Review of UH Academic Centers and Institutes for FY 2017

For the period September 1, 2016 to August 31, 2017

Information and Contacts:

Center or Institute Name: University of Houston Coastal Center

Year Established: early 2017 as a College-Level Academic Center; was originally constituted as a Research Institute in 1968.

Website Address (url): http://www.uhcc.uh.edu/

Director and Assistant Director:

Name and Title:	Steven Pennings, Professor Director	Guoquan Wang, Associate Professor Assistant Director
Campus Address:	321F, SR 2	231, SR 1
Telephone:	713-743-2989	713-743-3224
Email Address:	spennings@uh.edu	gwang@uh.edu

Planning unit head for the center/institute (i.e., department chair, college dean, or SVPAA/P):

Name and Title:	Dan Wells, Dean of NSM
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Submitted by:

Steven C. Pennings		1/15/2018
Name	Signature	Date

Introduction and historical context

The University of Houston Coastal Center (UHCC) was formally established by President Hoffman in 1968. Until 2014, it operated as a research institute reporting to the OVPR. In 2014 it began reporting to the Dean of NSM. At the same time, an audit revealed that the original UHCC center paperwork from 1968 had been lost. A proposal to (re-)create the UHCC as an academic center reporting to the Dean of NSM was approved by the Provost in early 2017.

B. Goals and objectives

The goals of the UHCC are to 1) develop a facility that meets the needs of environmental educators for field courses and informal educational activities, 2) develop a facility that meets the needs of environmental scientists for field sites, equipment and facilities, 3) develop a facility that provides the unique opportunity for environmental service activities benefitting Houston, Texas and the nation, and 4) foster productive collaborations among those using the UHCC.

The primary objectives over recent years have been to 1) increase the number of faculty utilizing the UHCC for education, research or service, 2) diversify the user base among multiple departments and colleges, 3) increase the number of academic courses using the UHCC, 4) hold annual meetings of advisors and users to foster interactions centered on the UHCC, and 5) develop a new funding and strategic plan that provides long-term stability for the operations of the UHCC.

C. Mission

The primary mission of the UHCC is to support environmental education, research and service on the Texas coast by providing users with access to environmental field sites, equipment and facilities.

The UHCC is the only field laboratory serving the University of Houston. It provides a unique and essential facility for faculty doing environmental education, research, and service, because it provides large areas of land (~1,000 acres) where equipment or experiments can be deployed, it provides access to a highly-endangered natural habitat (pristine coastal prairie), and the equipment and experiments are fairly secure because the UHCC property is partially fenced and has a caretaker who lives on site.

By preserving a large stand of pristine coastal prairie, the UHCC is also serving the nation at large. Coastal prairie is a highly endangered habitat (less than one tenth of one percent remains), and the prairie at the UHCC is one of the highest quality prairies (as assessed by plant diversity) in the nation. Conservation organizations and State and Federal agencies are aware of the conservation value of the prairie at the UHCC, and desire the long-term stability of the property.

The UHCC provides an ideal location for field courses taught by several UH departments, including Architecture, Biology and Biochemistry, Earth and Atmospheric Sciences (EAS), and Science Education, and for courses taught by other institutions in the Houston metropolitan area. The UHCC provides access to equipment and field sites coupled with

immediate access to an air-conditioned building that has laboratory space and restrooms. Work can be done outside, but it is easy to retreat inside if rain or high temperatures require it.

The UHCC provides an ideal location for future field courses in Petroleum Engineering and Oil&Gas Exploration, because we host wells from two oil companies on our property. Several faculty members at the EAS department currently offer field trips related to seismic survey and environmental studies in the UHCC campus. The EAS department offers the two-week-long UH Geophysics Field Camp at UHCC, which is a core course for UH geophysics majors. The UH Geophysics and Seismology program was ranked as the most popular (No. 1) geophysics and seismology program in the United States by both Geology Schools and Campus Explorer, two prestigious ranking groups. The field teaching at UHCC has become a fundamental component of the UH geophysics and seismology program. The UHCC also provides open and safe space for research and training activities using unmanned aerial vehicle (UAV) techniques. Faculty members from the Allied Geophysical Laboratory (AGL) at EAR department, the National Center for Airborne Laser Mapping (NCALM), and the Department of Civil and Environmental Engineering are testing their UAV-born survey sensors and methods in UHCC.

