming species endemic to the Galapagos Islands. Some of its unique flora and fauna are found nowhere else. Two-thirds of the resident birds (species and subspecies) and all reptiles (except for one species of gecko), are peculiar to the islands.

Charles Darwin spent five weeks on the islands in 1835, and out of this living laboratory which he called a "little world within itself" came some of his first theories of evolution. Galapagos means tortoise in Spanish, and no animal better characterizes the unique nature of these islands. Most remarkable is the way in which nature seems to reverse itself. Birds and reptiles show no fear of man and are tame, while dogs, pigs, and goats left on the island became wild and vicious.

The Galapagos represent one of the world's truly unique ecosystems. The Ecuadorian Park System maintains a strict program of preservation on the islands to prevent any disruption of the fragile plant and animal life. Outsiders must generally stay on ships off-shore and make daytrips to the islands. Because of the serious intent of this research project, we anticipate getting permission to establish a base camp and live on the island of Santa Cruz. This is a rare and coveted privilege. For this reason, each field team will be limited to ten participants.

The major focus of our research will be to study behavioral thermoregulation and inertial homeothermy in Galapagos tortoises. Our fieldwork will be conducted on the island of Santa Cruz, both at the Charles Darwin Station at Puerto Ayora and at the Tortoise Reserve near Santa Rosa.

We will examine the correlations between behavior and environmental conditions. We will observe and record the behavior of tortoises (time in the sun, time in the shade, as well as time devoted to various behaviors allowing construction of a time budget) while monitoring environmental parameters (such as solar radiant intensity and ambient temperature).

We will monitor the body temperature of tortoises both rectally with a thermometer and with temperature-sensitive radio transmitters (fed to the subjects). These transmitters emit a train of radio pulses, the frequency of which is temperature dependent. This technique allows body temperature to be monitored without disturbing the behavior of the tortoises.

We will measure the heating and cooling rates in tortoises of various body lengths. Large tortoises should heat and cool more slowly than small ones. The question we will be addressing is: Do these tortoises attain a large enough body size to become inertial homeothermal? We will try to determine if the heat produced by their large bodymass (even with the low metabolic rates characteristic of reptiles) is sufficient to keep their body temperature from ever dropping to that of the environment. We will try to determine if small tortoises spend more time in the sun and/or shuffling in and out of the sun in order to maintain a constant (high) body temperature. We will compare their behavior with that of large tortoises which may be capable of maintaining a constantly high temperature without relying on the external warmth of the sun.

Our conclusions may also have broader theoretical implications as inertial homeothermy has been suggested as a possible step in the evolution of endothermy (warm-bloodedness), characteristic of modern birds and mammals and perhaps some ancient dinosaurs.

Each student will be an equal member of this research team. Students will receive training and supervision in conducting the tests and measurements and in collecting and recording the data. Acceptance to this expedition will necessarily be highly competitive.

Leader

Michael Konecny is a Lecturer in ecology and behavior and vertebrate biology at the University of Florida and at the Charles Darwin Research Station on the Galapagos. He has conducted numerous research projects on the islands.

Level: B

Student fees: \$1,550

Departs from Santa Cruz



Conservation and Natural Resources

Where: Misty Fjords National Monument, Southeast Alaska

When: Team I: June 30 - July 24; Team II: July 27 - August 20

Focus: To document pristine ecosystems and to suggest visitor usage to the U.S. Forest Service

The rugged terrain of the recently established Misty Fjords National Monument contains many virgin coastal ecosystems and covers about 3,570 square miles in southeast Alaska. The monument is characterized by extraordinary geological features including fjords, steep sea cliffs, active glaciers, and natural canals. Equally exciting are the indigenous biota: bald eagles, brown and black bear, killer whales, otter, and seals.

Misty Fjords was designated a National Monument to protect the ecosystems which are of scientific and cultural value and which have a special wilderness character. Scientific studies are needed to provide information to the U.S. Forest Service for managing the monument and determining priorities for resource allocation.

This expedition offers a unique opportunity to study pristine ecosystems. We will conduct our research in two areas, Rudyerd Bay and Walker Cove. These areas are especially scenic, with sharp fjords, snow-covered peaks, lush vegetation, and untouched blue waters. They are excellent locations in which to conduct research because they offer small bodies of protected water.



