



## 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, and [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](mailto:twojtowicz@usgs.gov)).

### IMAGE OF THE MONTH



A pinyon pine and other vegetation near the Monitor and Merrimac Buttes in eastern Utah.  
(Photo credit: Todd Wojtowicz, USGS)

## OUTREACH

### Media, Broadcasts, and Films

#### Find us on Twitter

You can check in on multiple USGS science centers based in Arizona by going to our state USGS Twitter account (<https://twitter.com/usgsaz>). Take a look at our photos depicting field work, restoration approaches, water sampling, volcanoes, arthropods, wildlife, flowers, and beautiful natural areas.

#### Carnivores at tortoise burrows

The California Aggie published an article about the findings of a recently published paper titled, “Mammalian mesocarnivore visitation at tortoise burrows in a wind farm”. The lead author, Mickey Agha, is from the Department of Fish and Wildlife and there are several SBSC co-authors (Amanda Smith\*, Jeff Lovich\*, Laura Tennant\*, Shellie Puffer\*, and Terry Arundel\*). Additional co-authors are from U.S. Army Construction Engineering Research Laboratory, Tennessee Aquarium Conservation Institute, Walde Research and Environmental Consulting, Colorado State University, University of Kentucky, and University of California, Davis. The article can be found here: <https://theaggie.org/2017/06/06/a-second-wind-for-desert-tortoises/>. The paper can be found here: <http://onlinelibrary.wiley.com/doi/10.1002/jwmg.21262/epdf>.



Stonefly in its larval stage found in the Green River, Wyoming.  
(Photo credit: Adam Copp, USGS)

#### Biological soil crust research in drylands

Biological soil crust research by SBSC scientists Sasha Reed\*, Jayne Belnap\*, Scott Ferrenberg\*, and Colin Tucker\* is the focus of a recently published article in Discover Magazine (July/August 2017 issue). The article remarked on the importance of biocrusts in drylands, discussed results suggesting that biocrust communities and their functions show threshold responses to particular climatic changes, and highlighted SBSC research into the opportunities that exist for biocrust restoration in the face of change. The link to the beginning of the article is here: <http://discovermagazine.com/2017/jul-aug/the-deserts-living-skin>.

#### Tortoise research in Joshua National Park

A correspondent for Feature Story News produced an audio-visual piece about desert tortoises that was picked up as a radio clip by CRI (China Radio International) and as a video clip by CGTN America. Additionally, Feature Story News is also carrying the video on their home page. Both Jeff Lovich\* and Shellie Puffer\* of the SBSC and Michael Vamstad from Joshua Tree National Park were interviewed for the piece. Here is the link to the video: <https://m.youtube.com/watch?v=MnT2XoqgMeY>.



Close-up of male tortoise.  
(Photo credit: Shellie Puffer, USGS)

#### Aridity and land-use in the Southwest

A recently published paper titled, “Potential impacts of overlapping land-use and climate in a sensitive dryland: a case study of the Colorado Plateau, USA”, was covered by the Arizona Daily Sun. The authors of the paper are Stella Copeland\* (lead author, SBSC and Northern Arizona University), John Bradford\* (SBSC), Mike Duniway\* (SBSC) and Rudy Shuster (FORT). The title of the article is, “Increasing aridity and land-use overlap have potential to cause social and economic conflict in dryland areas”, and can be found here: <http://www.newswise.com/articles/view/675229/>. The paper can be found here: <http://onlinelibrary.wiley.com/doi/10.1002/ecs2.1823/abstract>.

### **Presentations, Posters, Lectures, Workshops, and Panels**

Daubert, M.\*, Muehlbauer, J.\*, Kennedy, T.\*, and Healy, B., 2017, **Aquatic invertebrate response to trout removal in Bright Angel Creek, Grand Canyon, AZ** [poster]: Society for Freshwater Science Annual Meeting.

Deemer, B.\*, Yackulic, C.\*, Hall, Robert, Kennedy, T.\*, 2017, **Phosphorus releases from Glen Canyon Dam control riverine primary productivity and higher trophic levels up to 120 km downstream** [presentation]: Society for Freshwater Science Annual Meeting.