Finally, the UHCC provides a unique venue for outreach and service activities related to the environment. In particular, we work closely with groups that are restoring coastal prairie habitat by providing a seed supply. The high diversity of the vegetation at the UHCC makes seed from our facility more desirable for restoration than seed from other prairie sites.

Few of the activities conducted at the UHCC could be moved to other UH properties, and the natural habitat itself is irreplaceable.

D. Metrics

When the current reporting period (September 1, 2016 – August 31, 2017) started, the UHCC was in a period of administrative uncertainty. Our two over-riding goals were to **1) gain formal status as an Academic Center** and **2) gain formal recognition from the Texas legislature**. Both of these goals were achieved. The UHCC was approved by the Provost as an Academic Center reporting to the Dean of NSM early in 2017, and was designated by the Texas Legislature and Governor as the Texas Institute for Coastal Prairie Research and Education in June of 2017 (House Bill 2285).

With these two foundational steps completed, we are now poised to work with the NSM Dean to develop a new strategic plan that will address the coming five-year period and appropriate metrics. For the moment, we are broadly tracking education, research, and service activity as our metrics.

E. UH Personnel and Units

1. List of participants.

For each senior participant below, we indicate whether they are a UHCC “member” or “user” as specified by our bylaws, and their level of activity. The UHCC currently has 15 members, defined as UH faculty who direct some IDC from funded projects to the UHCC.

College of Natural Sciences and Mathematics

Department of Earth and Atmospheric Sciences

Robert Stewart (geophysics research and education, UAV test). Member, active.
Guoquan Wang (geophysics research and education, GPS and LiDAR Survey, UAV test). Member, active.
James Flynn (atmospheric science research and education). Member, active.
Bernhard Rappenglueck (atmospheric science research). User, active.
Jon Snow (geological research). User, stores geology samples at UHCC.
Regina Capuano (hydrology research and education). Member, inactive.
Shuhab Khan (geoenvironmental field course). User, no activity this year.
Robert Talbot (atmospheric sciences). User, no activity this year.

Department of Biology and Biochemistry

Ann Cheek (ecology education). Member, active.
Kerri Crawford (ecology research). Member, active.
Angela Laws (ecology research). Member, active.
Steven Pennings (ecology research). Member, active.
Diane Wiernasz (evolution research). Member, no activity this year.
Larry Williams (ecology education). Member, active.

Cullen College of Engineering

Leon Arturo (flood control). Member, active.
Debora Rodriguez (microbial ecology). Member, active.
Saurabh Prasad (remote sensing). User, seeking opportunities.
Christopher Chung (control of exotic species). User, seeking opportunities.
Kostarelos Konstantinos (sensor technology). User, seeking opportunities.
Miao Pan (sensor networks). User, seeking opportunities.
Lawrence Schulze (control of exotic species). User, seeking opportunities.
Petroleum Engineering program. Interest in two active oil wells on UHCC property.

College of Architecture

Patrick Peters (Architecture education). Member, active.
Bruce Race (Sustainability education). Member, seeking opportunities.

College of Education

Wallace Dominey (environmental education for K12 teachers). User, active.
John Ramsey (environmental education). Member, open to opportunities.
Sissy Wong (environmental education). User, open to opportunities.

2. Effectiveness.

The UHCC is providing a valuable resource to faculty in NSM, with use for education, research, and outreach steadily increasing. There is strong interest from Engineering in the UHCC, and this interest should turn into increased activity in the next few years as these faculty

(many of whom are new at UH) obtain external funding and develop relevant courses. Faculty in Architecture have taught courses using the UHCC. Faculty in Education are open to opportunities for working at the UHCC, but activity to date has been very modest.

F. Outside Agencies or Populations

1. List of participants.

For each senior participant below (all are by definition "users" rather than "members"), we indicate their level of activity.

Academic

Rice University: Evan Siemann (ecology research). User, active.

San Jose State University: Craig Clements (fire research). User, working on a manuscript based on work at the UHCC.

Texas A&M: Charles Criscione (parasite life history research). User, not active this year.

University of Dayton. Chelse Prather (ecology research). User, active.

University of Houston Downtown: Michael Tobin (environmental education). User, active.

University of Houston Clear Lake: Rowena McDermid (conservation). User, active.

University of New Mexico: Jennifer Rudgers (plant ecology research). User, active.

University of New Mexico: Ken Whitney (experimental evolution research). User, active.