Since there has been very little research done in either of these locations, our efforts will be directed towards an initial identification and mapping of shoreline types and a characterization of the associated flora and fauna. Aerial photographs and topographic maps will be used to classify the shorelines according to the five major habitat types.

Our site surveys will provide ground truth verification of the classification. The flora and fauna of the intertidal area for each habitat type will be characterized. The upland vegetation will also be described. Transects will be established and horizontal stratification will be used to delineate survey areas.

Physical oceanographic experiments will be conducted in the study area, with emphasis on the processes for determining circulation patterns of the fjords. Experiments will include measurements of tides, measurements of salinity distributions, measurement of surface and subsurface currents and estimation of fresh water input.

Students will conduct all the research themselves under the direction and supervision of Dr. Sobey. The principle of the experimental design will be explained and students will be trained in the construction and use of scientific instrumentation, data collection, and data analysis. Students will learn to use current following devices, tide gauges, and conducting and temperature sensors. They will get first-hand experience in quantitative and observational techniques in botany and ecology, identification of intertidal animals and basic analyses of satellite photos.

In addition to direct participation in the field research program, there will be a series of lectures which will cover a range of both scientific and general interest. The topics will include: fjord geology and oceanography, the biological and physical oceanography of southeast Alaska, expedition photography, kayaking, navigation, wilderness living, meteorol-



ogy and weather prediction, foraging for food in the intertidal area, and the history of southeast Alaska.

As we will be situated fifty miles from the closest town, students will learn the wilderness living skills associated with the special conditions of southeast Alaska. Each student will also be given instruction in kayaking; those who wish to try out their kayaking skills will have the opportunity to paddle in remote wilderness areas, a kayaker's dream.

A base map within the monument will be established. Living quarters will be tents set up on wooden platforms. Cooking and camp chores will be shared by all. Transportation to and from selected study sites will be either by ocean-going kayak or Boston whaler. Both day trips and trips of 2-3 days are anticipated; the schedule for scientific work will be determined by the weather and tides.

Leader

Dr. Edwin Sobey is a physical oceanographer who is currently preparing environmental summaries for the offshore areas of Alaska. He has been a participant or leader in numerous expeditions to Alaska, Antarctica, Peru, and Costa Rica. Dr. Sobey earned his Ph.D. in oceanography from Oregon State University.

Level: Team I: A Team II: B
Student fees: \$1,150
Departs from Ketchikan

Ornithology

Where: Belize

When: Team I: July 1 - July 24; Team II: July 27 - August 19

Focus: To study the complex interaction of birds and plants in a tropical ecosystem

Bordering Mexico and Guatemala lies the Central American country of Belize (formerly British Honduras), a young but politically stable democracy marked by diversity. This little country offers an unusual mingling of natural habitats — lowland savannahs in the north and lush tropical rain forests in the hilly south, and limestone caves throughout much of the interior. There are over 300 waterways, crystal clear and teeming with life. In addition to the spectacular rain forests, caves, waterfalls, and mountains of a tropical paradise, the remote communities and fishing villages of the hospitable Mayan and Kekchi Indians are of particular interest to visit. The ancient and abundant Mayan ruins testify to the fascinating cultural legacy of this country. The official language is English.

The expedition team will have use of the facilities of the Desmond Slattery Biological Field Station in the mountains of the primary rain forests of the south. The station is located on Blue Creek in very dense rain forest. The only access is by foot on a 1 1/2 mile winding trail. This tropical and exotic environment hosts a myriad of birds and wildlife never studied or surveyed. Among the exotic animals frequently seen are parrots, macaws, toucans, opossums, iguanas, and morpho butterflies.

This pristine rain forest survives and provides an ideal outdoor laboratory for studying a fragile and varied environment threatened by the encroachment of civilization. Jungle ecosystems are tangled webs of interconnected species; the interaction between animal and plant life determines their composition and abundance. The tropics are the wintering grounds for many bird species. Ornithologists are increasingly convinced of the importance of the wintering grounds play in the preservation of bird species populations. The interrelationships of plants and birds, the availability of nutritional fruits, and the competition created by changes in the habitat are im-

portant elements in understanding and predicting the survival of certain species.

The interaction between birds and plants is complex. Birds eat fruit and disperse partially digested seeds. Our research will focus on this mechanism of seed dispersal and its relationship to plant distribution and abundance. We will also try to determine if the digestion of seeds speeds up the germination process.

