International Association of Hydrogeologists
U.S. National Chapter
Fall 2017 Newsletter

Editor: Gary Robbins

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Cover Photo: The Ancient walled city of Dubrovnik, Croatia. Dubrovnik was the location of the 2017 IAH annual meeting.

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A Note from the Chair

Chair Jim with IAH meeting participants from the Thailand Department of Groundwater Resources

The year 2017 has progressed rapidly for the USNC. The proven base of leadership provided by our new and expanded board has served us well.

Nineteen of our members attended the IAH Congress in Dubrovnik, Croatia in September, 2017, where we learned many things to help guide the USNC in coming years. We were also successful in accomplishing one of Vic's and my goals of increasing attendance. Next year's Congress is going to be in Daejon, Korea in September, 2018 so please start making plans to attend.

The USNC's Dave Kreamer, IAH Vice President for Science and Programme, and the Canadian National Chapter's Joanne Thompson, IAH Vice President for North America, represented us in fine fashion. Please thank them for their efforts and offer your support.

One of the many highlights was the LaMoreaux International Lecture presented by Abe Springer standing in for GSA Birdsall-Dreiss Distinguished Lecturer, Ed Harvey, who is Chief, Water Resources Division of the National Park Service. The international lecture is named for the first American President of IAH, Dr. Philip LaMoreaux and his wife Bunnie. This is one of several joint efforts the USNC is working on to

further develop programs and projects with GSA and AGI.

The USNC has also cosponsored several meetings and/or webinars with AGI. Tim Parker and Clint Carney are carrying on this liason, formerly performed by Lenny, between the two organizations. We are also looking for volunteers to serve as liasons between GSA Regional organizations and the USNC. Adam Milewski is looking for volunteers from the ECHN to do this.

Vicki and Suzanne have done an excellent job helping to publicize these activities on the website and social media. Please continue to check these sources for upcoming events and news about the USNC and its members. Also please share this newsletter with your friends and colleagues to spread the news about our chapter. More importantly please thank Gary Robbins for his hard work in preparing the newsletter.

In other international ventures and yet closer to home we are continuing to work with the Canadian National Chapter and the Mexican National Chapter as well as others in South America to develop joint activities. One of these which we have formally notified IAH of is our desire to host a joint IAH Congress in North America in 2021. Discussions are ongoing on where to have it (perhaps Seattle or Vancouver) and we're looking for someone who is willing to spearhead it. If you are interested, please let us know.

The final item I want to cover in my message from the Chair is the Early Career Hydrogeologists Network (ECHN) led by Adam Milewski, Chair; Katie Markovich, Vice Chair; Rory Cowie, Treasurer; and Racha El Kadiri, Secretary. The IAH USNC ECHN has a Facebook page, is on LinkedIn, and has a website, so please take time to access these and learn more about how you can participate in ECHN activities.

Many other activities in which the USNC is involved are covered in this newsletter. We welcome your input and would like for you to become even more active. Hop on board and make the ride even more exciting.

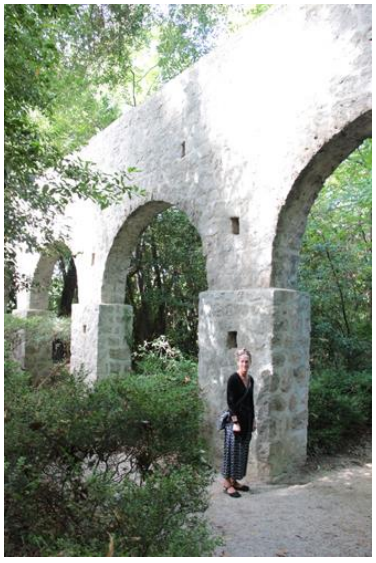
Wanted Articles About You

As the new editor of the newsletter, I need your help. Our newsletter is all about informing you of what the organization is doing and providing you with other news in our field that you may find useful. Of course all that is interesting. But it is also an opportunity to get to know eachother, to network and to further bond in our mutual love of this field. So I am asking you to help with the next newsletter. Send me a picture of you working with a brief description (name, company, where the picture was taken and what does the picture show you doing). Send me a brief article about some interesting place you are working or visited related to hydrogeology. Have some interesting groundwater related picture? Send that with a description of who took the picture and where. How about a brief article about you for our Members News Section (see below)? Send material to Gary.robbins@uconn.edu (Oh yes, I am sitting on the Iron Throne from the Game of Thrones. Well, a reproduction in Dubrovnik).

