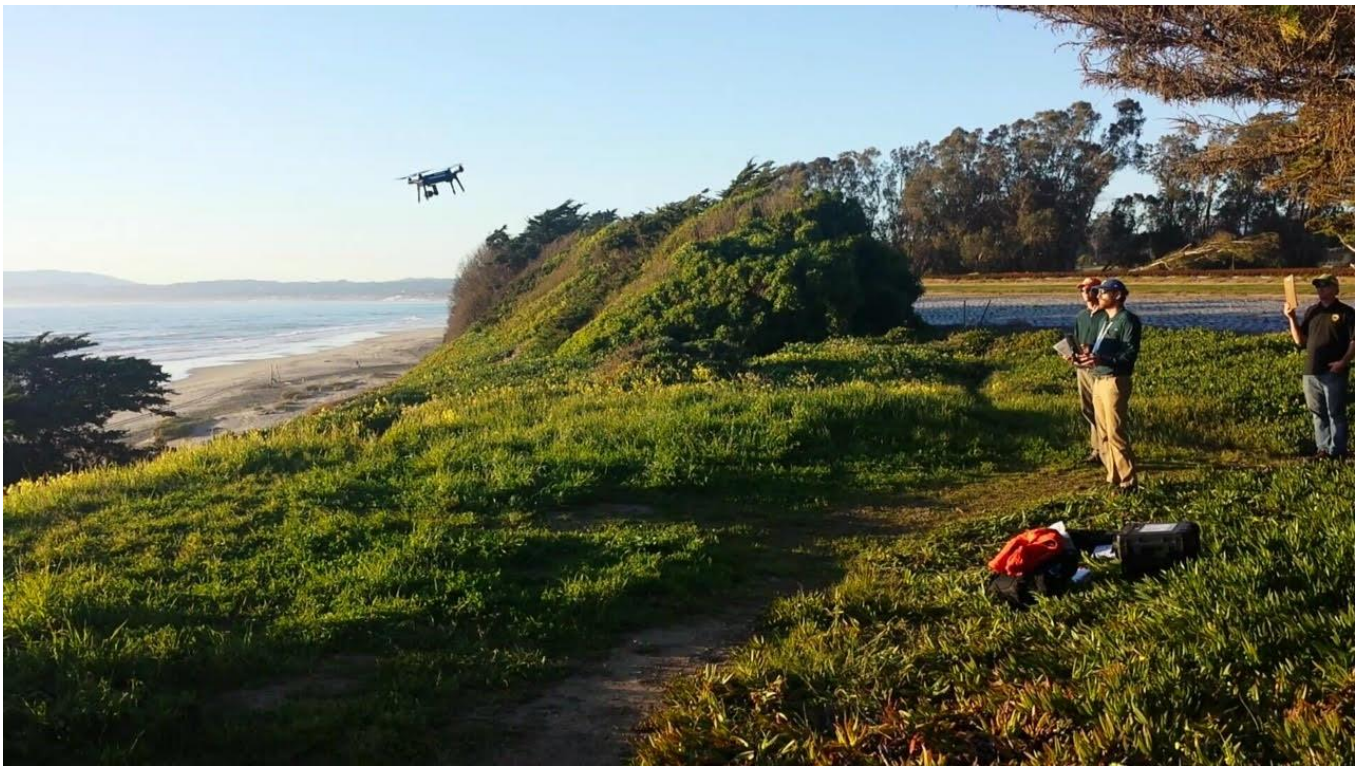
Southwest Biological Science Center Monthly Update

As a unit of the U.S. Geological Survey (USGS), the mission of the Southwest Biological Science Center (SBSC) is to provide quality scientific information needed to conserve and manage natural and biological resources, with an emphasis on the species and ecosystems of the southwestern United States. The SBSC has two research branches: *Terrestrial Dryland Ecology* (TDE) and *Rivers Ecosystem Science* (RES, which includes the Grand Canyon Monitoring and Research Center (GCMRC)). Both branches conduct research on the biology, ecology, and processes of the Southwest. SBSC has two field stations in Arizona (Flagstaff and Tucson) and one in Moab, Utah. You can find the SBSC online at: **https://usgs.gov/centers/sbsc**.