University of Texas, Austin. Edward LeBrun (exotic species research). User, active.

University of Texas Rio Grande Valley. Christopher Gabler (ecology research). User, no activity this year.

Agency

NASA: Barry Lefer (atmospheric science research). User, collaborates with UH atmospheric science group.

Harris-Galveston Subsidence District (HGSD, https://hgsubsidence.org). User, collaborates with UH Houston GPS Network (HoustonNet) for subsidence monitoring with the Houston metropolitan area. There are four permanent GPS stations and three groundwater monitoring stations within the UHCC campus, which have been integrated into the subsidence monitoring network operated by HGSD.

Conservation

Native American Seed: seed harvests. User, active.

Coastal Prairie Partnership: Jaime Gonzalez (restoration, conservation, education). User, active.

Katy Prairie Conservancy: Lan Shen (restoration research, conservation, education). User, active.

Texas Master Naturalists: seed harvests. User, active.

2. Effectiveness.

The UHCC is providing a valuable resource to a number of outside groups. In particular, we provide a valuable research site for several NSF-funded projects from outside universities, and a valuable source of seed for prairie restoration in Texas and Louisiana. We have developed a collaboration with the Coastal Prairie Partnership focused on the "Shasta's Prairie" on the UH main campus. This is a small restored prairie that is both a resource in its own right for education, and an advertisement for the UHCC. There is strong community interest in the UHCC, and we would be able to do considerably more outreach activities than we currently do if we had more staff.

G. Role of the Institute

1. University populations. The UH Coastal Center serves a number of UH faculty, primarily in NSM, who need the space or habitats uniquely provided by the UHCC (Section E).

2. Community populations. The UHCC serves educational and conservation organizations in the Texas and Louisiana area by providing tours and seed for prairie conservation (Section F).

3. Geographic region. The UHCC serves faculty in the Houston area and nationally who need the space or habitats provided by the UHCC (Section F). The UHCC serves the nation by conserving a pristine parcel of high-quality coastal prairie, a habitat type that is highly endangered (Section C).

4. Other units. The UHCC is the only field laboratory serving the University of Houston. Few of the activities conducted at the UHCC could be moved to other UH properties, and the natural habitat itself is irreplaceable.

5. Role of Students. Graduate and undergraduate students are active at the UHCC through the research programs in faculty laboratories, and through courses that utilize the UHCC.

H. Anticipated Changes

1. Size.

Pennings and Wang are continuing to recruit new faculty to conduct education, research, and service activities at the UHCC. There is room to expand all these activities within the current footprint of the facility.

The UHCC was awarded deferred maintenance funds in 2017 to renovate the bathrooms which are currently not ADA compliant. Plans have been drawn up and work is expected to begin early in 2018.

The UHCC suffered minor damage from Hurricane Harvey, with minor flooding in several buildings. The damage has been repeatedly inspected, and we are hopeful that some repairs will be made in 2018.

Pennings, Leon and Louie submitted a FSML (Field Stations and Marine Laboratories) proposal to NSF in December 2017 to support a wetland facility at the UHCC. This proposal is currently pending.

Shasta's Prairie, a small prairie restoration on the UH main campus, has proven valuable for education and service. During the next five years we will discuss the possibility of expanding Shasta's Prairie with the Dean of NSM and the relevant UH staff.

2. Budget.

Now that the UHCC has been approved as an Academic Center and recognized by the Texas Legislature, we will work with the NSM Dean to develop a new five year strategic plan for the UHCC that reflects our new reporting structure and provides long-term stability for the UHCC.

3. Administrative structure and governance.

In 2017 we began formally tracking UHCC members as specified by our new bylaws. We expect no changes to our administrative structure in the next five years.

4. Mission and goals.

We expect no changes to our mission and goals in the next five years.

5. New metrics.

We expect to develop formal metrics as part of our new strategic plan.

I. Current Measures of Performance

1. Personnel.

Faculty. We officially began tracking UHCC members in 2017 as specified by our new bylaws. We currently have 15 members and 30 users (listed in section E).

Staff. The UHCC has a single full-time staff person (Mr. Tim Becker) who is responsible for maintenance, security, grounds-keeping, janitorial duties, and providing logistical support to research operations.

Postdoctoral fellows. We will begin tracking postdocs in 2017-2018.