Birds will be collected using mist nets set in the forest and over streams. Digested seeds will be collected and identified. Research will include observations and experiments on species diversity, food selection, nutrient assimilations of wild fruits, and habitat selection.

The curriculum planned will include a broad-based overview of the most complex of all ecosystems — tropical forests. Discussions and projects will deal with the climate, vegetation, animals, and human influences on the environment in Belize. Students will be taught observation and identification skills and field research design, and learn from taking part in a cooperative research effort. An opportunity to snorkel and study the underwater ecosystem of a coral reef is also planned.

Leader

Fred Dodd has an M.S. in Zoology from the University of Northern Arizona. For the last eight years he has been lecturing in herpetology and conducting field courses and research in Belize, Costa Rica, Mexico, and the West Indies. He has developed his own field station and program in Belize.

Level: A/B

Student fees: \$1,050

Departs from Belize City



Botany

Where: The Peninsula of Yucatan, Mexico

When: Team I: July 1 - July 28; Team II: July 29 - August 25

Focus: To investigate the plant ecology of tropical and temperature plant communities

The Yucatan Peninsula, which juts out between the Caribbean Sea and the Gulf of Mexico, is one of the most fascinating and picturesque regions of Mexico. We will travel through the steaming jungles of the tropical lowlands, where Myan ruins hold the secret of this ancient and mysterious civilization, up to the 18,851 foot snow-capped peak of Citlaltépetl (Mountain of the Star), the highest peak in Mexico. This expedition offers a rare opportunity to explore a little-known and isolated area.

Our purpose will be to conduct a botanical investigation into the plant ecology of some of the world's most diverse habitats. This region of Mid-America is an ideal location for investigation because it includes both temperate and tropical forests, as well as rugged alpine vegetation. Our primary objective will be to classify plant zones, extending from the sea level of the Gulf coast to the alpine conditions of the highest peaks of Mexico. We will be pioneering the cataloguing of plant species, selecting representative plant members within each zone, and conducting systematic analyses to determine those life cycle adaptations which permit them to compete successfully in their environment.



A major portion of our investigations will focus on some of the 800 species of exotic orchids found in Mexico. Of all the plants in the world, this prolific family has evolved some of the most intriguing adaptations to survive in different climate zones. We will examine pollination strategies and the changes which take place within plant community structures as they adapt to their environments. A recording of the findings describing Mid-American plant community structure will be compiled for publication and presented to the Department of Biology of the University of Mexico.

Students will receive instruction, supervision, and first-hand experience in botanical study techniques which will include vegetation transects, line intercept sampling techniques, and quadrant sampling techniques. Methods of group organization and systematic study are essential for a successful field study. Each student will learn to understand and execute his/her individual role in collecting and recording data to contribute to the observations, hypotheses, and conclusions of the entire team.

Additional activities are planned. We will climb an active volcano, visit the Myan ruins of Pelanque, observe Howler monkey behavior, hike to an isolated Indian mountain community, and snorkel in the tropical waters of the Mexican coast.

We will explore as many habitats as possible. We will spend at least two weeks in the lowland and highland tropical forests and one week on the slopes of the volcano Orizaba. There will be considerable hiking, climbing, and backpacking with instruction in mountaineering and map reading. Our means of traveling within the Yucatan will vary — local and long distance buses, muleback, and hiking. Accommodations will include staying with Mexican families, staying in local hotels, and camping.

Leader

Marc DesMeules spent 2 1/2 years in Guatemala as an ecologist/botanist with the Smithsonian Environmental Studies Program. A former teaching assistant at Marlboro College and research assistant with Dartmouth College, he is currently on the field staff of the Nature Conservancy. He has led several climbs up some of the highest volcanoes in Central America.

Level: A/B

Student fees: \$950

Departs from Merida, Mexico



Earth Sciences

Where: Iceland

When: Team I: July 1 - July 22; Team II: July 24 - August 13

Focus: To conduct an inventory of glaciers and to sample the sediment of recently erupted volcanoes

Lying mid-way between North America and Europe and just below the Arctic Circle, the island known as Iceland presents an unusual and unspoiled landscape to explore. Despite its name, the warm waters of the Gulf Stream make the climate relatively temperate; summer temperatures are in the mid-50's and the midnight sun is seen during the summer solstice. Legend has it that the Vikings conferred the forbidding name of "Iceland" to the land they wanted to conserve for themselves, and gave the more inviting name of "Greenland" to its more northerly, barren, and cold neighbor.