WELCOME

Below are recent products and activities coming from the SBSC. SBSC personnel have an asterisk after their names. If you would like more information on anything in this month's update contact Todd Wojtowicz (twojtowicz@usgs.gov).

IMAGE OF THE MONTH



SBSC's Joel Sankey taking his final exam for the unmanned aircraft systems (UAS) certification in Santa Cruz, CA.
(photo credit: Joshua Caster, USGS)

OUTREACH

Media, Broadcasts, and Films

A recently published paper titled, "**Albedo feedbacks to future climate via climate change impacts on dryland biocrusts**" received quite a bit of attention in March. William (Austin) Rutherford* (lead author), Scott Ferrenberg*, Jayne Belnap*, and Sasha Reed* are the SBSC authors. The other authors of the paper are Thomas Painter, Gregory Okin (both from University of California), and Cody Flagg (National Ecological Observatory Network). The link to the paper is here: http://www.nature.com/articles/srep44188. Below are links to who covered the paper.

- A USGS press release titled, "**Changing temperatures and precipitation may affect living skin of drylands**", went live on March 15 and can be found on our website here: https://www.usgs.gov/centers/sbsc/news

- A USGS Facebook post (https://www.facebook.com/USGeologicalSurvey/; published on March 17)

- A USGS Instagram post (https://www.instagram.com/p/BRv-_bah-Z4/?taken-by=usgs) related to the paper is the 5th most popular image ever on the USGS Instagram site. The image depicts Sasha Reed and one of Ed Grote's automated CO2 chambers.

- High Country News article: "**The biocrust conundrum**", http://www.hcn.org/articles/a-bizarre-biocrust-discovery

- Arizona Daily Sun article: "**Climate change tweaks biocrust colors**", http://azdailysun.com/news/climate-change-tweaks-biocrust-colors/article_98c86688-45bd-55aa-abc7-1e63936fcbb6.html

- Several sources reprinted the USGS press release

  - Science Daily: https://www.sciencedaily.com/releases/2017/03/170315125546.htm

  - Space Daily: http://www.spacedaily.com/reports/Changing_temperatures_and_precipitation_may_affect_living_skin_of_drylands_999.html

  - Environmental News Network: http://www.enn.com/climate/article/50833?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+EnvironmentalNewsNetwork+(Environmental+News+Network)

  - Science Newsline: http://www.sciencenewsline.com/news/2017031613060048.html

  -Health Medicine Network: http://healthmedicinet.com/changing-temperatures-and-precipitation-may-affect-living-skin-of-drylands/

The recently published paper, "**Biological soil crusts: diminutive communities of potential global importance**", written by Scott Ferrenberg* (lead author), Collin Tucker*, and Sasha Reed* was covered in USGS Facebook post (https://www.facebook.com/USGeologicalSurvey/; published on March 17). The link to the paper is here: http://onlinelibrary.wiley.com/doi/10.1002/fee.1469/full.

A USGS Instagram image of a young turtle taken by the Jeff Lovich's* research group in celebration of 2016's World Turtle Day (May 23) is the 4th most liked photo ever on the USGS Instagram account. Here is the link to that ridiculously cute image: https://www.instagram.com/p/BFycDSGR2so/?hl=en.

The Arizona Daily Sun published a piece about the use of unmanned aircraft systems (UAS) by USGS researchers in Flagstaff. Joel Sankey* (SBSC) and John Vogel (WGSC) discussed the mapping of sandbars and river terraces along the Colorado River in Grand Canyon in the article. Additionally, the use of UAS in SBSC biocrust research and floodwaters research by the Arizona Water Science Center were

mentioned in the article. The link to the piece is here: http://azdailysun.com/news/local/flagstaff-scientists-look-to-drones/article_eeb92a19-28d3-5d6e-b34c-3b9a8d893ae0.html.

Public and Partner Outreach Activities

Moriah Evans* contributed to the Verde Valley SCITECH EXPO by educating the public about her aquatic and terrestrial arthropod exhibit at Yavapai College in Clarkdale, AZ.