Dubrovnik, Croatia 2017 IAH Conference

Our Croatian colleagues put on a wonderful event. The conference venue on the Adriatic sea coast was spectacular. The hotel where the conference took place was built down a limestone cliff face overlooking the coast. Given the conference location in Croatia, which is dominated by karst hydrogeology, many papers focused on issues associated with karst conditions. Quite a few dealt with contamination problems, and fracture flow and transport modeling. It was nice to see a lot of international student presentations and posters.

Visiting the nearby old walled city of Dubrovnik was going back in time to the middle ages. Water for the old walled city was obtained from a karst spring and was piped to a communal fountain. The fountain still provides water to the hordes of tourists that visit the city each day. The old city has been used in every season of Game of Thrones but the first. Fans take note the walk of shame was filmed here.



There were five mid-conference field trips. The one I went on was along the coast north of the city. At the Arboretum Trsteno was a fountain fed by a 15th century aqueduct. We also went to the village of Ston and climbed the ancient wall that surrounded the city. The wall was built to protect the salt industry which began there some 2000 years ago by the Romans. The bay near the city is divided up into evaporation ponds.

We also had plenty of time to network and meet up with our chapter members and other friends. There was also a night of Rock and Roll dancing.

USNC and friends in Dubrovnik

Awards and Honors

Dr. David Sabatini of the University of Oklahoma received the 2017 International Association of Hydrogeologists U.S. Chapter's International Service Award. It recognizes the efforts of hydrogeologists based in the United States who have shown an outstanding commitment to assisting the international community with groundwater-related needs.

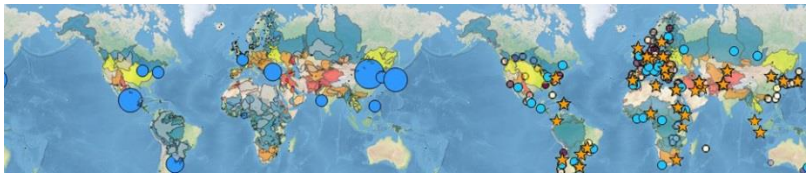
David holds the David Ross Boyd Professorship in the School of Civil Engineering & Environmental Science. He was presented with the International Service Award in recognition of his many years of deep commitment to promoting sustainable water resources projects in developing and impoverished countries, particularly through his creation of the WaTER (Water Technologies for Emerging Regions) Center at the University of Oklahoma. The WaTER Center aims to "promote peace by advancing health, education, and economic development through sustainable water and sanitation solutions for impoverished regions." As the organization's Director, he has been integral in its growth and success, and in establishing the bi-annual International WaTER Conference, which brings together participants from multiple disciplines worldwide in response to the UN Millennium Development Goals of bringing water and sanitation to emerging regions. David has demonstrated a passion and commitment to WASH (Water and Sanitation Health) in developing countries, and has vast expertise in Water Technologies for Emerging Regions, including integrating culture/behavior, business/supply chain and technology in pursuit of sustainable solutions.

The Award was presented to David during the Hydrogeology Division Luncheon and Awards Ceremony at the Geological Society of America Annual Meeting in Seattle on Tuesday, October 24. Congratulations David!

Contributed by Andrew H. Manning

Groundwater News and Information

Water Information Network System



The Water Information Network System (https://en.unesco.org/ihp-wins) is an open source and open access platform that combines geolocalized data. It was developed by UNESCO's International Hydrological Programme to serve as a global reference in the design and support of operations, management, and decision support functions for sound water resources governance. It is also designed to assist Member States in monitoring and implementing the Sustainable Development Goal to "ensure availability and sustainable management of water and sanitation for all" (SDG6).

This user-friendly, interactive tool can be used by a wide variety of stakeholders, to explore the data and generate customized maps. IHP-WINS consists of three main components, to provide:

- GIS data on the state of water resources at the global, regional, national and local level, allowing users to visualize and generate maps,
- a platform for interdisciplinary collaboration and knowledge sharing among water stakeholders (e.g. databases, reports, graphs, tables, videos, webinars, etc.), and
- a platform to be used by water stakeholders to build networks (i.e. discussion groups).

