

1. INSTITUTION: The University of Houston, Houston, Texas.

2. PROPERTY IDENTIFICATION:

The University of Houston Coastal Center occupies a portion of Camp Wallace, a property consisting of 1,603.2 acres out of the Phillip Gayatt Survey in Galveston County, Texas, located on the north side of State Highway 6 and the west side of FM 2004, immediately west of La Marque, Texas.

By means of a Deed Without Warranty, dated October 24, 1960, 1,052.6 acres were conveyed by the Federal Government to the University of Houston. This portion of the property was later reduced to 715.5 acres by Quitclaim Deed dated April 4, 1972.

By means of a Deed Without Warranty, dated July 11, 1961, the remaining 550.65 acres of the former Camp Wallace was conveyed to the University of Houston. This portion of the property was reduced to 210 acres by Quitclaim Deed dated April 4, 1972.

On April 27, 1980, the above referenced Deeds Without Warranty for 925.5 acres were amended by extending the period of time to which utilization restrictions apply for a period of eight years.

The extended period of restrictive use on the above referenced 715.5 acre portion expired on October 24, 1988, and the extended period of restrictive use on the above referenced 210-acre portion expired on July 11, 1989. Letters received from the United States Department of Education, dated November 3, 1988 and August 18, 1989, stated that the last Annual Report submitted (1988) and the most recent on-site survey of the property disclosed that the program of utilization was consistent with the purposes, terms, and conditions of the transfer. Hence, there will be no need for furnishing an annual utilization report in the future concerning subject property.

3. PROGRAM OF USE:

The University of Houston Coastal Center serves for those research or educational activities which (a) stimulate the improvement of the declining quality of urban coastal areas, (b) investigate and guide man's use and development of near-

urban coastal areas consistent with conservation and sound environmental management, (c) seek to obtain basic knowledge of the coastal environment, and (d) provide for broadly- or specially-educated leadership for these important phases of American life. The Center is the site for field and laboratory studies that cannot be performed efficiently on the main campus and for those procedures that require security, acreage, or time that make them inappropriate for the main campus. The Center serves as a support facility for fieldwork in the bays and along the Gulf Coast.

The Center serves the University-at-large, including the various colleges, departments, institutes and programs of the University of Houston, the University of Houston-Clear Lake, and the University of Houston-Downtown. By prior arrangement with the Director, the facilities are available to faculty and students of educational institutions of Texas and other states. Joint regional environmental studies have been made with the University of Texas at Austin, The University of Texas School of Public Health at Houston, The University of Texas Graduate School of Biomedical Sciences at Houston, Rice University, Southwest Texas State University, Texas A&M University, the National Marine Fisheries Center at Galveston, the Nature Conservancy, Armand Bayou Nature Center, Texas Parks and Wildlife, U.S. Fish and Wildlife, U.S. Geologic Service, and the Welder Wildlife Foundation.

The University of Houston provides funds to administer and maintain the facility plus a modest annual budget to initiate research programs that may eventually attract external funding. Educational activities at the Coastal Center have been funded by various public and private agencies, including the American Cancer Society, Department of Defense, Department of Energy, Gulf Universities Research Corporation, Environmental Protection Agency, Gulf Coast Hazardous Substance Research Center, National Aeronautics and Space Administration, National Institutes of Health, National Oceanographic and Atmospheric Administration, National Park Service, National Science Foundation, Sea Grant Program, Moody Foundation, Texas Higher Education Coordinating Board, Welch Foundation, Wray-Todd Foundation, The Nature Conservancy, U.S. Fish and Wildlife Service, and Welder Wildlife Foundation.

DEVELOPMENT OF THE CENTER

The long-term Academic Plan of the Coastal Center was formulated as a result of the recommendations of a committee of the faculty appointed by President Hoffman in 1968. The development of the Coastal Center began with the construction of an environmental field laboratory on the site in 1969. Major research programs utilizing the Coastal Center facilities were initiated in 1970. Annual reports were prepared for the University of Houston Board of Regents and the Federal Government from 1973 through 1988. A compilation of data from those 16 annual reports documents the ecological education and research utilization of the Houston Coastal Center. A summary of that documentation reveals that the University provided the Coastal Center with an operating budget totaling \$954,417 over those 16 years. External funding in force for research conducted in association with the Coastal Center during those 16 years totaled \$12,819,402. Graduate education associated with the Center resulted in 40 Master of Science theses, 24 Doctoral dissertations, and a grand total of 290 publications in books and refereed journals. Utilization of the Center for undergraduate education is noted in the annual reports but has not been summarized. Following notification of expiration of the extended period of restrictive use in 1988, submission of the annual report to the Federal Government is no longer required. The annual report for the years since 1988 continues to be published for the University Administration and scientists involved with the ongoing research at the Center.

FUTURE OF THE CENTER

The University of Houston has made a commitment to the Coastal Center to support the long-term research required for solutions to environmental problems. Studies started since the 1990's are assured of full protection through 2010 from alternative administrative uses of the land and the facilities. The University of Houston Coastal Center provides security from public disturbance and maintains records of current and past activity so that long-term studies are possible.

Future development of the facilities is dependent on the requirements generated by the research initiated by faculty and graduate students and by the needs of national agencies for the study of environmental problems. Many environmental studies require large areas with buffer zones, protection from public activities, and a long-term commitment to the study program. The long-term commitment to environmental studies by the University of Houston assures funding agencies that the initiation of funding is a reasonable step to the solution of major ecological problems.

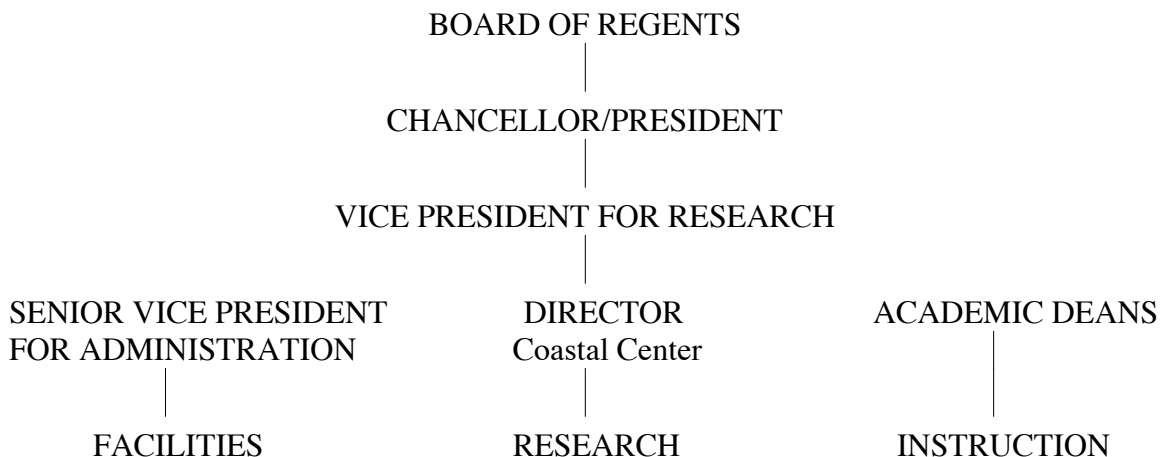
In accordance with the above statements, several long-term studies are continuing at this time. They are listed as research programs in a following section of this report.

FACILITIES

The University of Houston Coastal Center has approximately 925 acres of coastal prairie, shrub, ponds, and woodlands. Buildings on the Center include the Coastal Environmental Laboratory with office and research space, the Coastal Center Research Laboratory, an Equipment Storage Building, and a Residence for the caretaker. Several smaller buildings provide specialized research space for the Biology and Geosciences Departments. Roads built to support the former military occupancy are maintained to provide easy access to all parts of the Center. Several coastal habitats that support many natural and introduced species are available. Both experimental and observational sections are maintained for use by students and faculty. The Director's office is maintained on the University of Houston campus.

ADMINISTRATIVE STRUCTURE

The administrative structure of the University of Houston Coastal Center provides for the unification of the administrative responsibility and the designation of a Director responding to the Office of the President. This allows the clear focus on programs that support the graduate education and research requirements of the diverse interests of the University.



FINANCIAL SUPPORT

The total budget for the Coastal Center activities is derived from a variety of sources. The Coastal Center Operation budget is utilized to cover expenses incurred in administering the Center and to provide partial support for initiating faculty and student research projects. The Coastal Center Grounds Maintenance budget (p. 7) covers the salaries of a full-time caretaker, temporary employees, and routine maintenance of buildings, roads, and fence lines. Major repair and major equipment purchases are in addition to the base budget and are provided as the need arises. Salary monies for faculty and graduate students involved with teaching and research functions at the Center are provided by their Colleges and Departments. Grants, contracts, and private funds awarded to faculty members provide a substantial portion of salary, equipment, and

supply monies expended for environmentally related studies conducted in affiliation with the Coastal Center.