This remote and intriguing country, first settled by the Norwegians in 874, remains one of the least visited and least explored landscapes. Its economic and cultural differences will also be of interest to students. Its natural resources are hydroelectric power and thermal energy. Houses in the capital city of Reykjavik are heated by natural hot water.

From our base camp in the pastoral and meadowed tundra, we will explore many dramatic sites of this "land in creation". Because it is exposed to the ravages of climatic extremes and relatively denuded of vegetation, Iceland provides unique opportunities to see geomorphic processes at work. Glaciers of all types, from icecaps to small glacierets are numerous. In the north, many rock glaciers adorn the alpine topography and glacier surges occur. As the ice melts and retreats, many outwash and depositional forms are revealed: morrains, kettles, eskers, and extensive sandar.

Since about 80% of all fresh water exists in solid form, an accurate assessment of the amount, distribution and variation of all snow masses, both near to and far from inhabited areas, is of importance for the understanding of man's environment. Almost 99% of all ice on earth is contained in glaciers, and most of it is stored in the two continental ice sheets of Antarctica and Greenland (97% of the total glacier area of

the earth). Some of the 3% of the remaining glacierized area is, however, of direct importance to mankind, providing water for irrigation, industry, hydropower, recreation, and domestic supplies. There is a need for more complete and detailed information. Annual measurements have been carried out on selected Icelandic glaciers for many years, but until 1973, no inventory work had begun.

Even in this small area there are number of problems. Many of the glacierized areas are not marked on the existing topographical maps; the relief is high and access to the ice is sometimes difficult. A further problem is to establish which ice masses are genuine glaciers. Some are moving, others are stationary, but undoubtedly move from time to time in surges. In May 1971, the Teigardalsjokull surged 100 meters. The possibility of such surges recurring has stimulated more interest in the glaciers of Trollskagi.

This expedition will focus on inventory work and annual measurements of growth rates, as well as mapping, and a study of the firn depths in the accumulation zone, with the official recognition of the Iceland National Research Council. Training will be given in mapping, surveying techniques, and safe ice and snow travel, including rescue and first aid and mountain travel.

The recent activity at Mt. St. Helen's has stimulated a great deal of interest in volcanology and makes this expedition a particularly timely field study. The piles of Tertiary basalt flows that make up the margins of Iceland contrast sharply with the Neovolcanic belt that exhibit nearly all types of volcanoes found on earth; explosion craters, ash cones, shield volcanoes, calderas, and countless fissures lined with spatter cones. Unique to Iceland are the prominent subglacially-erupted moberg mountains composed of tuff breccia rich in hydrated glass called palagonite. Lake Myvatn is known for its lunar landscape, where remarkable pseudo-craters may be



found, formed when superheated water trapped within the lava burst out in vents of explosive steam. The volcanic eruptions continue and in the last decade we have seen significant eruptions at Askja (1961), Surtsey (1963), Helka (1970), Heimaey (1973), and Krafla (1979).

We hope to be able to ascend several of these recently active volcanoes to collect sediment samples which give indications of earlier eruptions. This will allow a better understanding of the pattern of eruptions and the influences that cause them. We also hope to spend time working together with a team of British students who will be on an expedition to Iceland to accomplish some of the same objectives.

Leader

Kenneth Andrasco has broad experience in researching, writing, and editing publications on environmental topics. He is President of the Harvard Mountaineering Club and has organized and led expeditions to Alaska, Nepal, British Columbia, and Morocco.

Level: A/B

Student fees: \$900

Departs from Reykjavik

Marine Biology

Where: Little Cayman Island

When: Session I: June 27 - July 17; Session II: July 20 - August 9; Session III: August 10 - August 31

Focus: To study tropical marine environments

The Caymans are three small islands in the clear waters of the North West Caribbean Sea. The islands are actually the leveled tops of huge submerged mountains. Cayman Brac and Little Cayman are only a few miles apart and separated from Grand Cayman by about 80 miles. Little Cayman is only 10 miles long and 2 miles wide. It has a permanent population of about 20 people and is the most natural and undeveloped of the three islands.