Kennedy, T.\*, 2017, **Use of alternative invertebrate sampling techniques can move the science of flow ecology forward: case studies from the Colorado River** [presentation]: Society for Freshwater Science Annual Meeting.

Metcalf, A.\*, 2017, **Big river bugs: a citizen science approach** [presentation]: Annual meeting of the Consultative Group for Biological Diversity.

Metcalf, A.\*, Kennedy, T.\*, Muehlbauer, J.\*, Marks, J., 2017, **The Colorado River Basin: aquatic insect diversity and distribution in a fragmented riverscape** [presentation]: Society for Freshwater Science Annual Meeting.

Muehlbauer, J.\*, Quigley, T.\*, and Kennedy, T.\*, 2017, **Can we relate terrestrial-aquatic linkages to hydropower flows downstream of a large dam?** [presentation]: Society for Freshwater Science Annual Meeting.

Walters, D., Ford, M.\*, and Zuellig, R., 2017, **An open-source digital reference collection for aquatic macroinvertebrate of North America** [presentation]: Society for Freshwater Science Annual Meeting.

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### **Published Papers, Reports, Data Releases, etc.**

Bunting, E.L.\*, Munson, S.M.\*, and Villarreal, M.L., 2017, **Climate legacy and lag effects on dryland plant communities in the southwestern U.S.:** Ecological Indicators, v. 74, p. 216-229, <https://doi.org/10.1016/j.ecolind.2016.10.024>.

Itter, M.S., Finley, A.O., D'Amato, A.W., Foster, J.R., and Bradford, J.B.\*, 2017, **Variable effects of climate on forest growth in relation to climate extremes, disturbance, and forest stand dynamics:** Ecological Applications, v. 27, p. 1082-1095, <http://dx.doi.org/10.1002/eap.1518>.

Li, A., Zhao, W., Mitchell, J.J., Glenn, N.F., Germino, M.J., Sankey, J.B.\*, and Allen, R.G., 2017, **Aerodynamic roughness length estimation with lidar and imaging spectroscopy in a shrub-dominated dryland:** Photogrammetric Engineering & Remote Sensing, v. 83, p. 415-427, [http://www.asprs.org/a/publications/pers/2017journals/PERS\\_June2017\\_Public/HTML/files/assets/basic-html/index.html#415](http://www.asprs.org/a/publications/pers/2017journals/PERS_June2017_Public/HTML/files/assets/basic-html/index.html#415).

Lovich, J.E.\*, and J.R. Ennen, 2017, **Reptiles and amphibians.** In, pp. 97-118. Perrow, M. (ed.), Wildlife and windfarms: conflicts and solutions. Vol. 1. Onshore. Pelagic Press. Exeter, U.K.



Lovich, J.E.\* , Ennen, J.R., Averill-Murray, R.C., and Agha, M., 2017, **Desert tortoise reproductive ecology and precipitation, Mojave and Sonoran Deserts—Data**: U.S. Geological Survey data release, <https://dx.doi.org/10.5066/F7JS9NN9>.

Petrie, M.D.\* , Bradford, J.B.\* , Hubbard, R.M., Lauenroth, W.K., Andrews, C.M.\* , and Schlaepfer, D.R., 2017, **Climate change may restrict dryland forest regeneration in the 21st century**: Ecology, vol. 98, no. 6, p. 1548-1559, <http://onlinelibrary.wiley.com/doi/10.1002/ecy.1791/abstract>.

Webb, N.P., Van Zee, J.W., Karl, J.W., Herrick, J.E., Courtright, E.M., Billings, B.J., Boyd, R., Chappell, A., Duniway, M.C.\* , and others, 2017, **Enhancing wind erosion monitoring and assessment for U.S. rangelands**: Rangelands, <http://www.sciencedirect.com/science/article/pii/S0190052817300160>.

## AWARDS

David Ward\* received the Outstanding Alumni Award from the University of Arizona, School of Natural Resources and the Environment for "outstanding contributions to the school accomplishments of its mission and goals".



Biological soil crusts (mosses, lichens, and cyanobacteria) between grasses in eastern Utah. (Photo credit: Hilda Smith, USGS)