The platform is gradually building a repository of, and links to, sources of information from other UN organizations, regional organizations, and national institutions, including UNESCO Category 2 Centres and Chairs specialized in water-related issues.

By providing a platform where national institutions can share their SDG 6 monitoring and implementation experiences, IHP-WINS aims to assist Member States in improving their institutional capacities, human resources, and to provide a sound basis for science-based decision-making. Lessons learned can also be shared through the discussion groups.

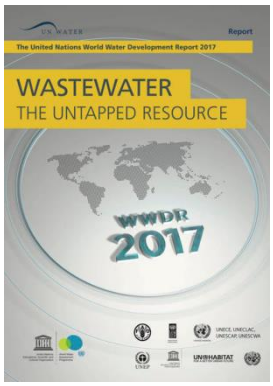
European Inventory for Groundwater Research

The EU-funded KINDRA project <http://kindraproject.eu/> officially launched the European Inventory for Groundwater Research (EIGR) for public access. Based on a unique classification system, the Inventory allows users to showcase their research to the community of European professionals actively contributing to the European water sector. EIGR is now available to all groundwater practitioners looking for information and/or wishing to share their research outcomes or knowledge.

The EIGR is a tool that allows for the inclusion of a wide range of information sources, ranging from scientific papers, hydrogeological maps, technical reports, and book chapters to position papers. The current version of the Inventory already contains more than 2000 metadata records referring to or providing links to groundwater research carried out in Europe since the year 2000. These records have been compiled by experts of the national member associations of the European Federation of Geologists (EFG) who have gathered information from diverse sources, consulting at national level the relevant

reports and databases from universities, research centers, government bodies, regional and local administrative offices, and other parties involved in groundwater research,

Wastewater: The Untapped Resource

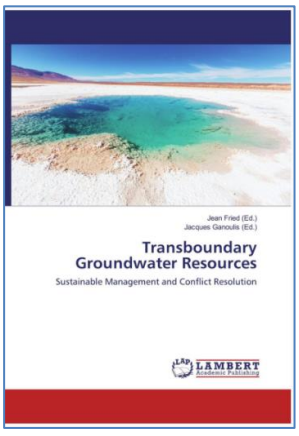


The 2017 edition of the United Nations World Water Development Report, entitled "Wastewater: The Untapped Resource," demonstrates how improved wastewater management generates social, environmental, and economic benefits essential for sustainable development and is essential to achieving the 2030 Agenda for Sustainable Development. The Report seeks to inform decision-makers, government, civil society, and the private sector about the importance of managing wastewater as an undervalued and sustainable source of water, energy, nutrients, and other recoverable by-products, rather than something to be disposed of or a nuisance to be ignored.

The report's title reflects the critical role that wastewater is poised to play in the context of a circular economy, whereby economic development is balanced with the protection of natural resources and environmental sustainability, and where a cleaner and more sustainable economy has a positive effect on the water quality.

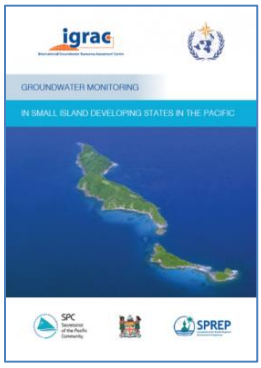
Improved wastewater management generates social, environmental, and economic benefits, and is essential to achieving the 2030 Agenda for Sustainable Development. More information and a link to download the report are available at:
http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/wwdr/2017-wastewater-the-untapped-resource/

Transboundary Groundwater Resources



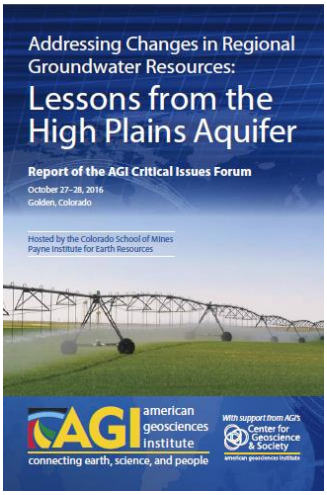
"Transboundary Groundwater Resources: Sustainable Management and Conflict Resolution," a new book edited by J. Fried and J. Ganoulis, combines science and law to yield an interdisciplinary tool for the complex issue of cross border groundwater resources management. The manual highlights the governance of transboundary groundwater resources as a general framework for management and decision-making and includes basic elements of water diplomacy, aiming at facilitating the resolution of possible international disputes on shared groundwater resources, especially through the article on conflict resolution at the end of the manual. Illustrated by a number of case histories, it provides the readers with methods and practical examples of scientific, legal, and diplomatic instruments in a multidisciplinary approach for managing effectively transboundary groundwater on the one hand, and assisting in the negotiations and resolution of conflicts on the other hand. More information and ordering details are available from the publisher at:
https://www.morebooks.de/store/gb/book/transboundary-groundwater-resources/isbn/978-3-659-96418-3