The water surrounding the island is of unsurpassed clarity — visibility reaches 200 feet. The reefs along the north shore descend from the surface to hundreds of feet below. This remarkable coral wall is one of the best diving areas in the world. Because there is no silt to choke and kill coral polyps, the island offers a unique underwater environment. The reefs have grown uninhibited for thousands of years, yielding unparalleled underwater scenery. Many colorful fish thrive in these waters. Coral, gorgonians, and sponges flourish. Many sea fans exceed 4 feet in diameter. Seaweeds 6 feet tall are not uncommon, and sponges in a variety of types, colors, and forms throng the coral walls.

This expedition is divided into three sessions. The courses of each session will complement the courses of the other sessions, but any course may be taken by itself. Students in each session will select one of two courses and concentrate on either marine biology or marine zoology. All courses are primarily field and laboratory courses. Informal morning lectures are planned for 3 days each week.

SCUBA diving ability is recommended. The field studies for all courses will involve a substantial amount of underwater work. Certified divers can plan on more dives per day. Snorkelers will also be able to participate. The last 10 days of Session I will include a SCUBA certification course (at extra cost) if enough students express interest. Students interested in SCUBA certification must notify SFS well in advance.



Session I (June 27 - July 17): Tropical Marine Ecology

This session will include an overview of several tropical marine ecosystems: coral reefs, sandy lagoons, exposed shores and mangrove stands. We will examine the interrelationships between marine organisms and their physical, chemical, and biological environments. Lectures will introduce students to major ecological concepts as they apply to the study sites. Students will have the option of being included in one of two field teams.

One team will concentrate on the botanical component. Marine algae are the "primary producers" that form the foundation of all marine ecosystems. They convert solar energy to chemical energy via photosynthesis. The team will examine the species composition, the function, and the requirements of the algal communities at the study sites.

The other team will concentrate on the zoological component. They will study the "energy consumers" (i.e., the animals) at each study site. This team will examine community structure, grazing, competition, predation, reef building, etc.

Session II (July 20 - August 7): Marine Botany and Marine Zoology

The emphasis in the Marine Botany course will be on the identification and classification of the major groups of tropical marine algae. The primary study and collecting site will be the 200 foot vertical coral wall off the little-explored north shore of the island which is full of fascinating caves and spectacular colored corals. Other collecting sites will include sandy lagoons and exposed "iron-shores". Students will learn field identification of the common species, plus laboratory identification of the more unusual ones. Lectures will cover the distinguishing characteristics of various algal groups and the fundamentals of legal classification.

The emphasis of the Marine Zoology course will be on the identification and classification of major groups of tropical marine animals, primarily the invertebrates (such as corals, gorgonians, and sponges) which make up the extensive coral reef system surrounding the island.





Session III (August 10 - August 31): Marine Botanical Research and Research Diving Techniques

The Marine Botanical Research Project is primarily for students with a genuine interest in marine research and some diving experience. This project will be the continuation of a study begun last summer. A research team conducted a study on seaweed with an extremely large depth range (0-700 feet) and found that in this species, greater amounts of a pigment, B-carotene, are produced under high light conditions. Since this situation has not been seen in any other species, we will continue the research to examine the role of B-carotene in this species. Students accepted for this project will have the opportunity to participate in both the field and laboratory aspects of the research. Informal discussions and lectures will provide students the necessary background to fully understand the study.

The course in Research Diving Techniques will give students training in the tools and methods of underwater scientific research. SCUBA divers will learn to plan and carry out underwater ecological surveys. The course will cover underwater surveying of study sites, the use of underwater photography for data recording, planning of individual dives for the most efficient use of time, and safety procedures. We will plan and carry out an underwater survey to determine the species composition, abundance, and

distribution of marine organisms on the coral reefs. The major emphasis will be on marine animals, but the techniques taught will be applicable to plant communities as well.

Motivated students who would like to undertake independent research projects on Little Cayman Island are encouraged to apply to Session III. The School and teaching staff of this expedition will act as advisors.

We will be lodged at the Southern Cross Station of the southwest shore of Little Cayman. The station has a central building with kitchen, dining and recreation areas, plus six smaller buildings with sleeping accommodations, running cold water and sporadic electricity. Students will share the cooking and chores.