ORGANIZED RESEARCH

Coastal Center Operations: (1-1-27013)

	<u>Budget 2009-20010</u>	<u>Budget 2010-2011</u>
Salaries		
Student Support	\$45,000	\$40,000
Professional	38,000	35,000
Subtotal =	\$83,000	\$75,000
Maintenance and Operations		
Research Support	\$19,076	\$18,787
Operational Support	6,000	6,000
Contracts & Capital Equipment	2,000	2,000
Subtotal =	\$27,076	\$26,287
Total =	\$101,787	\$101,787

Student salary support supplemented by teaching fellowships.

Total supplemented by external grants and contracts in force totaling over \$2,500,000.

GROUNDS MAINTENANCE

Coastal Center: (1-1-64629)

	<u>Budget 2009-2010</u>	<u>Budget 2010-2011</u>
Wages: Non-Students	\$41,281	\$41,281
Maintenance and Operation		
Supplies	14,429	14,429
Travel	0	0
Total =	\$55,710	\$46,260

COOPERATIVE EDUCATIONAL PROGRAMS

The University of Houston Coastal Center develops cooperative research and instructional programs with other institutions that provide maximum utilization of resources. The use of the Center for educational purposes by other institutions is provided on the same basis that space and services would be provided on the University campus.

Texas Gulf Coast tall-grass prairie, utilized as grazing land, dominated the Houston Coastal Center site prior to World War II. The land came into possession of the United States Military in October of 1940, and an army basic training center, Camp Wallace, was built on the upland prairies near Hitchcock in Galveston County. Construction began in November 1940 with a 3.9-mile railroad spur off of the Gulf, Colorado, & Santa Fe tracks, 17 miles of oyster shell roads, oyster shell parking lots, and utility infrastructure. The shell was dredged from Red Fish Bar, the last remaining vestige of the barrier reef across Galveston Bay, and was transported up Dickenson Bayou by barge and trucked to Hitchcock. Camp Wallace opened on February 1, 1941 and by May 1941 approximately 10,250 military personnel and civilians trained, worked, and lived there in the 399 buildings. It was also used as a German Prisoner of War detention camp throughout the WWII. On April 30, 1944 the control of Camp Wallace was transferred from the Army to the Navy, and it became a naval boot camp and distribution center. From September 1945 to September 1946, Camp Wallace became a naval separation center where 50,000 Navy officers and enlisted men were debriefed before being discharged. On October 15, 1946 the site came under the custody of the War Assets administration and in 1947 the U.S. Government declared Camp Wallace surplus. The buildings were removed, leaving behind the roads, parking lots, concrete foundations of several buildings, and many species of non-native plants. Approximately 300 acres of the original land purchase were not utilized for roads or building structures. This portion of the Houston Coastal Center comprises a remnant of the original native prairie that occupied the entire site prior to 1940.

In August 1995, a group concerned about ensuring a future source of grasses indigenous to the Houston Gulf coastal prairie began work to establish a native grass seedbank for the region. The need for a seedbank became apparent during discussions

about using native grasses to help re-vegetate Sims Bayou after the completion of a major Corps of Engineers flood control project. Also, naturally occurring stands of native grasses in the Houston area are disappearing due to agriculture, noxious weed/brush encroachment and urbanization. The only cost-effective method of establishing native grasses on any large-scale project is to use seed. It is preferable to use the seed of local ecotypes and genotypes; however, there is no bulk seed source of these local types. The goal of the seed bank is to establish local ecotypes and genotypes where the seed can be readily collected for either extending the seed bank area or for sowing on large-scale projects.

The Coastal Center has become widely recognized for the prime prairie remnant within its borders. Representatives of several agencies and organizations, including Texas Parks and Wildlife, U.S. Fish and Wildlife, Sea Grant, the Nature Conservancy, the Trust for Public Land, the Brazoria Wildlife Refuge, the U.S. Geological Survey, and the Native Prairie Association of Texas, have visited the prairie several times. All are in agreement that the prairie is an invaluable resource as a seed bank in efforts to restore native prairie flora to other selected sites in the Gulf Coast region. A selection of photographs on the UH Coastal Center Web site (<http://www.uhcc.uh.edu/>) provides a visual sample of the prairie vegetation throughout the year.

The U.S. Fish and Wildlife Service and the University of Houston Coastal Center have entered into a cooperative agreement to maintain the biological integrity, ecological processes, and historic assemblage of coastal prairie flora and fauna for any anticipated conservation effort that may provide direct or indirect benefit to the coastal prairie landscape. The Coastal Center has conveyed to the Service a conservation easement, encompassing approximately 279 acres of coastal prairie, shrub, and woodlands, for a period of at least seven years. The Service and the Coastal Center have appointed a Steering Committee charged to develop a master management plan with specific objectives and practices designed to obtain basic knowledge concerning coastal prairie maintenance and restoration. The Steering Committee members are drawn from the University of Houston, the U.S. Fish and Wildlife Service, The Nature Conservancy, Texas Parks and Wildlife, and the U.S. Geological Survey Biological Resources Division. The management plan will serve as the guiding instrument for the conservation easement area and will provide flexible management objectives, recommendations, and guidelines for its cooperative use. The master management plan is an evolving conceptual

model. It recommends certain actions, practices, and strategies for achieving Coastal Center management objectives as determined by the Steering Committee.

Regardless of whether or not the recommendations of the Steering Committee are implemented in a given year, the impact of management actions and practices on the Coastal Center easement area must be regularly and critically evaluated. These evaluations will assist the Steering Committee in determining whether to change current practices, adopt particular aspects of this or another management plan, or modify an existing management plan. Irrespective of the particular management regime implemented, the following long-term objectives have been adopted to secure the Coastal Center easement area for its purpose into the future.

1. Maintain the current and/or enhance native species complement and diversity of coastal prairie flora and fauna within the easement area.
2. Allow, within the limitation of management objectives, natural processes to proceed in the easement area.
3. Minimize the likelihood of introducing additional non-native flora and fauna within the easement area.
4. Minimize the impact of researchers using the Coastal Center by establishing and enforcing regulations and guidelines for research on the easement area.
5. Increase public awareness of the intrinsic value of the bio-diversity already present within the easement area.

The following criteria should be used to assess whether current management practices on the easement area are achieving these objectives, or require modification:

- A. Conduct annual surveys to the *biota* (or representative *taxa*) on the easement area to determine if a stable or increasing level of native bio-diversity is present.
- B. Conduct annual surveys of the abiotic resources present within the easement area to assure that the quality of the substrate is not diminished due to use, erosion, or management practices.
- C. Conduct annual surveys of easement area users to determine the reasons for their visits, the frequency of their visits, and their awareness of the biological and ecological value of the easement area.
- D. Publish a summary of all uses made of the easement area every two years.

The following projects have been completed in an effort to meet the long-term objectives:

The total easement consisting of approximately 279 acres has been subdivided into seven areas. Fifteen 100-meter transects have been placed within the seven sub-areas with GIS documentation and permanent marker posts. The history of past management practices in the areas represented by the transect lines has been noted and the initial floral survey has been completed for each transect. The vegetation analysis employed a list of 48 species of plants commonly found in coastal areas that were indicative of high, neutral, or low prairie quality. Plants associated with low quality are introduced exotic species. Neutral species are native, but associated with succession to other non-prairie ecosystems. The high- quality species are grasses and forbs associated with mature coastal prairies. One square meter areas located at random compass positions and distances from evenly-spaced points along each transect have been sampled in the Fall of 1999 and 2000, in the Spring of 2000 and 2001, and in the Fall of 2001, Spring and Summer of 2002. A diversity/quality index of the seven areas has been established.

Portions of the easement area have been maintained for the past 40 years with a mowing regimen designed to control invasive species such as the Chinese tallow and other woody plants. The Steering Committee noted that a historic assemblage of native species remain on approximately three-fourths of the total area with this past management plan. The controlled burn conducted on Area 2 in spring 1999 had little or no effect in controlling re-growth of tallow, wax myrtle, or other woody species, but did shift the species composition to more forbs and less grasses during the 1999 growing season. The grasses have become more dominant during the 2000 and 2001 growing seasons. As a consequence of the discussion, the Committee recommended cessation of burning and establishing a mowing regimen designed to enhance production of seed from native grasses, since restoration of native prairie in other Gulf Coast locations will depend heavily upon seed from the Coastal Center. In accordance with the recommendation, all seven areas were mowed during March and April of 2001, during February and March of 2002, during March and April of 2003, and during April and May of 2004. Areas three, four, five, six, seven and eight were mowed during April and May of 2005. Areas one and two were burned on February 17, 2005. Areas one, three, four, five, six, seven and eight were mowed during January and February of 2006. Area two was burned for a meteorological experiment in February of 2006. All areas were mowed

during the winter and spring months of 2007 after combining was completed. The annual mowing regime has continued through the spring of 2010.