***Doctoral students*.** We began tracking graduate students in 2016-2017.
Tianjiao Adams, Ph.D. Biology, UH.
Carl Buist, Ph.D., fiber-optic sensing, EAS, UH.

Timothy J. Kearns, Ph.D., EAS, University of Houston.
Xiong Lin, Ph.D., EAS, University of Houston.
Xing Zhou, Ph.D., EAS, University of Houston.

Hannah Locke, PhD, Biology and Biochemistry, UH
Noah Luecke, PhD, Biology and Biochemistry, UH
Josh Lynn, PhD, Biology, UNM
Michael McClimans, Ph.D., EAS, UH.
Ryan Reihart, PhD, University of Dayton.

Masters students.

Meghan DiBaco, M.S., EAS, University of Houston.
Jennifer Welch, M.S., EAS, University of Houston.
Elena Ermolaeva, M.S., EAS, University of Houston.
Anna Hawkins, 2016, MS, Effects of water availability on plant coexistence through altered plant-microbes interactions, Biology and Biochemistry, UH
Emily Jones, MS, Department of Biology, University of Dayton.
Dongje Li, 2016, Aquifer compaction at different depths: observations from a vertical GPS array at the University of Houston Coastal Center, Texas. M.S. Thesis, Department of Earth and Atmospheric Sciences, University of Houston.
Abby Ross, M.S., EAS, UH.

Undergraduates. We will begin tracking undergraduates by name in 2017-2018. We report undergraduate user days below (Section I.8).

2. Funding.

Category	**2016-2017 income**	**Comments**
OVPR	$15,000	
NSM	$40,000	
EAS	$5,000	
BIO	$5,000	
User fees	$600	Variable among years
IDC return	$3,390	Variable among years.
Seed sales, beekeeper	$1,829	Highly variable among years.
Donations	$350	
Total	**$71,169**	

3. Contracts and Grants.

The UHCC does not directly receive grants; rather, faculty with grants through their departments work at the facility. A list of awards for projects active at the UHCC follows. This includes 6 state-funded and 4 federally-funded projects to UH investigators.

Awards Active during 2016-7 (grants from UH investigators total $2,649,538)

PI: Kerri Crawford. Sand dune restoration: Do plant diversity and soil microbial amendments enhance ecosystem services? Texas Sea Grant: 1/2016 to 1/2018, $238,600.

PI: James Flynn (100%), "Characterization of Background PM2.5 and NOx north of the Houston Metropolitan Area", Texas Commission on Environmental Quality [$489,000] February 2015 – April 2018.

PI: James Flynn (100%), "Monitoring related to Ozone Formation in and Ozone and Particulate Matter Transport into the Houston Region", Texas Commission on Environmental Quality [$280,000] March 2016 – September 2017

PI: Angela Laws. Senior personnel: CM Prather, M Strickland, J Jonas, D Bransen, A Joern, S Pennings. Is a diverse grasshopper community beneficial to the health and functioning of rangeland ecosystems? USDA. 2015-2018. $150,000.

PI: Chelse Prather. Pennings is Senior Personnel and UH subcontract lead. Are micronutrients important in structuring plant and herbivore communities? A test in coastal tallgrass prairie. NSF. 2015-2018. $271,662 to UH.

PI: Steven Pennings and Anna Armitage. Mangroves are invading Texas salt marshes: what are the consequences? Texas Sea Grant. $176,603. 5/2014-4/2016, with two 1-year no cost extensions.

PI: Merryl Alber, Steven Pennings. LTER: Georgia Coastal Ecosystems III. National Science Foundation. $5,880,000. UH budget $292,021. 2012-2018.

PI: Guoquan Wang. Title: TUES (Transforming Undergraduate Education in Science, Technology, Engineering and Mathematics): Integrating GPS and LIDAR into geosciences education. Sponsor: NSF. Project period: October 1, 2013—September 30, 2016. Total Award: $168,187.

PI: Guoquan Wang. Title: Houston GPS Data Processing and Subsidence Monitoring Center, funded by the Harris-Galveston Subsidence District, $220,000 ($55,000 annually). Project period: January 1, 2016---December 30, 2019.

PI: Robert Stewart. TCEQ-sponsored Subsea Seismic Institute research project for fiber-optic sensing ($298,878)

PI: Robert Stewart. NSF RAPID grant on Hurricane Harvey sediment deposits ($64,587).