Leader

Christopher Neefus is a Ph.D. candidate in Marine Botany at the University of New Hampshire. During his five years as Research Associate at the Harold E. Edgerton Research Laboratory at the New England Aquarium, he designed laboratory and field instruments for algal research. He has led marine research expeditions for the past five years. He has over thirteen years of diving experience.

Level: Session I: A Session II and III: B
Student fees: \$1,195
Departs from Little Cayman

Limnology

Where: West Yellowstone, Montana

When: August 3 - August 27

Focus: To study the ecology of trout streams and lakes in the Yellowstone region

This expedition will concentrate on the ecology of trout streams and lakes in the Yellowstone Region. The major project will consist of a study in the feeding ecology of trout and the phenomenon of invertebrate drift, where nymphs and larvae of certain aquatic insects periodically leave the shelter of weed beds and rocks and drift in the current. At this stage they are particularly vulnerable to predation from trout. We will examine the relationship between this phenomenon and the feeding behavior of the fish to determine if the trout selectively feed on a particular species.

This study is of potential theoretical interest as it involves certain models regarding optimal feeding strategies. Students will learn the pertinent techniques of field work and investigation and directly participate in the research. Identification of insects will be accomplished by microscope and the use of detailed technical keys. Students will learn how these tools are used, as well as the use of statistics in ecological studies.

There will also be an opportunity for a variety of different sorts of general surveys of a wide variety of lakes, streams, and wilderness areas. Most of the field work will be done in daytrips from a central location. A four-day canoe trip to the little visited southeast area of Yellowstone Lake is planned. Students will have an opportunity to see all of the characteristic features of Yellowstone Park. Students interested in learning to fly fish should bring their own fishing tackle.

The expedition will be based in a cabin in the immediate vicinity of West Yellowstone. Students will share all the cooking and cleaning responsibilities.

Leader

Dr. Kenneth Miyata received his Ph.D. in Biology from Harvard University. He is currently a Research Associate in Herpetology at Harvard's Museum of Comparative Zoology. His research interests include



the systematics and ecology of amphibians and reptiles and endangered species. He has participated in and led several field studies in tropical South America and the Galapagos. He is a skilled fisherman and photographer.

Level: A

Student fees: \$680

Departs from West Yellowstone Airport



Archaeology

Where: Fort Christanna, Brunswick County, Virginia

When: June 1 - July 10

Focus: To delineate the plan of Fort Christanna for reconstruction and to gather interpretive data on Indian-white interaction, colonialism and frontier adaptations

This six-week field study will be the second season of field work and analysis on this project which is co-sponsored by the Brunswick County Historical Society. We will conduct our excavations at the site of Fort Christanna, a colonial fort built in 1714 by Virginia's royal governor, Alexander Spotswood, and named for Christ and Queen Anne.

Fort Christanna protected settlers along the frontier, housed an Indian school, and functioned as a center for the fur trade. A village inhabited by some 300 Tributary Indians was located near the fort. Since 1979, the site has yielded evidence of military and trading activities as well as information about the plan and construction of the palisade and bastions which comprised the fort's perimeter. The artifacts recovered include European and Indian-made glass, gun parts, trade items, and aboriginal stone tools.

Students may receive either undergraduate or graduate credit for training in excavation techniques, photography, mapping, surveying, and archaeological interpretation. Visiting guest lecturers will discuss various aspects of archaeological work. Members of the Fort Christanna Project Crew will assist in site orientation and field supervision.

Accommodation, lectures, and evening labs will be on the campus of St. Paul's College in Lawrenceville, Virginia, three miles north of the site. Brunswick County is predominantly rural in character. Its rolling hills are covered with pine forests or given over to tobacco cultivation; lumber and tobacco-growing are the primary sources of work and income for county residents.

Tours planned include trips to Colonial Williamsburg, Jamestown, Yorktown, the James River Plantations, and to other excavations in progress. Excursions to the areas of Lake Gaston, Virginia Beach, and North Carolina's Outer Banks may be arranged.

Leader

Mary C. Beaudry earned her Ph.D. in Anthropology at Brown University. She is an Assistant Professor in the Archaeological Studies Program at Boston University. Her areas of special interest and research have been in historical archaeology and socio-cultural anthropology. This is her second year as Director of the Fort Christanna Project. She has ten years of experience as an excavator in the field.