An herbicide, Grazon P+D, is being utilized on selected tallow trees in all of the areas. The herbicide is applied to cut stems of small growth or stumps of larger trees. Beginning in Spring 2006 the herbicide has been applied directly to small tallow trees in area 2. Grazon P+D is effective in killing the treated tallow with a slight indication that adjacent vegetation is also impacted. Steven Mitchell, Texas Parks & Wildlife, began a study in July 2003 to determine what impact, if any, took place. A vegetational analysis of three different sites was done and application of herbicide was applied. The post vegetational analysis showed no significant difference from untreated plots. Grazon P + D has been utilized in 2004 to clear mature tallow from a ten acre plot, which will be referred to as Area 1, near the entrance gate. It has become a routine tool for removing tallow from several of the other established prairie plots on the property.

The wet conditions during November and December of 2004 aborted plans to combine seeds, as it was not possible to put heavy equipment on the prairie. Small amounts of selected seeds, notably aloe, coneflower, and several grasses, were handpicked by groups from the Native Prairie Association of Texas and by staff from the Houston Arboretum. Weather conditions in the fall of 2005 and 2006 were similar.

Spring and Summer 2007 rainfall was well above average and distributed evenly through the growing season. The prairie vegetation responded with robust growth and seed set, and rainfall decreased in October and November making it possible to access all prairie patches. Negotiations were completed in October to harvest sufficient Coastal Prairie Mix seed to restore 160 acres of coastal prairie.

Bill Niemann and George Cates of Native American Seed contracted to combine the Coastal Center prairie, and transport the harvest to Junction where cleaning, drying, and purity and germination analyses were conducted. The bagged seeds, 4,000 pounds, are held in a conditioned facility until planting.

Matt Whitbeck, Anahuac National Wildlife Refuge, received 1,200 pounds of the Coastal Prairie seed mix and planted 60 acres on the refuge in the spring of 2008. Andy Sipocz, Texas Parks and Wildlife, has negotiated with Native American Seeds to prepare the seedbed and plant the remainder on a 100-acre plot at the San Jacinto Battleground.

The remainder of the seed was planted at Sheldon Lake State Park in the spring of 2010. Texas Parks and Wildlife personnel, along with numerous volunteers, have handpicked seeds from plants as they ripened during the spring and summer of 2008. These seeds will be planted in conjunction with those harvested by combine in November, 2007 in an attempt to increase the plant diversity of the restored plots.

Dr. Evan Siemann (Ecology and Evolutionary Biology, Rice University) has established observational and experimental sites on the Houston Coastal Center to address questions in population, community and ecosystem ecology with an emphasis on the ecology of exotic plants. The research has several areas of emphasis:

Effects of resources on plant invasions: Changing abiotic conditions may be responsible for the success of alien plants. In other words, a change in dominant plant types or species may reflect poor adaptation of native plants together with pre-adaptation of the alien species to a new set of abiotic conditions. To address such questions he has used the alien Chinese tallow tree (*Sapium sebiferum*, “*Sapium*” hereafter) which is invasive in the southern United States. Experimental nitrogen additions indicate that anthropogenic nitrogen addition may promote *Sapium* invasion into Texas grasslands. In addition, once pioneer trees are established in grasslands, they may favor their seedlings in competition with grasses by increasing nitrogen availability and reducing light availability. This positive feedback may accelerate the transition from coastal prairie to *Sapium* forest.

Ecological effects of enemies on plant invasions: A recurring question in ecology is whether a lack of enemies (herbivores and diseases) in an alien plant’s introduced range provides an important advantage in competition with native plants. In simple terms, an alien plant may have additional resources available for growth that native plants are losing to enemies. The mechanism in this case is a phenotypic response to a benign environment. After several experiments, there is some understanding of the role of low herbivory in *Sapium* invasions in Texas. Simple phenotypic reallocation of resources normally lost to enemies does play a role in its invasive success. However, *Sapium* has a substantial performance advantage over native tree species even when differences in herbivory are eliminated.

Evolutionary effects of enemies on plant invasions: Differences in enemy impacts between an alien plant's native range and introduced range may still play an important role in plant invasions. Experiments have begun to test whether evolutionary changes in plant defenses and growth have allowed *Sapium* and other invasive plants to escape conventional ecological constraints. The highlight of this work has been the finding that there are genetic differences in growth and defense between *Sapium* collected in its native and introduced ranges and grown in a common garden and among *Sapium* populations in North America that differ in the time since *Sapium* introduction. A combination of low allocation to defense, high growth and low herbivory (which native plants cannot achieve) may allow *Sapium* to be extremely successful in North America. This intriguing pattern is consistent with a major hypothesis of invasion ecology and we believe it is a model system that can be used to thoroughly test its predictions. This area of research will be the primary focus for the next few years.

The Coastal Center served as one of the monitoring sites for the location of wind profiling instruments in October, 2000 to conduct measurements for the Texas Air Quality Study 2000 (Tex AQS 2000). As part of the continuing EPA project, "Development of Joint Multi Pollutant Air Quality Modeling Facilities and Air Monitoring Stations for the Houston-Galveston Metropolitan Area", the Air Quality Group at the University of Houston has selected the Coastal Center as one of its three measurement sites designed to characterize surface energy exchanges in a coastal environment. Development of the site at the Coastal Center, with addition of faculty members and major instrumentation, has resulted in research findings that provide a better understanding of the air quality in the Houston/Galveston area.

INSTRUCTIONAL PROGRAMS

Instructional programs that use the University of Houston Coastal Center area are limited by the necessity to control the access of individuals into and out of the research areas. Nevertheless, approximately 200 acres have been designated for instruction and are used to demonstrate research procedures or to allow the student to perform certain field exercises which cannot be done elsewhere. The area consists of a Chinese tallow forest, a grassland area, and several drainage ditches. The diversity of habitats makes this area especially suitable for ecological observations and studies. Sampling techniques, animal marking techniques, and animal behavior studies are learned on individual and class projects by University of Houston students as well as by students from other colleges and universities.

During the 2009–2010 academic year, 12 faculty, 32 graduate students, and 15 visiting scientists used the Coastal Center and its resources for their research or as a base for research along the coast and in the estuaries. Support from the Coastal Center budget for individual projects included travel, specialized equipment, supplies, and stipends. Students and faculty from the University of Houston, University of Houston-Clear Lake, University of Houston-Downtown, Southwest Texas State University, Rice University, the University of Cincinnati, and Oklahoma State University utilized the Coastal Center for environmentally related studies during the year. Personnel from Armand Bayou Nature Center, The Nature Conservancy of Texas, the Gulf Coast Bird Observatory the U.S. Geologic Survey, Texas Parks and Wildlife Service, The U.S. Fish and Wildlife Service, and the Native Prairie Association of Texas continued their studies on the Center.

RESEARCH PROGRAMS

The support of long-term studies designed to answer basic ecological and environmental questions continues to be a major objective of the Houston Coastal Center. Dedicated study areas, laboratory space, shop facilities, and field equipment are provided for these research programs. Salaries for research personnel, supplies, and specialized research equipment are funded by external research grants and contracts. Annual reports for each of these programs are kept on file in the Coastal Center library. The programs are:

Chinese Tallow tree invasive mechanisms.

Stable isotopic analysis of rain, water vapor, fossils and tree rings from the tropics and subtropics: Storm dynamics and paleoclimatology.

Ecological interactions of the imported fire ant.

Prairie maintenance and restoration.

Microbiological studies on free-living cellulolytic nitrogen-fixing organisms of the Family *Azotobacteraceae* and related Diazotrophes.

Groundwater studies of the northern Texas Gulf Coast.

Characterization of surface energy exchanges in a coastal environment.

Air quality modeling and measurements.

RESEARCH PROJECTS

Cooperative interaction between the Coastal Center, various Colleges and Departments of the University of Houston, other educational institutions, and governmental agencies resulted in a variety of research investigations which utilized the facilities of the Coastal Center during the past year. The following is a list of investigators and titles of projects that received logistic and/or financial support from the Coastal Center during 2008-2009.

Ackerman, L. Measurements of formaldehyde (HChO) and volatile organic compounds (VOCs) at the Houston Coastal Center.

Ahern, J.R. and K.D. Whitney. Evolutionary ecology of sesquiterpene lactone chemistry in *Xanthium strumarium*.

Anderson, D. Collection of data at the UHCC and UHMT sites (student assistant).

Appleby, L. Shifts in reproductive phenology and body plasticity in the ant *Pogonomyrmex occidentalis*.

Appleby, D. Environmental modification of worker size in harvestor ants.

Aumann, G. Prairie maintenance and restoration.

Capuano, R.M and A. Chakraborty. Dissolved organic carbon 13 and carbon 14 as tracers to identify areas of surface water recharge and salt water upwelling in sand aquifers underlain by oil and gas reservoirs.

Cole, B. The effects of genetic variation and colony size on social homeostasis in the ant *Pseudomyrmex pallidus*.

Croxatto, G. Peroxyacetylnitrates (PANS) and hydrocarbon precursors under land-sea breeze conditions (student assistant).