Moriah Evans*, Shellie Puffer*, David Ward*, Ken Sheehan*, Jeff Muehlbauer*, Ben Vaage*, and Eric Kortenhoeven* contributed to STEM Night in Flagstaff, AZ by educating the public about arthropods, turtles and tortoises, native and non-native fishes, and general aquatic ecology. Additionally, Don Bills (Arizona Water Science Center) and Greg Vaughan (Astrogeology Science Center) also attended the event and interacted with the public.

On Friday March 3rd, USGS scientist Sasha Reed* led a workshop for resource managers (BLM, NPS, USFS, TNC, Utah Division of Wildlife), USGS scientists, and Utah State University graduate students and professors. The workshop was part of the National Science Foundation graduate research traineeship, which is aimed at bridging disciplinary and cultural gaps between science and management. The workshop included a panel where managers and scientists (including SBSC scientist Jayne Belnap*) talked about the ways science and management work together and the challenges and opportunities for improved collaboration and impact.

Kathryn Thomas* met with BLM Gila District Associate District Manager Pamela Mathis. Thomas provided Mathis with updates on two landscape ecology projects Thomas is conducting and they discussed strategies to increase communication among SBSC scientists and BLM districts centered in Arizona, including Client's Day for the 14th Biennial Conference in Flagstaff in September.

SCIENCE

Presentations, Posters, Lectures, Workshops, and Panels

Bradford, J.B.*, 2017, **Ecological drought and climate change in terrestrial ecosystems of the Southwest** [presentation]: Southwest Climate Science Center, Ecological Drought Workshop.

Massatti, R.*, 2017, **Using next-generation sequencing to inform native plant materials development** [presentation]: Colorado Plateau Native Plant Program 2017 Annual Meeting, National Native Seed Conference, and Northern Arizona University.

Massatti, R.*, Doherty, K. and Wood, T., 2017, **Using next-generation sequencing data to investigate population structure and local adaptation: a case study in *Syntrichia ruralis*, an important component of biological soil crusts** [presentation]: Society for Range Management Annual Meeting.

Published Papers, Reports, Data Releases, etc.

Ferrenberg, S.*, Tucker, C.L.*, and Reed, S.C.*, 2017, **Biological soil crusts: diminutive communities of potential global importance**: Frontiers in Ecology and the Environment, http://onlinelibrary.wiley.com/doi/10.1002/fee.1469/full.

Hossack, B.R., Honeycutt, R.K., Sigafus, B.H.*, Muths, E., Crawford, C.L., Jones, T.R., Sorensen, J.A., Rorabaugh, J.C., and Chambert, T., 2017, **Informing recovery in a human-transformed landscape: drought-mediated coexistence alters population trends in an imperiled salamander and invasive predators:** Biological Conservation, v. 209, p. 377-394, http://www.sciencedirect.com/science/article/pii/S0006320716304311.

Kaplinski, M., Hazel, J.E., Jr., Grams, P.E.*, Kohl, K.*, Buscombe, D.D.*, and Tusso, R.B.*, 2017, **Channel mapping river miles 29–62 of the Colorado River in Grand Canyon National Park, Arizona, May 2009**: U.S. Geological Survey Open-File Report 2017–1030, 35 p., https://doi.org/10.3133/ofr20171030.

Kaplinski, M., Hazel, J.E., Jr., Grams, P.E.*, Kohl, K.*, Buscombe, D.D.*, and Tusso, R.B.*, 2017, **Channel mapping of the Colorado River in Grand Canyon National Park, Arizona - May 2009, river miles 29 to 62**—Data: U.S. Geological Survey data release, https://dx.doi.org/10.5066/F7930RCG.

Knapp, A.K., Avolio, M.L., Beier, C., Carroll, C.J.W., Collins, S.L., Dukes, J.S., Fraser, L.H., Griffin-Nolan R.J., Hoover, D.L.*, Jentsch, A., Loik, M.E., Phillps, R.P., Post, A.K., Sala, O.E., Slette, I.J., Yahdjian, L., and Smith, M.D., 2016, **Pushing precipitation to the extremes in distributed experiments: recommendations for simulating wet and dry years**: Global Change Biology, doi:10.1111/gcb.13504, http://onlinelibrary.wiley.com/doi/10.1111/gcb.13504/full.