PI: Ken Whitney, Loren Rieseberg. National Science Foundation DEB 1257965. Repeatability and genetic architecture of adaptive introgression: a long-term experimental evolution study in sunflowers (not included in UH total funding).

PI: Jenn Rudgers. National Science Foundation. Collaborative Research: Parsing the effects of host specificity and geography on plant-fungal symbioses under climate change. Rudgers, J.A.; Collins, S.; Porras-Alfaro, A.; Jumpponen, A.; Herrera, J. 09/01/2015 - 08/31/2019. $406,134 to UNM, $1,089,436 total (not included in UH total funding).

PI: Ryan Reihart (graduate student). Prairie Biotic Research Grant. $1,000 to University of Dayton. (Not included in UH total funding).

Pending Awards

PIs: A. Bezbaruah, S. Seal, D. Rodrigues, L. R. Pokhrel, R. Brueggeman, K. M. Crawford, S. Duranceau, K. Katti, D. Katti, A. Leon, E. R. McKenzie, W. Nganje, A. Ronen, M. Quadir, C. Vogiatzis. United States Department of Agriculture, Next-generation hydroponics and alternative water sources for urban and peri-urban agriculture. NIFA Water for Food Productions Systems, Integrated Project. ($5.2 million)

PI: K. M. Crawford, National Science Foundation, Testing how interactions between plants and soil microbes influence plant community structure in a changing climate. Division of Environmental Biology, Population and Community Ecology Cluster ($647,023)

PI: James Flynn (100%), "Monitoring related to Ozone Formation in and Ozone and Particulate Matter Transport into the Houston Region", Texas Commission on Environmental Quality [$224,237] November 2017 – January 2019

PI: James Flynn (100%), "Characterization of Background PM2.5 and NOx north of the Houston Metropolitan Area", Texas Commission on Environmental Quality [$180,000] December 2017 – June 2019.

PI: Bernhard Rappenglueck, "BLIMA-highRes [Boundary Layer Study combining an Integrative Measurement Approach and high Resolution WRF-LES Modeling]", National Science Foundation (NSF) [$389,774.00], March 01, 2017 – February 28, 2019

PI: Bernhard Rappenglueck, co-PI: Yunsoo Choi "Improved Description of the Planetary Boundary Layer Height", Earth and Atmospheric Science - Research Grant (EAS-RG) [$28,378.00], January 01, 2017 – December 31, 2017

PI: Steven Pennings, Co-PIs: Arturo Leon, Stacey Louie. Wetland facility for the University of Houston Coastal Center. NSF FSML.

PI: Steven Pennings. RAPID: Collaborative Research: Do mangroves provide better coastal protection than salt marshes? A Hurricane Harvey case study from Port Aransas, Texas, USA. (This project was funded but after the current reporting period).

PI: Steven Pennings. The effects of shifting coastal wetland plant communities on the food webs that support coastal living resources. Texas Sea Grant.

PI: Steven Pennings. A functional trait-based approach to grassland community ecology. UH GEAR.

PI: Steven Pennings. Collaborative Research: Ecosystem responses to changes in foundation species: Do effects vary across trophic levels? NSF

4. Expenditures.

The UHCC does not have a business manager and relies on staff in the department of Biology and Biochemistry to handle our accounts. We are currently not able to recompense the department for this service. Major expenses were funding for the UHCC caretaker, who provides grounds-keeping, maintenance, security, janitorial and research services, various expenses related to maintenance of the facility, and matching or seed funding for research projects.

Category	2016-2017 Expenditures	Comments
Salary	$37,171	UHCC caretaker (Tim Becker)
Fringe	$13,647	UHCC caretaker (Tim Becker)
M&O	$12,272	Maintenance expenses, modest matching or seed funding for research projects.
Travel	$275	Matching or seed funding for research projects.
Total	**$63,365**	

5. Publications and Presentations.

Below we list publications from 2015-2017.

In review or in press

Aziz, A., R.R. Stewart, and S. Green, Effect of GPR antenna frequency on near-surface imaging: To be submitted to J. Measurement.