David, D. Individual worker performance based on task novelty and the use of social cues in the ant *Pseudomyrmex pallidus* (Hymenoptera:Formicidae).

David, D. The effects of nest mates, prior experience, and maturation on task fidelity of newly enclosed workers in the ant *Pseudomyrmex pallidus*.

- David, D. Age-dependent changes in response thresholds and the evolution of task polyethism in the ant *Pseudomyrex pallidus*.
- David, D. How age contributes to the development of response thresholds in the ant *Pseudomyrmex pallidus*.
- Flynn, J. Impact of clouds and aerosoles on ozone production in Southeastern Texas.
- Francis, L. and R. M. Capuano. Sources of upwelling brine and gas in the green River Area, Paradox basin, Utah.
- Gonzales, J. (Katy Prairie Conservancy). Establishment of demonstration prairie plots by transfer of plants and seeds from the Houston Coastal Center.
- Jurtshuk, Peter, Jr. Studies on the Coastal Center nitrogen fixing *Streptomyces* isolates and their comparative acetylene reduction analyses to other free living nitrogen fixing soil microorganisms.
- Kramer, M. Collection of Aloe seeds for diversification of prairie composition. (Armand Bayou Nature Center).
- Lawrence, J.R. and Rosalie Maddocks . Stable isotope analyses of rain, water vapor fossils and tree rings from the tropics and subtropics: Storm dynamics and paleoclimatology.
- Lindsay, S. and R. M. Capuano. Saltwater contamination pathways into the Chicot/Evangeline aquifers of Brazoria County, Texas.
- Marquardt, E.S. How do nitrogen fixing bacteria affect mycorrhizae-plant associations?
- Masrou, N. Measurements of formaldehyde (HCHO) and volatile organic compounds (VOCs) at the Houston Coastal Center.
- Nijjer, S. The effects of soil biota and fertilization on the success of *Sapium sebiferum*. (Rice University)
- Patel, M. Study of local wind circulation and its role on ozone concentrations in the Houston-Galveston area.
- Pedemonte, L. Analysis of turbulent fluxes under different atmospheric stability conditions for improving meteorological model predictions (student assistant).
- Pennings, S.C. Community ecology of coastal salt marsh plants.
- Pennings, S.C. and Huy Vu. Geographic variation in top-down control of *Solidago sempervirens*.

- Pennings, S.C. and E. Marquardt. Does overwintering success of a parasitic plant determine its host range?
- Rappengluck, B. Analysis of turbulent fluxes under different atmospheric stability conditions for improving meteorological model predictions.
- Roberts, P. Installation of tower for data transfer between meteorological instruments and campus.
- Sipocz, A. Native seed collection for prairie restoration at San Jacinto State Historical Park and Sheldon Lake State Park. (Texas Parks and Wildlife)
- Sutton, P. Monitoring of mosquito species and population density on the Coastal Center (Galveston County Mosquito Control).
- Vu, H. Elucidating the mechanisms linking crab herbivory to sal marsh dieback.
- Wason, Elizabeth. Diet mixing in a parasitic plant.
- Whitney, K. and L.H. Rieseberg. Long-term natural selection and adaptive introgression in weedy sunflowers. (Rice University).
- Wiernasz, D.C. Antagonistic sexual selection, multiple mating and fitness in harvester ants.
- Wiernasz, D. and B. J. Cole. Determinants of lifetime fitness in the harvester ant *Pogonomyrmex occidentalis*.
- Zufall, R. and K. Spring. Fitness effects of a ciliate parasite on mosquito viability.
- Zufall, R. and Hongan Long. Life cycle dynamics of a marine free-living ciliate, *Glaucanema trihymene*.

RESEARCH PAPERS

The following research papers have been published or submitted for review during the past year by investigators working on research projects associated with the Coastal Center.

Callaway, R.M., Pennings, S.C. and C.L. Richards. Parasitic plants: Parallels and contrasts with herbivores. *Oecologia*, in press.

Charkraborty, A. 2007. Carbon 14 dating of the Chicot Aquifer Water, Texas Gulf Coast. Evaluation of a carbon 13 correction of carbon sources other than from calcite reactions. M.S. Thesis, University of Houston, Department of Geosciences, 139, 139 pp.

Clements, C.B., C. Haman, B. Lefer, and C. Beals (2008). Surface layer temperature structure observed at Summit, Greenland, *Eos Trans. AGU, Fall Meet. Suppl.*, Abstract A31G-0201.

Chen, S., X. Ren, J. Mao, Z. chen, W.H. Brune, B. Lefer, B. Rappengluck, J. Flynn, J. Olson, and J. H. Crawford (2009). A comparison of chemical mechanisms based on TRAMPS-2006 field data. *Atmospheric Environment*, doi10.1016/j.atmosenv.2009.05.027 (10 pp).

Cole, B.J., R. Edward, C.T. Holbrook, L. Holm, J. Heyward, and D.C. Wiernasz. 2008. Does foraging activity affect foraging success in the western harvester ant, *Pogonomyx occidentalis* (Hymenoptera:Formicidae)? *Annals of the Entomological Society of America* 101:272-276.

Cole, B.J., A. Smith, Z. Huber and D.C. Wiernasz. 2009. The temporal pattern of foraging activity in harvester ant colonies. *Behavioral Ecology* 21:337-342.

Corr, C.A., N. Krotkov, S. Madronich, J.R. Slusser, B. Holben, W. Gao, J. Flynn, B. Lefer and S. M. Kreidenweis (2009). Retrieval of aerosol single scattering albedo at ultraviolet wavelengths at the T1 site during MILAGRO. *Atmos. Chem.. Phys.*, 9, 5813-5827, 2009.

Craft, C., J. Clough, J. Ehman, S. Joye, R. Park, S. Pennings, G. Guo and M. Machmuller. Forecasting the effects of accelerated sea level rise on tidal marsh ecosystem services. *Frontiers in Ecology and the environment* 7:73-78.

- Crawford, K.M. and K.D. Whitney. 2010. Population genetic diversity influences colonization success. *Molecular Ecology*. 19:1253-1263.
- Collins, S.L., K.N. Suding, E.E. Cleland, M. Batty, S.C. Pennings, K.L. Gross, J.B. Grace, L. Gough, J.E. Fargione and C.M. Clark. 2008. Rank clocks and plant community dynamics. *Ecology* 89:3534-3541.
- Cooper, O.R., M. Trainer, A.M. Thompson, S.J. Oltmans, D.W. Tarasick, J.C. Witte, A. Stohl, S. Eckhardt, J. Lelieveld, M.J. Newchurch, B.J. Johnson, R.W. Portmann, L. Kalnajs, M.K. Dubey, T. Leblanc, I.S. McDermid, G. Forbes, D. Wolfe, T. Carey-Smith, G.A. Morris, B. Lefer, B. Rappengluck, E. Joseph, F. Schmidlin, J. Meagher, F.C. Fehsenfeld, T.J. Keating, R.A. Van Curen and K. Minschwaner (2007). Evidence for a recurring eastern North America upper tropospheric ozone maximum during summer. *Journal of Geophysical Research-Atmospheres*, 112, p. 1-12.
- Craft, C., J. Clough, J. Ehman, S. Joye, R. Park, S. Pennings, H. Guo, M. Machmuller. 2009. Forecasting the effects of accelerated sea level rise on tidal marsh ecosystem services. *Frontiers in Ecology and the Environment* 7:73-78.
- Degouw, J.A., S. Telintelhekkert, J. Melqvist, C. Warnake, E.L. Atlas, F.C. Fehsenfeld, A. Fried, G.J. frost, F.J.M. Harren, J.S. Holloway, B. Lefer, O.R. Lueb, J.F. Meagher, D.D. Barrish, M. Patel, O.L. Pope, D. Richter, C. Rivera, T.B. Ryerson, J. Samuelsson, J. Walega, P.A. Washenfelder, P. Weibring and X. Zhu (2009). Airborne Measurements of Ethene from Industrial Sources Using LaserPhoto-Acoustic Spectroscopy. *Environ. Sci. Technol.* 2009, 43, 2437-2442.
- DeWalt, S.J., E. Siemann and W.E. Rogers and H.N. DeSilva. 2007. Geographic distribution of genetic variation in introduced populations of Chinese Tallow Tree (36 pages, 6 figures, 2 tables, submitted).
- Flynn, J., B. Lefer, B. Rappengluck, M. Leuchner, R. Perna, J. Dibb, L. Ziemba, C. Anderson, J., Stutz, W. Brune, X. Ren, J. Mao, W. Luke, J. Olson, G. Chen, and J. Crawford. (2010). Impact of clouds and aerosols on ozone production in southeast Texas. *Atmospheric Environment*, doi:10.1016/j.atmosenv.2009.09.005.
- Haman, C.L., B.L. Lefer, M.E. Taylor, G. Morris, J.H. Flynn and B. Rappenglueck (2010). Overview of the Meteorological Conditions on High Ozone Days during SHARP. 90th Annual American Meteorological Society conference, 12th Atmospheric Chemistry, Paper 6A.2.
- Haman, C.L., B.L. Lefer, M.E. Taylor, G. Morris and B. Rappenglueck (2010). Comparison of Mixing Heights using Radiosondes and the Vaisala CL31 Mixing Height Algorithm. 90th Annual American Meteorological Society conference, 15th Symposium on Meteorological Observation and Instrumentation, Paper 5.4.