Groundwater Monitoring in Pacific Islands States



According to a news release from the International Groundwater Resources Assessment Centre (IGRAC), IGRAC and the World Meteorological Organization (WMO) have published a new report on "Groundwater Monitoring in Small Island Developing States in the Pacific," which is freely available from a link in the IGRAC downloads section (https://www.un-igrac.org/downloads). The report is a summary on groundwater monitoring practices in Pacific Small Island Developing States (SIDS) and is an outcome of a workshop "Advancing Groundwater Monitoring in Pacific SIDS" that was held in Suva, Fiji, from 29 August through 2 September 2016 and was organized in the framework of WMO Education and Training Programme and of the Global Groundwater Monitoring Network (GGMN) programme. GGMN is a programme set up to improve quality and accessibility of groundwater monitoring information and subsequently our knowledge on the state of groundwater resources. The report gives a brief overview for each Pacific SIDS to capture the current groundwater monitoring and assessment practices and their future challenges. In addition, it gives a set of recommendations on how groundwater monitoring in these islands could be improved.

AGI Report on Lessons from the High Plains Aquifer



The American Geosciences Institute (AGI)—with the support of IAH/USNC and other organizations— recently convened an open meeting of expert speakers and interested individuals from academia, consulting, professional societies, and local, state and federal agencies to discuss the use, monitoring, and management of groundwater in the United States. The assembled group at this second-ever Critical Issues Forum focused on experiences from the High Plains Aquifer (HPA) region.The Forum was held at the Colorado School of Mines in Golden, Colorado, Oct. 27-28, 2016.

The HPA was chosen as the forum emphasis not only because it features prominently in U.S. agriculture and faces significant current and future challenges, but also because — as it extends beneath multiple states — there are a variety of groundwater management practices in use across the High Plains that offer ample opportunities for comparison, information sharing, and learning.

The aim of the forum was to foster open and honest conversation about lessons learned in the region. A final report on this Critical Issues Forum was recently released in book form by AGI, entitled: "Addressing Changes in Regional Groundwater Resources: Lessons from the High Plains Aquifer." The report can be downloaded at no cost from: https://www.americangeosciences.org/policy/ci-forum-2016/final-report This report provides an overview of the key lessons and ideas that emerged during the forum, and outlines approaches identified as being potentially beneficial in helping states and municipalities fulfill their own designated groundwater management goals. In addition, the presentations themselves are available at: https://www.americangeosciences.org/policy/ci-forum-2016/presentations

New Factsheets Showcase Geoscience in Every State

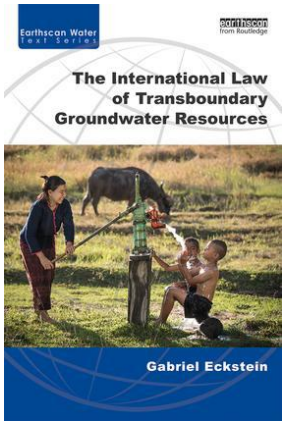
According to a news release from the American Geosciences Institute (AGI), of which IAH/USNC is a member society, AGI has completed fifty new factsheets, which quantify the tangible contributions of geoscience to the economy, environment, public health, and safety of every U.S. state. AGI has gathered information from nationwide sources to generate this comprehensive, standardized set of factsheets. Unlike a lengthy report, these factsheets allow federal and state decision-makers to glean important facts about the role of geoscience and the government agencies that fund geoscience in their states as quickly as possible.

"The factsheets are each thoughtfully divided into ten sections with identical line items that can be compared apples-to-apples across all fifty states," said Maeve Boland, Director of Geoscience Policy at AGI. Perhaps most importantly, the factsheets frame geoscience as a discipline that brings benefits to every state. Water, minerals, and petroleum - all natural resources that many of us take for granted - would not be safely available without geoscience. Furthermore, geoscience brings jobs, attracts students and faculty to universities, and spurs research and innovation, while helping mitigate the risks of public health emergencies and natural hazards like earthquakes, hurricanes, and droughts.