Cheek, A. O. In press. Estimating fish population size using a mark-recapture technique. Article in: McMahon, K. ed. Tested studies for laboratory teaching. Volume 38. Proceedings of the 38th Conference of the Association for Biology Laboratory Education (ABLE). http://www.ableweb.org/proceedings/index.php

Cuchiara G.C., Rappenglück B. Analysis of a Large-Eddy Simulation of the Planetary Boundary Layer in the Houston-Galveston area, Texas, Environ. Fluid. Mech., submitted

Cuchiara G.C., Rappenglück B. Single-Column Model and Large Eddy Simulation of the Evening Transition in the Planetary Boundary Layer, Environ. Fluid. Mech., in revision

Cuchiara G.C., Rappenglück B. Simulating the influence of convective decay parameterization for a case study in Houston, TX, Texas, Atmos. Environ., submitted

Henriksen JW*, Lim DS*, Lu X, Ding JQ, Siemann E. Strong effects of hydrologic environment and weak effects of elevated CO2 on the invasive weed *Alternanthera philoxeroides* and the biocontrol beetle *Agasicles hygrophila* (24 pages, 3 tables, 4 figures)

Kearns T. J., Wang G., Turco M., Welch J., and Tsibanos V. (2017). Houston16: A stable geodetic reference frame for subsidence and faulting study in the Houston metropolitan area, Texas, U.S. Geodesy &Geodynamics (In Review, Submitted in August 2017)

Kent, Dylan R. Kent, Joshua S. Lynn, Steven C. Pennings, Lara A. Souza, Melinda D. Smith, Jennifer A. Rudgers, Biogeographical Assessment of Herbivore Damage Among Dominant Grasses of the North American Great Plains. In review.

A Laws, D Branson, and CM Prather. *In review.* Orthoptera functional richness is a better predictor of herbivore effects on primary production than species richness in three grassland sites. Journal of Animal Ecology.

Prather, CM, AN Laws, J Cuellar, R Reihart. *In review*. Desperately seeking salt: herbivorous insects are co-limited by macronutrients and Na. Ecology Letters.

Yang Q, Ding JQ, Siemann E. Biogeographic variation of distance-dependent effect of an invasive tree species (25 pages, 7 tables, 4 figures)

Yang, Q, Ding JQ, Siemann E. Ecological and evolutionary interactions of plants and foliar herbivores depend on soil biota (30 pages, 3 tables, 6 figures)

Wang Y, Ding JQ, Zhu L, Xiao L, Siemann E. Contrasting effects of invasive plant volatiles on host selection of generalist and specialist herbivores (28 pages, 1 table, 5 figures)

Wang H, Zhang L, Ma XC, Zou JW, Siemann E. in press. The effects of elevated ozone and CO2 on growth and defense of native, exotic and invader trees (29 pages, 5 tables, 6 figures, Journal of Plant Ecology)

2017

Guo, H., C. Weaver, S. P. Charles, A. Whitt, S. Dastidar, P. D'Odorico, J. D. Fuentes, J. S. Kominoski, A. R. Armitage and S. C. Pennings. 2017. Coastal regime shifts: Rapid responses of coastal wetlands to changes in mangrove cover. Ecology 98:762-772.

Jumpponen, A., J. Herrera, A. Porras-Alfaro, J.A. Rudgers. 2017. Biogeography of Root-Associated Fungal Endophytes. IN: Biogeography of Mycorrhizal Symbiosis, Springer. Editor (L. Tedersoo). PP. 195-222

Porras-Alfaro A., Muniania-Nninga C., Hamm P.S., Torres-Cruz T.J., Kuske C.L. 2017. Fungal Diversity and Function in Desert Ecosystems. Ed. Stevens B. De Gruyter. In press.

Prather, CM, A Huynh, SE Pennings. 2017. Woody structure facilitates invasion of woody plants by providing perches for birds. Ecology and Evolution 7(19): 8032-8039.

Prather, CM, M. Strickland, A. Laws, and D. Branson. 2017. Herbivore species identity and composition affect soil enzymatic activity through altered plant composition in a coastal tallgrass prairie. Soil Biology and Biochemistry 112: 277-280.

Ross, A., J. Zong, R.R. Stewart, and R. W. Wiley, 2017, Exploring for water using resistivity methods at the UH 2017 Geophysics Field Camp: GSH Journal, v. 8, n. 2, 23-25.

Siemann E, DeWalt SJ, Zou JW, Rogers WE. 2017. An experimental test of the Evolution of Increased Competitive Ability Hypothesis in multiple ranges: invasive populations outperform those from the native range independent of insect herbivore suppression Annals of Botany Plants doi:10.1093/aobpla/plw087

Sudarshan, S. K. V., V. Montano, A. Nguyen, M. McClimans, L. Chang, R. R. Stewart, and A. Becker, 2017, A heterogeneous robotics team for large-scale seismic sensing: IEEE Robotics and Automation Letters, 2, 3, 1328-1335.