- Haman, C.B., B.L. Lefer, J.E. Dibb, L.G. Huey, J. Stutz, J. Liao (2009). Possible origin and production pathway for BrO at Summit, Greenland, AGU Fall Meet. Suppl., Abstract A21B-0136.
- Hartley, M., W.E. Rogers and E. Siemann. 2010. Comparisons of arthropod assemblages on an invasive and native trees: abundance, diversity and damage. (23 pages, 4 figures, 1 table). In press.
- Hennigan, C.J., A.P. Sullivan, C.I. Fountoukis, A. Nenes, A. Hecobian, O. Vargas, R.E. Peltier, A. T.C. Hanks, L.G. Huey, B.L. Lefer, A.G. Russell and R.J. webber. (2008). On the volatility and production mechanisms of newly formed nitrate and water soluble organic aerosol in Mexico City. *Atmospheric Chemistry and Physics*, 8, 3761-3768.
- Ho, C.K. and S.C. Pennings. 2008. Consequences of omnivory for trophic interactions on a salt-marsh shrub. *Ecology* 89:1714-1722.
- Ho, C-K. and S.C. Pennings. Preference and performance in plant-herbivore interactions across latitude-a study in U.S. Atlantic Coast salt marshes. *Journal of Ecology*, in review.
- Ho, C.-K., S.C. Pennings and T.H. Carefoot. 2010. Is diet quality an overlooked mechanism for Bergmann's Rule? *American Naturalist* 175:269-276.
- Huang, W., E. Siemann, G.S. Wheeler, J. Zou, J. Carrillo and J. Ding. In Press. Resource allocation to defense and growth are driven by different responses to generalist and specialist herbivory in an invasive plant (35 pages, 2 tables, 4 figures. *Journal of Ecology*.
- Hughes, Z. J., D. M. Fitzgerald, C. A. Wilson, S. C. Pennings, K. Wieski and A. Mahadevan. 2009. Rapid headward erosion of marsh creeks in response to relative sea level rise. *Geophysical Research Letters* 36, L03602, doi:10.1029/2008GL0336000.
- Kunza, A.E. and S.C. Pennings. 2008. Patterns of plant diversity in Georgia and Texas salt marshes. *Estuaries and Coasts* 31:673-681.
- Lefer, B. and B. Rappengluck (2010). The TexAQS-II radical and aerosol measurement project (TRAMP), *Atmos. Environ.*, doi:10.1016/j.atmosenv. 2010.05.053.
- Lefer, B., J.H. Flynn, C.L. Haman, B. Rappenglueck,(2010). Photochemical and meteorological relationships during the Texas-II Radical and Aerosol Measurement Project (TRAMO). *Atmos. Environ.*, doi:10.1016/j.atmosenv. 2010.03.011.
- Leuchner, M. and B. Rappengluck. 2009. VOC source-receptor relationships in Houston during TexAQS-II, *Atmos. Environ.*, doi:10.1016/j.atmosenv. 2009.02.029.

- Linsay, S.V., 2009. Sources of saline water contamination Chicot/Evangeline Aquifer of Brazoria, fort bend and Wharton Counties, using multi-element hydrochemical analyses. M.S. Thesis, University of Houston, Department of Geosciences, 107 pp.
- Luke, W.T., P. Kelley, B. Lefer, J. Flynn, R. Rappengluck, M. Leuchner, J.E. Dibb, L.D. Ziemba, C.H. Anderson, and Martin Buhr (2010). Measurements of primary trace gases and NO composition in Houston TX. Atmospheric Environment, doi:10.1016/j.atmosenv.2009.08.014.
- Luke, W.T., P. Kelley, B.L. Lefer and J.H. Flynn (2010). Measurements of Reactive Nitrogen Compounds (NO, NOX, NOY) during SHARP, 90th Annual American Meteorological Society Conference, 12th Atmospheric Chemistry, Paper 8.4.
- Maddocks, R.F., Machain-Castillo, M.-L., and F.R. Gio-Argaez. Ostracoda podocopa. In: D.L. Felder and D.A. Camp, Editors, Gulf of Mexico Origin, Waters and biota: Biodiversity, Volume 1, Texas A&M University Press. (this is the long-awaited Phase 1 of the Bulletin 89 50-year Update, Gulf of Mexico Biodiversity Project (coordinated by Harte Institute for Gulf of Mexico Studies in Corpus Christi).
- Marczak, L.B., C.-K. Ho, K. Wieski, H. Vu, R.F. Denno and S.C. Pennings. Latitudinal variation in top-down and bottom-up control of a salt marsh foodweb. Ecology, In review.
- Mao, J., X. Ren, S. Chen, W.H. Brune, Z. Chen, M. Martinez, H. Harder, B. Lefer, B. Rappengluck, J. Flynn and M. Leuchner (2009). Atmospheric oxidation capacity in the summer of Houston 2006: Comparison with summer measurements in other metropolitan studies. Atmospheric environment, doi:10.1016/j.atmosenv.2009.01.013.
- Marquart, E.S. and J.C. Pennings. Constraints on host use by a parasitic plant. Oecologia, In revision.
- Marquart, E.S. and S.C. Pennings. Diet mixing in a parasitic plant: adaption or constraint? Plant Ecology, in revision.
- Mellqvist, J., J. Samuelsson, J. Johansson, C. Rivera, B. Lefer, S. Alvarez, and J. Jolly (2010) Measurements of industrial emissions of alkenes in Texas using the solar occultation flux method. J. Geophys. Res. 115, D00F17, doi:10.1029/2008JD011682.
- McMillan, W.R., R. Pierce, L.C. Sparling, G. Osterman, K. McCann, M.L. Fischer, B. Rappenglueck, R. Newton, D.D. Turner, C. Kittaka, K. Evans, S. Biraud, B. Lefer, A. Andrews and Oltmans. (2010). An observational and modeling strategy to

investigate the impact of remote sources on local air quality: A Houston, Texas case study from TEXAQS II, *J. Geophys. Res.*, doi:10.1029/2009JDO11973.

Morris, G.A., B. Ford, B. Rappenglueck, M. Thompson, Ashley Meffert and B. Lefer. (2009). An evaluation of the influence of the morning residual layer on afternoon ozone concentrations in Houston using ozonesonde data. *Atmospheric environment* doi:10.1016/j.atmosenv.2009.06.057 (11 pp).

Nijjer, S., W.E. Rogers and E. Siemann. 2010. Impacts of fertilization on mycorrhizal allocation and effectiveness in Western Gulf Coast grasslands. *American Midland Naturalist* 163:124-133.

Olague, E.P., B. Rappengluck, B. Lefer, J. Stutz, J. Dibb, R. Griffen, W.H. Brune, M. Shauck, M. Buhr, H. Jeffries, W. Vizuete and J.P. Pinto (2009). Deciphering the role of radical precursors during the Second Texas Air Quality Study. *Journal of air and Waste Management association*, Vol. 59, No. 11, 1258-1277.

Olague, E.P., B.L. Lefer, B. Rappenglueck, J.P. Pinto, (2009). Observations of radical precursors during TexAQS II: Findings and Implications. *AGU Fall Meet. Suppl.*, Abstract A53E-05.

Olague, E.P., B.L. Lefer, B. Rappenglueck and J.P. Pinto (2010). Scientific and policy motivations behind the Study of Houston Atmospheric Radical Precursors (SHARP) field experiment. 90th Annual American Meteorological Society Conference, 12th Atmospheric Chemistry, Paper 6A-1.

Ortega, A.M., W.H. Brune, M. Cubison, B.L. Lefer, A. Schallharter, A. Metzger, M. Mueller, A. Hansel, J.L. Jimenez (2009). Characterization of potential aerosol mass using an oxidation chamber coupled to an aerodyne HR-ToF-AMS during DAURE, SHARP, and FLAME-3, *AGU Fall Meet. Suppl.*, Abstract A11D-0153.

Pennings, S.C. In press. Local and geographic variations in *Spartina*-herbivore interactions. *Proceedings of Spartina Conference*.

Pennings, S.C., C-K. Ho, C.S. Salgado, K. Wieski, N. Dave', A.E. Kunza, E.L. Wason. In press. Latitudinal variation in herbivore pressure in Atlantic Coast salt marshes. *Ecology* 90:183-195.

Pennings, S.C., and E.H. Borneman. In press. Indirect effects of interactions among species on coral reefs. In: Birkeland, C. (ed.) *Life and death of coral reefs*.