Level: A/B

Student fees: \$1,250

Departs from St. Paul's College,
Lawrenceville, Virginia



Special Projects

The School for Field Studies has been engaged in a contract with the Massachusetts Department of Youth Services. The "Search and Rescue" program is designed to serve disadvantaged youth. These youth are male juvenile delinquents, who for various reasons have been unable to productively integrate into their community or family. Students range in age from fourteen to seventeen and come from each of the seven regions of the Massachusetts Department of Youth Service.

The School has adapted its educational methodology of academics and adventure to address the problems of these youth. The challenge of wilderness expeditions provides them with an opportunity to improve their self-concept. Highly qualified staff provide strong role-models. The natural wilderness environment serves as a classroom for learning academic subjects, such as geography, science, and math.

Our educational programs have included acid rain testing in the White Mountains and several wildlife and plant surveys in various regions of New England. Our expeditions have included canoeing on the Housatonic, Saco, and Pemigewasset Rivers, rock climbing on some of New Hampshire's larger cliffs, ascents of New England's five tallest peaks, and a sailing expedition from Newport, R.I. Skills taught have included first aid, aquatic survival, and mountain rescue, as well as basic survival skills, such as shelter building, cooking, and map and compass navigation.



Application Process

1. To apply, complete the Student Application. Please type.
2. Include a Letter of Recommendation from a teacher or non-related person who knows your interests and abilities.
3. Include a 300-word Personal Statement which explains your reasons for wanting to join an expedition.
4. Enclose a check for \$25 (your Membership and Application Fee).
5. Mail all of the above, in one envelope, to:
School for Field Studies
P.O. Box 171
Prudential Center
Boston, MA 02199

Acceptance

You will be notified by the School within 3 weeks, and sent further information on your expedition regarding logistical and travel arrangements, and equipment and documentation needs. You may be called by your instructor to discuss the expedition. You and the leader will review your application. You may decide that the choice is inappropriate; the leader may decide the same. If the School accepts your application, and if you agree to join, you must then reserve your place with a non-refundable deposit of \$300. The expeditions fill quickly, and you should proceed without delay. Deposit deadlines are *June 1* for July expeditions and *June 15* for August expeditions.

Refunds

Refunds are rarely made. Most of the costs of field research are incurred well in advance of the winter or summer season. Students who withdraw and fail to carry through jeopardize the success of an expedition and the costs of replacing participants are high. Refunds are made when expeditions are canceled.

Tax Deductions

Each individual should consult his or her own tax advisor concerning the possible tax deductibility of out-of-pocket expenses incurred in connection with participation in SFS projects.

Expedition Levels

Expeditions are graded A or B, depending on their difficulty and the degree of experience and preparedness required. Level A expeditions are designed for younger students, with little outdoor experience. They emphasize training, and require good physical fitness and basic knowledge of the natural sciences. Level B expeditions focus on specialized research and require solid grounding in science and excellent physical condition.

Student Fees

The student share of costs pays for out-of-pocket expenses including food, accommodations, and ground transportation during the expedition—but does not include transportation expenses to and from the departure point. It includes all group equipment, medical supplies, and scientific instruments and materials. Personal gear, such as packs and sleeping bags, and personal equipment, such as SCUBA tanks, are the student's responsibility, as are medical insurance, passports, visas, and inoculations.

Responsibility

In organizing and managing these expeditions, the School for Field Studies (SFS), its agents, employees and staff give notice that they act solely on behalf of and for the benefit of the participants, on the express agreement that SFS shall not be liable, financially or otherwise, for non performance or unsatisfactory service; for injury to persons, including death; for loss of, or damage to property; for accident or delay; and/or for expenses rising from strikes, weather, quarantine, sickness, government regulation, or from any act or omission of its agents or employees, and/or airline, railroad, bus company, automobile rental agency, hotel, or other supplier of service.

SFS reserves the right to refuse any applicant to any expedition if it deems him/her unsuited for the project for any reason. SFS reserves the right to require any participant to withdraw from an expedition at any time, if the expedition leader deems his/her acts or conduct—including use of drugs not authorized by a medical doctor and uncooperative behavior — to be detrimental to or incompatible with the interests, harmony, comfort, or welfare of the expedition. Should such a withdrawal occur, SFS will notify parents if the student is under 21 and

return the student to the point of departure of the expedition, at which time any and all responsibility on the part of SFS will cease.