Wang G., Turco M., Soler T., Kearns T., and Welch, J. (2017). Comparisons of OPUS and PPP solutions for subsidence monitoring in the greater Houston area. J. Surv. Eng. 143(4), 05017005, doi:10.1061/(ASCE)SU.1943-5428.0000241

Xiong, L., G. Wang and P. Wessel. 2017. Anti-aliasing filtering for deriving high-accuracy DEMs from TLS data: case study at Freeport, Texas. Computers & Geosciences, 100: 125-134. doi:10.1016/j.cageo.2016.11.006

Zengel, S., J. Weaver, S. C. Pennings, B. Silliman, D. R. Deis, C. L. Montague, N. Rutherford, Z. Nixon and A. R. Zimmerman. 2017. Five years of Deepwater Horizon oil spill effects on marsh periwinkles Littoraria irrorata. Marine Ecology Progress Series. 576:135-144. DOI 10.3354/meps11827.

Zhang L. Zou JW, Siemann E. 2017. Interactive effects of elevated CO2 and nitrogen deposition accelerate litter decomposition cycles of invasive tree (*Triadica sebifera*) Forest Ecology & Management 385: 189-197

Zhou X., Wang G., Bao Y., Xiong L., Guzman V., and Kearns T. J. (2017). Delineating Beach and Dune Morphology from Massive Terrestrial Laser Scanning Data Using the Generic Mapping Tools, Surv. Eng., 143(4), 04017008, doi: 10.1061/(ASCE)SU.1943-5428.0000223

2016

Carrillo J, Siemann E. 2016. Native plant competition mediates the biocontrol impact of above- and belowground herbivory on an invasive tree. Ecological Applications 26:2060-2071.

Lee, Dongie. Compaction of aquifer at different depths: observations from a vertical GPS array at the Coastal Center of the University of Houston. M.S. Thesis, Department of Earth and Atmospheric Sciences, November 2016.

Li, X. W. Guo, E. Siemann, W. Huang, J. Ding. 2016. Interactions of aboveground and belowground heterospecific herbivores varied in tallow tree native and invasive genotypes(Triadica sebifera) Oecologia 182:1107-1115

Li, S. and S. C. Pennings. 2016. Disturbance in Georgia salt marshes: variation across space and time. Ecosphere 7(10):e01487. DOI: 10.1002/ecs2.1487.

Liu, W., Maung-Douglass, K., Strong, D.R., Pennings, S.C. and Zhang, Y. 2016. Geographical variation in vegetative growth and sexual reproduction of the invasive Spartina alterniflora in China. Journal of Ecology 104:173-181.

Pennings, S. C., S. Zengel, J. Oehrig, M. Alber, T. D. Bishop, D. R. Deis, D. Devlin, A. R. Hughes, J. J. Hutchens, W. M. Kiehn, C. R. McFarlin, C. L. Montague, S. Powers, C. E. Proffitt, N. Rutherford, C. L. Stagg, K. Walters. 2016. Marine ecogregion and Deepwater Horizon oil spill affect recruitment and population structure of a salt marsh snail. Ecosphere 7(12)e01588, DOI: 10.1002/ecs2.1588.

Wang, H. X. Ma, L. Zhang, JW. Zou and E. Siemann. 2016. UV-B has larger impacts on invasive populations of Triadica sebifera but ozone impacts do not vary. Journal of Plant Ecology 9:61-68.

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6. Outreach and Service.

Gonzalez continues to work with the University of Houston to host service learning opportunities throughout the year at Shasta's Prairie. These service days encourage UH staff and

students, along with Texas Master Naturalist volunteers, to maintain and augment the aesthetic and biodiversity value of the planting. These service learning days were September 15, 2017, March 3, 2017, and July 28, 2017. On average each planting hosted 20 students, approximately 4 UH staff members, and 3-4 volunteers from the Katy Prairie Conservancy/Texas Master Naturalists.

Laws gave a tour of UHCC including an overview of the undergraduate education and research opportunities at UHCC to representative from the STEM career counselor office. She also gave a talk about grasshopper ecology and demonstration of grasshopper sampling methods to interns working at a Nature Center in Ft. Worth.