Pennings, S.C. and D.J. Moore. Variation in salt marsh primary production on multiple temporal scales. In review.

- Pennings, S.C., M. Alber, C.R. Alexander, M. Booth, A. Burd, W.-J. Cai, C. Craft, C.B. DePratter, D. Di Iorio, C. Hopkinson, S.B. Joye, C.D. Meile, W.S. Moore, B. Silliman, V. Thompson, J.P. Wares. South Atlantic Tidal Wetlands. In review. In A. Baldwin and D. Batzer (eds), *Wetlands Habitats of North America: Ecology and Conservation Concerns*.
- Pikelnaya, O.J., J. Stutz, D. Fu, J.H. Flynn, and B. L. Lefer (2009). Formaldehyde emissions from industrial facilities in Houston TX. AGU Fall Meet. Suppl., Abstract A11D-0168.
- Rappengluck, B., Dasgupta, P., Leuchner, M., Li, Q., and W. Luke. (2009) The origin and source apportionate of formaldehyde in the Houston-Galveston airshed. *Environ. Sci. Technol.*, submitted.
- Rivera, C., Mellqvist, J. Samuelsson, B. Lefer, S. Alvarez and M.R. Patel (2010). Quantification of NO₂ and SO₂ emissions from the Houston Ship Channel and Texas City industrial areas during the 2006 Texas Air Quality Study. *J. Geophys. Res.*, 115, DO8301, doi:10.1029/JDO12675.
- Rua, M.A., S.J. DeWalt, W.E. Rogers, J.W. Zou and E. Siemann. 2007. Variation in resistance to generalist insect and mollusk herbivores in chinese Tallow tree (*Sapium sebiferum*) populations. (17 pages, 1 table). Submitted.
- Rua, M.A., S. Nijjer, A. Johnson, W.E. Rogers and E. Siemann. 2007. Experimental approaches for testing allelopathy: a case study using the invader *Sapium sebiferum*. *Allelopathy Journal*, in press.
- Sharitz, R.R. and S.C. Pennings. 2006. Development of wetland plant communities. In: *Ecology of Freshwater and Estuarine Wetlands*, D. Batzer and R.R. Sharitz (eds). University of California Press. In Press.
- Stutz, J. H.-J. Oh, S.I. Whitlow, C. Anderson, J.E. Dibb, J.H. Flynn, B. rappengluck and B. Lefer (2009). Simultaneous DOAS and mist-chamber IC measurements of HONO in Houston TX. *Atmospheric Environment*, doi:10.1016/j.atmosenv.2009.02.003 (9 pp).
- Stutz, J., O. Pikelnaya, D. Fu, J.H. Flynn and B.L. Lefer. (2010). Imaging of point source emissions of HCHO and SO₂ in Houston TX, using Differential Optical Absorption Spectroscopy, 90th annual American Meteorological Society Conference, 12th Atmospheric Chemistry, Paper 7.2.
- Stutz, J., K.W. Wong, L. Lawrence, L. Ziemba, J.H. Flynn, B. Rappengluck and B. Lefer. (2009). Nocturnal NO₃ radical chemistry in Houston, TX. *Atmospheric Environment* doi:10.1016/j.atmosenv.2009.03.004 (8 pp).

- Taylor, M.E., G. Morris, B.L. Lefer, B. Rappenglueck, C. Haman and J. H. Flynn. (2010) SHARP climatology and its impact on ozone profiles, 90th Annual American Meteorological Society Conference, 12th Atmospheric chemistry, Paper 6A-3.
- Wang, Y., W. Huang, E. Siemann, J. Zou, G.S. Wheeler, J. Carrillo and J. Ding. In Press. Lower herbivory resistance and higher tolerance in invasive plants: biological control agents reach high densities but exert weak control of their host plants (35 pages, 2 tables, 4 figures, Ecological Applications).
- Wiernasz, D.C. and B.J. Cole. 2006. Optimal offspring size and reproductive allocation in the western harvester ant. (Submitted to American Naturalist).
- Wiernasz, D.C. and B.J. Cole. 2006. Assembling phenotypes: genetic diversity and disease resistance in harvester ants. (submitted to Science).
- Wiernasz, D.C., J. Hines, D. Parker, and B.J. Cole. 2007. Mating for variety increases colony activity in the harvester ant, *Pogonomyrmex occidentalis*. Molecular Ecology 17:1137-1144.
- Wiernasz, D.C. and B. J. Cole. 2009. Dioecy and the evolution of sex ratios in ants. Proceedings of the Royal Society of London B 209:2125-2132.
- Wiernasz, D.C. and B.J. Cole. 2010. Patriline shifting leads to apparent genetic caste determination in harvester ants. Proceedings of the National Academy of Sciences 107:12958-12962.
- Wieski, K., H. Guo, C. B. Kraft and S. C. Pennings. In revision. Ecosystem functions of tidal fresh, brackish and salt marshes on the Georgia Coast. Estuaries and Coasts.
- Wieski, K., H. Guo, C.B. Kraft and S.C. Pennings. 2010. Ecosystem functions of tidal fresh, brackish and salt marshes on the Georgia Coast. Estuaries and Coasts 33:161-169.
- Whitney, K.D., J.R. Ahern, L.G. Campbell, L.P. Albert, and M.S. King. 2010. Patterns of hybridization in plants. Perspectives in Plant Ecology, Evolution and Systematics. In Press.
- Whitney, K.D., R.A. Randall, and L.H. Rieseberg. 2010. Adaptive introgression of abiotic tolerance traits in the sunflower *Helianthus annuus*. New Phytologist 187:230-239.
- Wright, M.E., D.B. Atkinson, L. Ziemba, R. Griffin, N. Niranuma, S. Brooks, B. Lefer, J. Flynn, R. Perna and B. Rappenglueck (2009). Extensive Aerosol Optical Properties and Aerosol Mass Related Measurements during TRAMP/TexasAQS 2006- Implications for PM Compliance and Planning, Atmospheric environment doi:10.1016/j.atmosenv.2008.12.055 (10 pp).

- Yu X.-Y., J. Cowin, N. Laulainen, M. Jedema, B.L. Lefer, D. Anderson, D. Pernia, J.H. Flynn, and S.C. Herndon. (2010). Radical initiated secondary aerosol formation- Particle measurements during the 2009 TEXAQS, 90th Annual American Meteorological Society conference, 12th Atmospheric chemistry, Paper 9.2.
- Ziemba, L.D., J.E. Dibb, R.J. Griffen, C.H. Anderson, S.I. Whitlow, B.L. Lefer, B. Rappengluck, and J. Flynn (2009). Heterogeneous conversion of nitric acid to nitrous acid on the surface of primary organic aerosol in an urban atmosphere. *Atmospheric Environment*, doi:10.1016/j.atmosenv.2008.12.024 (9pp).
- Zou, J., W.E. Rogers and E. Siemann. 2007. Plasticity of *Sapium sebiferum* seedling growth to light and water resources: Inter- and intraspecific comparisons. *Basic and Applied Ecology*, in press.
- Zou, J., S.J. DeWalt, W.E. Rogers and E. Siemann. 2008. A trade-off between resistance and tolerance to native specialist beetles of the invasive plant *Sapium sebiferum*. *Ecogeography*, in press.

PAPERS PRESENTED

The following list includes meetings attended and papers presented by students and faculty working on research projects associated with the Coastal Center.

Ahern, J.R. and K.D. Whitney. Sesquiterpene lactone stereochemistry determines herbivore resistance in *Xanthium strumarium* (Asteracea). Ecology Society of America Annual Meeting, Albuquerque, NM August 2009.

Ahern, J.R., Whitney, K.D. Effects of sesquiterpene lactone stereochemistry on herbivore resistance in *Xanthium strumarium*. Gordon Research Conference: Plant-Herbivore Interactions. Galveston TX 2010.

Carrillo, J.A. and E. Siemann. Biographic pattern of induced, indirect defense in native and invasive populations of Chinese tallow tree, *Triadica sebifera*, ESA 2009, Albuquerque, NM.

Gabler, C. and E. Siemann. Impacts of management methods and native and exotic propagule availability on restoration outcomes in a formerly invaded freshland after three years. ESA 2009, Albuquerque, NM.

Gabler, C. and E. Siemann. Factors affecting recruitment of invasive Chinese tallow tree in restored wetlands: evidence of ontogenetic niche shifts and the effect of water regime, competition and nutrient availability, SWS, 2009, Madison, WI.

Guo, H., Pennings, S.C. and K. Wieski. 2008. Poster: Physical stress, plant productivity, competition, and diversity in Georgia tidal marshes. Coastal Habitats. 93rd Annual Meeting of the Ecological society of America, August 3-8, 2008, Milwaukee, Wisconsin.

Lawrence, J. R., Gedzelman, S. D. and K.P. Bowman. Ice core isotopes: do they reflect changes in storm activity (38th International Arctic Workshop, 5-7 March, 2008, U. Colorado, Boulder, Colorado).