These factsheets can also inform government policies and budget decisions on geoscience topics. With these factsheets, scientists can more easily communicate how geoscience is vital to society at the state and local level.

Find the factsheet for your state at: http://bit.ly/AGIStateSheets.

New Book on Transboundary Groundwater Resource Law



Gabriel Eckstein, Professor of Law and Director of the School of Law Program in Natural Resources Systems at Texas A&M University, has authored a new book entitled, *The International Law of Transboundary Groundwater Resources*. The book is a comprehensive review of international law applied to transboundary groundwater resources and aquifers. The book is interdisciplinary and provides a hydrogeological underpinning for the application of law and policy to transboundary groundwater resources. The book provides a detailed review of case studies of the few existing transboundary aquifer agreements in operation.

For more information visit: https://www.routledge.com/The-International-Law-of-Transboundary-Groundwater-Resources/Eckstein/p/book/9781138842991

Tech News

Flexible Liner Underground Technologies

FLUTe is a technology using flexible everting borehole liners for performing many high-resolution hydrologic measurements. Developed by Flexible Liner Underground Technologies, the methods include sealing open boreholes quickly, mapping NAPL and the dissolved phase of contaminants, measurement of the transmissivity distribution of a borehole on a 30 cm scale, mapping the head distribution on a 3 m scale and providing long term monitoring of water quality and head at many elevations in a borehole. A transmissivity and head profile can be done in a single day for a 100 m borehole.

The FLUTe family of flexible liner methods has evolved over 20 years and is in use in many countries from Sweden to South Africa, Australia and Canada plus all 50 USA states. The liner systems are manufactured in the USA and installed by FLUTe field staff or the customers. The most common use is to seal boreholes immediately after drilling to prevent cross contamination. The transmissivity profile method, first developed in 2004, has been used many hundreds of times in lieu of straddle packers.

Activated carbon felt mounted on a sealing liner is used to map the dissolved phase contaminant distribution. Head and transmissivity profiles can be obtained by measuring the descent rate of the everting liner into a borehole. Most installations are in fractured rock formations, but recent developments have used sonic casing for unstable sediment installations. The methods are particularly well suited for karst formations because the liner seals the borehole wherever it can be sealed. FLUTe has received the National Ground Water Association Technology Award.

Additional information is available at www.flut.com.

Contributed by Carl Keller

Member News and Notes

Water Systems of Rome: Ancient to Modern

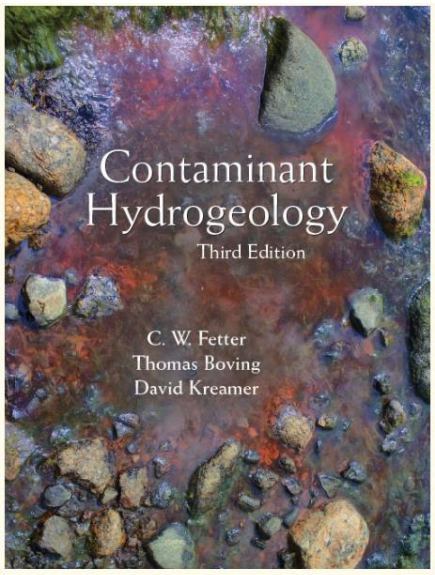
The University of Connecticut will be offering a study abroad field course in Rome Italy, Water Systems of Rome: Ancient to Modern. The course will take place from May 8 to 24, 2018. Dr. **Gary Robbins** (hydrogeology) and Dr. Glenn Warner (Water Resources Engineering) are the instructors. The field course explores 2000 years of water system development. Students have an opportunity to visit Rome, Pompeii and Ostia Antica to explore ancient water systems. They also journey to spring sources in the Apennines used by the city of Rome today. A major focus of the course is on how hydrogeologic conditions have influenced water system development in the Eternal City and the rise (and perhaps fall) of ancient Rome. The course is open to undergraduate students from any University enrolled in a science or

engineering course of study. For more information visit: https://abroad.uconn.edu/program/uconn-water-systems-of-rome-ancient-to-modern-rome-italy-summer-faculty-led/