Prather gave 18 presentations about or tours of the research project to a total of approximately 800 people from groups representing a wide-range of scientists, conservationists, students, and members of the public. These groups included: the Texas Chapter of the Native Prairies Association; managers, restorationists, conservationists, and scientists at the Southern Prairie and Plains Conference; and scientists at the International Congress of Entomology. Undergraduates have played key roles in these tours and presentations, allowing them to showcase the skills and knowledge they have gained to the public.

Prather's group is in the process of updating information, links, and images about insect orders and common grasshopper and hemipteran species at the UHCC on public reference sites, especially Wikipedia. Dr. Prather has now incorporated updating information on insect orders as an assignment in 2 courses she has taught. In total, Dr. Prather, her research students, and the students in her "Insects and Society" course have created or updated 37 Wikipedia pages (including updates to every order of insects, edits to some families and genera of insects, and 11 new pages created for common North American grasshopper species and one hemipteran species). These pages have been viewed approximately ~2 million times since they have been edited. As a consequence of this success, Dr. Prather also wrote about these experiences in Wikipedia's education blog (https://wikiedu.org/blog/2016/08/09/bugging-wikipedia-opening-up-insect-ecology/).

McDermid (Environmental Institute of Houston, UHCL) led seed collection of native species at UHCC with the help of Master Naturalist, UHCL undergraduate and UHCL graduate student volunteers. The seed is to be used for a prairie restoration project at Sheldon Lake State Park.

7. Courses taught at the UHCC or Shasta's Prairie in the 2016-2017 academic year.

UH

BIOL 2397, Biological Field Research, Ann Cheek. Hands on field education. Course met 3 hours per day, 3 – 5 days at UHCC per week from Jul 10 to Aug 4, 2017 a total of 16 class days. 9 students.

BIOL 1362H, Honors Introductory Biology, Ann Cheek. Hands on field education. Students used the app i-naturalist to photograph and report species observations at Shasta's Prairie.

BIOL 3305, Biodiversity, Steven Pennings. Field trip and service project at Shasta's Prairie.

BIOL 4206, Ecology and Evolution Laboratory. Larry Williams. Field trips to UHCC.

BIOL 4368, Ecology, Steven Pennings. Field trip and service project at Shasta's Prairie.

BIOL 4397, Conservation Biology. 5 students. Field trip to Shasta's Prairie.

GEOL4330 Introduction to Geophysics, Guoquan Wang. ~110 students. A one-day field trip for oil field instrumentation, GPS and LiDAR survey, groundwater monitoring, and land subsidence.

GEOL4332 and GEOL 6324 Geoscience Applications of GPS and LIDAR, Guoquan Wang. ~55 students. A one-day field trip for GPS and LiDAR education.

GEOL 4355, UH Geophysics Field Camp. 60 students. This is a core course for UH geophysics majors. The course is offered by Rob Stewart, Guoquan Wang, and six other faculty members in the May of each summer. Fundamental geophysics field survey methods were taught over 9 days at the UHCC campus.

GEOL 4383. Elements of Reservoir Geophysics. 15 students. Two field trips to UHCC.

GEOL 6394. Geophysical data acquisition. Rob Stewart. 12 students. Two field trips to UHCC.

GEOL 6323, Satellite positioning and GPS geodesy, Fall 2016. Guoquan Wang. 11 student. A one-dayhour field trip for GPS and subsidence education (November 2016).

Stewart taught a course for Nautilus Inc. on Seismic Data Acquisition. 16 students, 5 days.

UHD

BIOL-CHEM-GEOL 4260 Environmental Lab and Field Studies, Michael Tobin. 14 students. Field exercises at the UHCC.

8. User days.

We recorded 1,134 visitor-days to the UHCC In 2012, 1,633 in 2013, 1,677 in 2014, 1,794 in 2015, 2,240 in 2016, and 2,225 (as of October) in 2017, indicating a doubling in use over the last 5 years. Visits to the UHCC are split between research (~38%), education (~19%) and operation of the oil wells (~40%), with a small number of outreach days. About 19% of the user days in 2017 were faculty and staff, 11% graduate students, 27% undergraduates, 40% industry and 3% general public.

J. Future Measures of Performance

As noted above, we will develop a new five-year strategic plan for the UHCC this year that will include metrics of performance. Our general goals will remain unchanged: to continue to increase research, teaching and service activities that are facilitated by UHCC.