Lawrence, J.R. and A. Dessler. (2008) Stable isotope of water vapor and climate change (AGU Chapman Conference on Atmospheric Water Vapor and its Role in Climate). Kilauea-Kona, Hawaii, 20-24.

Lawrence, J.R. and A. Dessler. (2008) Evaluation of the present and past hydrologic cycles in tropics using stable isotope measurements from the surface, aircraft and satellites (Special Session A29, National Meeting of the Fall American Geophysical Union) San Francisco, CA. December 15-19, 2008.

- Lawrence, J.R., Gedzelman, S., Noone, D., Grigsby, N., Sodemann, H. and A. Dessler. (2009) Is there a record of changes in the jet stream over Greenland in the isotopic composition of snow and firn at the Dye 2 and Dye 3 ice core sites that has been derived from water vapor produced by tropical cyclones? TES/NASA Meeting at the University of Colorado (February 23-25, 2009).
- Lawrence, J.R. et al. (2009) Do tropical cyclones provide a look at past changes in the late Summer jet stream from anomalously low stable isotope ratios in the Southern Greenland ice cores? (American Geophysical Union Fall Meeting, San Francisco CA, 14-18 December 2009). Abstract A13M-05.
- Lawrence, J.R. et al. (2010) More detailed isotopic and chemical sampling of Greenland ice cores combined with comprehensive evaluation may provide a record of changes in the polar jet stream (40th International Arctic Workshop, March 10-12, Winter Park CO).
- Lawrence, J.R. et al. (2010) Measuring sea spray changes in hurricanes via measurements of salt concentrations in rain using a salinity/conductivity sensor on a NOAA research aircraft. (American Meteorological Society Hurricane Conference, May 10-14, Tucson AZ).
- Lefer, B. L., B. Rappenglueck, E.P. Olaguer, W. Brune, J. Stutz, J.E. Dibb, X. Ren, S.C. Hernden, T.B. Jobson, G. Mount, X.Y. Xu, R. Griffen, S. Thomas, M. Shauck, L.G. Huey, R. Zang, and J.L. Jimenez. (2010). First results of the Study of Houston Atmospheric Radical Precursors (SHARP). American Meteorological Society, 12th conference on Atmospheric Chemistry Paper 9.1.
- Pennings, S.C. Latitudinal variation in plant-herbivore interactions. Entomology Department, Texas A&M, Galveston TX, March 5, 2009.
- Pennings, S.C. and A.E. Kunza. Patterns of plant diversity in Texas and Georgia salt marshes. Ninth Biennial State of the Bay Symposium. Galveston TX, Jan. 2009.
- Pennings, S.C., Buck, T.L. Lynes, A.R. and J.B. Grace. Poster: Centrifugal organization of vegetation in salt marsh plant communities. 2009, LTER All Scientists Meeting. 2009, Estes Park, CO.
- Ren, X., A. Rajendran, B. Rappenglueck, B. Lefer, J. Golovka, and J. Flynn. (2010). Measurement of HONO Flux using relaxed eddy accumulation during SHARP, 90th Annual American Meteorological Society conference, 12th Atmospheric Chemistry, Paper 169.

- Siemann, E., J. Carrillo, and J. Ding. Using resource competition models to predict the ability of biocontrol agents to limit the ecological success of their host plants. ESA 2009, Albuquerque, NM.
- Whitney, K.D. Hybridization, Evolution and Invasion: Implications for Resilience. 10th Annual Ecological Integration Symposium, "Resilience from genes to Ecosystems: Ecological, Evolutionary, and Social Perspectives on Sustainable Conservation", Texas A&M University, March 6, 2009.
- Whitney, K.D., J.R. Ahern, L.G. Campbell and L.P. Albert. Explaining hybridization propensity in plants. Ecology Society of America. Albuquerque NM 2009.
- Whitney, K.D. Evolutionary and genetic factors influencing species invasions. Rocky Mountain Biological Lab Seminar series, Gothic Co (29 June 2010).
- Wieski, K., Guo, H. and S. C. Pennings. 2008. Poster: Ecosystem functions of tidal fresh, brackish, and salt marshes. Estuarine, Coastal and Intertidal Systems. 93rd Annual Meeting of the Ecological Society of America, August 3-8, 2008, Milwaukee, Wisconsin.

RESEARCH GRANT APPLICATIONS

- Ahern, J.R. and K.D. Whitney. National Science Foundation Dissertation Improvement Grant DEB 1011661. DISSERTATION RESEARCH: Evolutionary ecology of defensive chemical variation in *Xanthium strumarium*. 2010-2012. \$14,982. Funded.
- Byun, D. and B. Rappengluck. 2007-2009. Studies of boundary layer processes in coastal and urban environments to improve meteorological simulations for Air quality assessment, Texas Air Research Center (TARC). \$144,708, funded.
- Cole, B.J. and D.C. Wiernasz. Mating for variety: activity and fitness in *Pogonomyrex* harvester ants. Program in Animal behavior, National Science Foundation, \$110,000, funded.
- Cole, B.J. and D.C. Wiernasz. Mating for variety: activity and fitness in *Pogonomyrex* harvester ants. National Science Foundation. REU supplement, \$6,000, funded.
- Cole, B. The effects of genetic variation and colony size on social homeostasis in the ant *Pseudomyrex pallidus*. Houston Coastal Center, \$5,570, funded.

- FitzGerald, D.M., A. Mahadevan, S. C. Pennings, and S. T. Petsch. ETBC: Collaborative Research: Biogeochemical and ecological controls on the geomorphological response of salt marsh to sea level rise. NSF. \$172,409 to UH. 2009-2012. Pending.
- FitzGerald, D.M., Z. Hughes, A. Mahadevan, S. Pennings. Marsh platform dissection as a response to sea level rise: physical mechanisms of erosion. DOE National Institute for ClimaticChange Research. \$28,000 to UH. 2010-2011.
- FitzGerald, D.M., A. Mahadevan, S.C. Pennings, S.T. Petsch. ETBC: Collaborative Research Biogeochemical and ecological controls on the geomorphological response of salt marsh to sea level rise. NSF. \$172,409 to UH. 2009-2012, Funded.
- Garby, M., D. P. Anderson and S. C. Pennings. CDI: Type II: Building cyberinfrastructure capacity for understanding plant ecosystems experiencing global change. NSF pre-proposal. 2009-2015. Declined.
- Granato, J., Cole, B.J. and D.C. Wiernasz. 2008-2013. Citizenship and Security. IGERT, National Science Foundation. (pending, preproposal selected as a finalist)
- Hollibaugh, T., Pennings, S.C., and M. Alber. GCE II: Georgia coastal ecosystems. National Science Foundation, \$4,920,000, November 2006-November 2012, funded.
- Huey, G., B. Lefer and B. Rappenglueck. Deployment of a Chemical Ionization Mass Spectrometer for measurements of CINO₂ and other species during the SHARP campaign. Texas Commission on Environmental Quality, \$49,983. April 2009-August 2009.
- Jiang, X., and B. Lefer. Comparison between an atmospheric chemistry model and observations for the second Texas Air Quality Study Period, NASA, \$92939, April 2009-April 2011.
- Johnsson, L., B. Rappengluck, and B. Lefer. Gulf Star Grid-Houston network of environmental towers (H-NET), EPA, 2007-2009, \$495,900, funded.
- Jurtshuk, P. Jr. and E. Marquardt. How do nitrogen fixing bacteria affect mycorrhizae-plant associations. Houston Coastal Center, \$10,410, funded.
- Jurtshuk, P. Studies on the Coastal Center nitrogen fixing Streptomyces isolates and their comparative acetyle reduction analyses. Houston Coastal Center, \$2,000, funded.
- Lawrence, J.R. and R. Maddocks. Study of climate change in the tropic using stable isotopes. Houston Coastal Center, \$9,000. Funded.
- Lawrence, J.R. A study of tropospheric water vapor using Aura measurements. NASA, \$150,000 (Joint with A. Dessler and K. Bowman, TAMU), \$150,000.