Please note that all expeditions, dates, and contributions are tentative until verified and confirmed by the School.

There are variables beyond the School's control — weather, currency rates, political movements, natural disasters, that may necessitate changes before or during an expedition. Your participation on an expedition requires flexibility to adapt to such possible changes.

Travel Arrangements

In order to insure orderly arrivals and departures at the site, the School has made arrangements with a travel agency to handle all details. Plane, train, bus and boat travel reservations should be handled through them. Further information will be sent to applicants.

Field Conditions

Please note that living during an expedition tends to be primitive — meals may get repetitious, hot showers a long awaited luxury, contact with the outside world only in emergencies, and so on. There is exposure — to weather, to thick and thin air, and to things that stick, sting, or bite. There are rewards that come from this effort — your awareness will grow, you will become closer to your teammates, you will be removed from the day to day problems of home, as you live with the natural processes that you are studying.

A typical day might involve rising early and cooking breakfast. The morning might be spent with lectures and discussions, a lunch break, and the afternoon collecting data. Evenings may be free for time alone or to write in your journals; there may also be special collecting forays if necessary, or lectures. Occasional days off from research may allow exploring the countryside, an excursion to a different ecosystem, or the chance to pursue an independent project. Day to day schedules of every expedition are available on request, and are automatically sent to accepted applicants.

Financial Aid

Financial aid in the form of scholarships is made available to otherwise qualified applicants who require assistance in order to participate. Applicants seeking aid are advised to apply as early as possible, as awards are made in two rounds which have *April 15* and *June 1* deadlines. Students aged 16-21 desiring assistance should submit with their application a request for a Financial Aid Form. Students 21 and older may be given aid in the form of an interest free loan.

Academic Credit

It may be possible for students to arrange academic credit through their own school with the help of their advisors or through an independent study arrangement. School staff and faculty will support such proposals.

In addition, the School is currently discussing an arrangement with a number of universities to extend credit to their students for satisfactory completion of an expedition, and some School faculty are also able to extend credit through universities with which they are affiliated.

If credit is desired, please notify all parties well in advance of departure. Credit is rarely possible to arrange after a student has departed or returned.

The School for Field Studies admits students of any race to all the rights, privileges, programs, and activities generally accorded or made available to participants and does not discriminate on the basis of race in administration of its educational policies, scholarship and loan programs, and athletic and other school-administered programs.

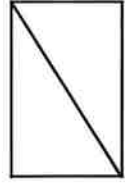




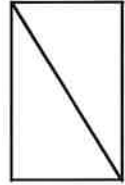
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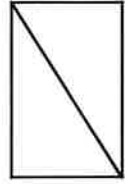
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Deposit / Receipt



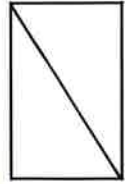
Fee / Receipt



Medical / Release



Reference



App. Memb. / Receipt Fee

Application Form

Name _____ Date of Birth _____ Age _____

Home Address _____ Sex _____ Height _____ Weight _____

School/College _____ city _____ state _____ zip _____ Previous accidents, injuries, or special problems: _____

Address _____ Swimming ability: ☐ good ☐ average ☐ poor

Home Phone _____ School Phone _____ Parent or guardian _____

Grade or year in school _____ Parents' occupations _____

Mailing Address: ☐ Home ☐ School _____

Major Interests: _____

Extracurricular Activities: _____

Clubs, Organizations: _____

Athletic Participation: _____

Honors, Awards: _____

Travel Experience and dates: _____ Foreign language, if any _____

Passport Number (if needed) _____

Magazines read regularly: _____

Name and address of local/school newspaper: _____

How did you hear about SFS? (please be specific) _____

SFS Expeditions:

☐ First choice: _____ Second choice: _____

☐ Wait list me for my first choice.

☐ Assign me to second choice if first is full.

☐ Please send a financial aid form.

Training and Experience Related to Your Choice of Expedition:

Academic Courses _____

Field Experience _____

Outdoor Experience _____

Special Skills _____

College Major: _____ College Minor: _____ Career Plans: _____

Personal Reference: Name _____ Relationship: _____

Address: _____

Names and addresses of other persons who might like to receive information about SFS

Attach a 300-word Personal Statement, typed or neatly written, which describes the reasons for your interest in joining the expedition.



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