McCoy-Sulentic, M.E., Kolb, T.E., Merritt, D.M., Palmquist, E.*, Ralston, B.E.*, Sarr, D.A.*, and Safroth, P.B., 2017, **Changes in community-level riparian plant traits over inundation gradients, Colorado River, Grand Canyon**: Wetlands, http://rdcu.be/qawd.

Muehlbauer, J.D.*, Kennedy, T.A.*, Copp, A.J.*, and Sabol, T.A.*, 2017, **Stream Drift Sampling in Arizona, 2014**—Data: U.S. Geological Survey data release, https://doi.org/10.5066/F71J97WD.

Palmquist, E.C.*, McCoy-Sulentic, M.E., and Kolb, T.E., 2017, **Community-level riparian plant traits, Colorado River, Grand Canyon, 2013-2015**—Data: U.S. Geological Survey data release, https://doi.org/10.5066/F73R0R24.

Palmquist, E.C.*, Ralston, B.R.*, Sarr, D.*, Merritt, D.M., Shafroth, P.B., and Scott, J.A., 2017, **Functional traits and ecological affinities of riparian plants along the Colorado River in Grand Canyon**: Western North American Naturalist, v. 77, p. 22-30, http://scholarsarchive.byu.edu/wnan/vol77/iss1/3/.

Palmquist, E.C.*, Ralston, B.R.*, Sarr, D.*, Merritt, D.M., Shafroth, P.B., and Scott, J.A., 2016, **Southwestern Riparian Plant Trait Matrix, Colorado River, Grand Canyon, Arizona, 2014 - 2016**—Data: U.S. Geological Survey data release, https://dx.doi.org/10.5066/F7QV3JN1.

Rutherford, W.A.*, Painter, T.H., Ferrenberg, S.*, Belnap, J.*, Okin, G.S., Flag, C., and Reed, S.C.*, 2017, **Albedo feedback to future climate via climate change impacts on dryland biocrusts**: Scientific Reports, http://www.nature.com/articles/srep44188.

Wertin, T.M., Reed, S.C.*, 2016, **Experimental Design Plant and Soil Measurement Data, Colorado Plateau, 2011**: U.S. Geological Survey data release, http://dx.doi.org/10.5066/F7PG1PVH.

New Grants and Other Funded Opportunities

Kirsten Ironside* and Erin Boydston (Western Ecological Research Center) received funding from Bryce Canyon Natural History Association to identify factors that contribute to whether or not mountain lions cross

roads. Their research aims to limit motor vehicle collisions with mountain lions in northern Arizona and southern California. Contact Dr. Kirsten Ironside at kironside@usgs.gov or (928) 556-7343 for more information about this project.

Kirsten Ironside* and Charles Drost* received funding from the USGS YES (Youth in Education and Science) student internship program to mentor Northern Arizona University student Bryden Baker. Bryden will be investigating the short-term and long-term responses by mountain lions to wildfire and prescribed fire events using an extensive telemetry dataset. Contact Dr. Kirsten Ironside at kironside@usgs.gov or (928) 556-7343 for more information about this project.

SBSC PUBLICATIONS HIGHLIGHTED BY OTHER SCIENTISTS OR ORGANIZATIONS

A recently published paper by David Ward* (the lead author) titled, "**Long-term fish monitoring in large rivers: utility of "benchmarking" across basins**"", was highlighted by the American Fisheries Society (https://fisheries.org/2017/03/long-term-fish-monitoring-in-large-rivers-utility-of-benchmarking-across-basins/). This paper was co-authored by researchers from multiple USGS centers, University of Illinois Urbana Champaign, and Oregon Department of Fish and Wildlife. The link to paper is here: http://afs.tandfonline.com/doi/abs/10.1080/03632415.2017.1276330.

OTHER NOTABLES

Joshua Caster* and Joel Sankey* attended the DOI-USGS Unmanned Aircraft Systems Basic Operator and 3DR Solo Training Feb 27-Mar 3rd in Santa Cruz, CA. They became certified USGS pilots for the 3DR Solo quadcopter UAS and plan to use the system for a wide variety of research and monitoring projects.

Kathryn Thomas* attended an unmanned aircraft systems (UAS) workshop, which was sponsored by the USGS Innovation Center. Kathryn is hoping to use UAS for vegetation and landscape applications.