- Lefer, B. and B. Rappengluck. Nitrogen oxide (NO and NO₂) measurements and ozone photochemistry at the Houston Coastal Center. Houston Coastal Center, \$30,000, funded.
- Lefer, B. and B. Rappenglueck. Fort Bend Ozone Monitor Operations, Sugar Land Campus, Texas Commission on Environmental Quality. \$135,000. March 2009-May 2010.
- Lefer, B., L. Johnsson and B. Rappenglueck. Ozone and carbon monoxide monitor operations, University of Houston Sites (PGA No. 582-5-64594-FY10-12), Texas Commission on Environmental Quality, \$125,000, March 2010-March 2011.
- Pennings, S.C. Plant species richness and productivity in Texas tidal marshes. Environmental Institute of Houston. \$14,990. Funded.
- Pennings, S.C. and E.S. Marquardt. Does overwintering success of a parasitic plant determine its home range? Houston Coastal Center, \$13,750, Funded.
- Pennings, S.C. 2006. Collaborative proposal: Latitudinal variation in top-down and bottom-up control of salt marsh herbivores. National Science Foundation. January 2007-December 2009. \$159,000. Funded.
- Pennings, S.C. Anthropogenic effects on top-down and bottom-up regulation of community structure: eutrophication and salinity stress. NOAA. National Estuarine Research Reserve fellowship for Juan Jimenez. \$40,000. 2007-2009. Funded.
- Pennings, S. C., C. Alexander, M. Alber, V. Thompson, and C. DePratter. Ecological legacies of historic human activity on the Southeastern US coast over the past 4,500 years. NSF. \$934,149 total. 2009-2012. Declined.
- Pennings, S.C. RAPID Deepwater Horizon Oil Spill: Insights into salt marsh food webs from the Deepwater Horizon oil spill. NSF. \$131,115. 2010-2011. Funded.
- Siemann, E. and W.E. Rogers (1/1/06-12/31/10) A long-term experimental deletion of a dominant invasive plant: responses of a southeast forest ecosystem, National Science Foundation, \$310,160. Funded.
- Siemann, E. REU supplement: Aboveground and belowground enemies and the invasion success of plants: experimental tests in the US and China”, NSF, \$15,000, 5/15/10-4/30/11.
- Siemann, E. DISSERTATION RESEARCH: Predicting restoration outcomes in exotic-invaded ecosystems, NSF, \$15,000, 6/1/09-5/30/11.

- Siemann, E. Aboveground and belowground enemies and the invasion success of plants: experimental tests in the US and China., NSF, \$445,925, 2008-2012., funded. (Rice University)
- Whitney, K.D., and L.H. Rieseberg. 2007-2012. Long-term natural selection and adaptive introgression in weedy sunflowers. National Science Foundation, \$577,527, funded. (Rice University).
- Whitney, K.D. 2009. National Science Foundation REU supplement to DEB 0716868, \$7,475, funded.
- Whitney, K.D. Effects of sesquiterpene lactone stereochemical variation on herbivore resistance across the Asteracea. National Science Foundation REU supplement to DEB 0716868. 2010. \$7,000.
- Wiernasz, D.C. and B.J. Cole. Genetic diversity and disease transmission. Texas Coordinating Board Advanced Research Program. \$200,000, funded.
- Wiernasz, D. Genetics of reproductive conflict. Texas Coordinating Board, Advanced Research Program. \$147,093. Funded.
- Weirnasz, D. Interdisciplinary research in behavioral biology. NSF. \$728,202, Pending.
- Wiernasz, D. The effect of age on task sensitivity in workers of *Pseudomyrmex pallidus*. Houston Coastal Center, \$5,705, funded.
- Wiernasz, D. Undergraduate research mentoring in behavioral biology. 2009-2014. NSF \$845,000, pending.
- Zufall, R. and K. Spring. Fitness effects of a ciliate parasite on mosquito viability. Houston Coastal center, \$5,705, funded.

4. IMPROVEMENTS MADE

The Coastal Center Research Lab (BLDG. # 752), with 900 square feet of space, was constructed in 1968 to house the ionospheric radio wave propagation experiments. This building now serves a variety of research projects. A new roof was installed in FY2003. A 10 x 40 foot trailer and a 42-m micrometeorological flux tower and several other measurement platforms were purchased and installed immediately east of BLDG. #752 in 2005. They serve as the air chemistry lab and boundary layer measurement facilities for the Institute of Multi-Dimensional Air Quality Studies at the University of Houston..

The Coastal Center Environmental Laboratory (BLDG. # 751), with 2,700 square feet of space, was constructed in 1969. This building contains laboratories, offices, and various support rooms for scientific research. A new roof was installed in FY 2003. An upgrade of the lighting system and new drop ceiling was completed in 2005.

The Coastal Center Equipment Storage (BLDG. # 753), with 3,000 square feet of space, was constructed in 1972. This building houses a shop and storage for field equipment. The south wall siding of the shop was replaced in FY 2003. A concrete slab work area was installed in 2005.

The Caretakers Mobile Home (BLDG. # 754), was replaced in FY 2003 with a new 1,100 square foot mobile home.

A new greenhouse was constructed in the fall of 2003 on the site where building #755 was located.

A sea-land container with Arctic sea floor rock collections was placed on the concrete slab near the south water well and a metal building which will serve as laboratory space for research on the collection was purchased and erected next to the container in 2007.

5. MAINTENANCE.

A full-time resident caretaker and temporary employees perform routine maintenance of the buildings, equipment, and fence lines around the property. A

regular program of roadside and property line mowing has been established. The caretaker is responsible for security and vehicular traffic control. The University of Houston Plant Operations is on call for maintenance of utilities and major road repairs.

6. ENCUMBRANCES.

The Deed to this property reflects that conveyance was made and accepted subject to certain easements. These include an easement granted to Houston Lighting and Power Company, which runs to June 28, 2004; a pipeline easement to Trunkline Gas Company; and easements to public roads and highways, public utilities, railroads and pipelines existing prior to December 28, 1942, when the land was acquired by the Federal Government by condemnation.

Oil and gas deposits in and upon this land were conveyed to the Department of Interior by Public Land Order 1062, dated February 2, 1955, and were subsequently conveyed to various individuals and oil companies for the purpose of removing said oil and gas.

Houston Oil Producing Enterprises, Inc. (HOPE) presently operates a stripper well and a tank farm on the P. Gayatt survey A-71, Galveston County, TX. Houston Oil Producing Enterprises, Inc. drilled No. 3 Camp Wallace in 1986. Drilling terminated at 9,560 feet, the hole was plugged, and the site was abandoned. Houston Oil Production Enterprises, Inc. (HOPE) was granted permission in 2002 to drill Camp Wallace Well No.4, P. Gayatt Survey A-71, Galveston County, TX. The well was put into production in the spring of 2004.

The Daniels Corporation was granted a surface lease agreement for \$600/year on a 370' x 220' tract of University property in Fall 1993. Federal Gayatt #2 was drilled to 9,600 feet and placed in oil production. Holding tanks were constructed on the surface lease.

The Daniels Corporation was granted permission to drill Federal Gayatt #3 on the same site occupied by Federal Gayatt #2. The well was slant-drilled to a depth of 9,050 feet and placed into production in 1998. Federal Gayatt #3 was taken out of production in 1999. HillCorp Energy Company purchased the Daniels Corporation in 2000 and Federal Gayatt #3 was plugged in 2003.

The Board of Regents for the purpose of maintaining the North-South drainage system through the property granted an easement in 1992 to the City of La Marque. A section of the ditch extending from the north fence line to the first road crossing was improved at the expense of Gulf Greyhound Partnership, Ltd.

The University granted Galveston County Drainage District No. 2 a lease to improve and maintain the East-West and North-South drainage through the Coastal Center property in spring 1994. This lease supersedes and extends the lease granted to the City of La Marque. Phase one of the proposed ditch was completed in 1998. Phase two, widening of the channel to its final width and depth, began in April 1999. This project continues.

The University granted Texas-New Mexico Power Company a 5' x 30' electric utility easement out of Lot 1, Share H of the P. Gayatt Survey in 1993.

The University of Houston System Board of Regents donated 2.019 acres of land in the northwest corner of the Coastal Center property to the Texas Department of Transportation for a right-of-way easement for FM 1764 in 1997. The Department of Transportation completed construction of a low-water crossing on the drainage ditch south of FM 1764 and relocated the new right-of-way fence line in 1999 as a condition of the donation of land.

HillCorp Energy Company and Houston Oil Production enterprises, Inc. resurfaced the roadbed from the entrance gate to their production facilities in 2004. The roadbed was regraded, packed and oiled in August, 2005.

The University of Houston granted Hillcorp Energy Company a 5' wide, 4,851' long pipeline easement extending from the northwest corner of the Coastal Center to the southern property line on April 14, 2005.

7. CIVIL RIGHTS.

The University is in full compliance with Title VI of the Civil Rights Act of 1964 (PL88-352) and all requirements imposed by or pursuant to the Regulation of the Department of Education regarding the Camp Wallace Property.

COASTAL CENTER BULLETIN

The Coastal Center Bulletin is an official publication of the University of Houston and provides for publication of original work which is not published elsewhere and which contributes to those research or educational activities which (a) stimulate the improvement of the declining environmental quality of urban coastal areas, (b) investigate and guide man's use and development of near-urban coastal areas consistent with conservation and sound environmental management, (c) seek to obtain basic knowledge of coastal environment, and (d) provide for broadly- or specially-educated leadership for these important phases of American life.

Priority is given to (1) Annual Report of the Coastal Center, (2) preliminary summary reports of papers where publication will be delayed by backlogs in major journals, (3) instructional materials, (4) papers which summarize data that provide potential baselines to future and to continuing research, and (5) papers which summarize data normally not published in research journals because of page limitations and page charges.

GLENN D. AUMANN
EDITOR