Karst Book Series

Jim LaMoreaux poses at the Springer booth at the IAH 2017 conference. On display were the *Cave and Karst Systems of the World Book Series* and the *Advances in Karst Sciences Book Series*. Jim is the editor of these series. For more information visit: https://www.springer.com/series/11987and https://www.springer.com/series/15147

Contaminant Hydrogeology Revised



Thomas Boving and **David Kreamer** have revised C.W. Fetter's *Contaminant Hydrogeology* book (3rd edition by Waveland Press, Inc. Publishers). The new edition updates, expands, and reorganizes the original work. It also presents a good deal of new material. For more information visit http://www.waveland.com/browse.php?t=383&r=d|103

Research in the Dolomites

Gary Robbins, Professor of Geology and Hydrogeologist, at the Univesity of Connecticut, journeyed this past summer to the Dolomites in Northern Italy to conduct sampling of springs and their water sources. He is testing a new tracer method using indigenous bacteria. He is working with Dr. Roberto Mazza and his students from U. Roma Tre who have conducted detailed hydrogeologic investigations there, including dye testing. The UConn sampling effort there involved trekking some distance at over 2500 m across and over some very rough and at times steep terrain to collect samples. Sampling entailed pumping water through special filters to capture bacteria which were then preserved. Bacteria are being identified by DNA sequencing at UConn. Results are undergoing biostatistical analyses to assess trends in biodiversity and that can be used to identify water sources and track groundwater flow in the karstic terrain.

High peaks of the Dolomites

Trekking at over 2500 m

Snow melt lake: one of the spring water sources

One of the many springs sampled that gush from the karstic terrain

Opportunity for a *Sponsored* IAH Student Membership

*****Call for Nominations – Due December 15, 2017*****

The International Association of Hydrogeologists (IAH) U.S. National Chapter (USNC) encourages hydrogeology graduate students eager to learn more about hydrogeology in other countries to join IAH.

The USNC is continuing to sponsor one-year student memberships in IAH for several select graduate students. To pursue this opportunity for 2018 the USNC requests the following:

- USNC members and University professors/advisors in graduate hydrogeology programs can nominate one hydrogeology graduate student (who will remain a graduate student at least through December 2018) for a one-year membership.
- Nominating USNC members, professors/advisors should determine that the graduate student has an interest in and will benefit from this membership and submit the following qualifying information:
    - Nominating member's or professor's/advisor's name, institutional/academic/corporate affiliation and department, and contact information (mailing address, phone number and email);
    - Student name, academic affiliation and department, and contact information (mailing address, phone number and email);
    - Student graduation month and year (anticipated date); and
    - Statement relating to student interest and potential benefit derived from IAH membership (1 to 2 sentences).
- Nominations are due by **December 15, 2017**; please email the requested nomination information to Devin Galloway, USNC Board Member and Membership Liaison at dlgallow@usgs.gov.

By January 15, 2018 the IAH USNC Executive Committee will a) qualify the nominations, b) select awardees, and c) notify all nominees and nominating professors. The IAH USNC will submit the applicant's contact information and payment to IAH headquarters for the student's IAH membership, including subscription to the *Hydrogeology Journal*, beginning with the first issue of the membership year. The awardees will be featured in the *Spring 2018* USNC IAH Newsletter.

The USNC looks forward to increasing student participation in IAH! Visit our websites to learn more about IAH (https://iah.org/) and the USNC (http://iah-usa.org/).

Early Career Hydrogeologists Network News

The ECHN network is growing and having fun in the process! We met many enthusiastic hydrogeologists at the annual GSA meeting in Seattle. We thank everyone who stopped by our booth at the meeting and promise many new and exciting ideas are in store. We also had a good turnout at our ECHN mixer event at Optimism Brewery (pictured below). It was great meeting people from every sector and at different stages of their career. Make sure to follow our updates and events on the website (http://echn-usa-iah.org) and social media (Instagram: @echn.us; Facebook: ECHN USA IAH).

ECHN mixer event at Optimism Brewery
(Photo credit: Holly Hutcheson)

IAH/ECHN exhibit booth at GSA (Pictured left to right: Claire Webster, Adam Milewski, and Rachel Rotz)
(Photo credit: Holly Hutcheson)

Check out the USNC website at: http://iah-usa.org/

This is your newsletter, so please contribute.