

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).

IMAGE OF THE MONTH



The rare island night lizard found on San Nicolas Island, CA. For more information on this interesting lizard, please visit: https://www.usgs.gov/centers/sbsc/science/monitoring-rare-island-night-lizard-san-nicolas-island?qt-science_center_objects=1#qt-science_center_objects
(photo credit: Gary M. Fellers, USGS)

OUTREACH

Media, Broadcasts, and Films

Dryland restoration approach using small structures

Mike Duniway* and Becky Mann* were interviewed by KZMU, a community radio station located in Moab, UT. Mike and Becky discussed their dryland restoration project that uses small structures to influence the local environment to facilitate native plant seedling establishment. The small structures are called connectivity modifiers (ConMods) and they are small screens that protect seeds and provide them with safe spaces to germinate. Here is the link to the interview: <http://www.kzmu.org/3-24-2017-science-moab-changing-connectivity-desert/>. For more information on the ConMod restoration project, go to this link:

https://www.usgs.gov/centers/sbbsc/science/new-approaches-restoring-colorado-plateau-grasslands?qt-science_center_objects=0#qt-science_center_objects.



6" tall hardware cloth structures used to influence the local environment to favor native plant seedling establishment during restoration efforts in dry systems. (Photo credit: Rebecca Mann, USGS)

Turtles die in southern California lake following drought and fire

This USGS press release is about a recently published paper with SBSC personnel Jeff Lovich* (lead author) and Charles Yackulic* as co-authors, and discusses the combined effects of drought and fire on the fate of southwestern pond turtles in Elizabeth Lake, located in the Angeles National Forest. The link to the press release is here: <https://www.usgs.gov/centers/sbbsc/news>. The paper that the press release is based on is titled, "**The effects of drought and fire in the extirpation of an abundant semi-aquatic turtle from a lacustrine environment in the southwestern USA**" and can be found here:

<http://www.kmae-journal.org/articles/kmae/pdf/2017/01/kmae160179.pdf>.

Wind turbines affect behavior of desert tortoise predators

This joint USGS-University of California, Davis press release was prepared for a recently published study that investigated the effects of a wind energy facility and its associated complex of roads and culverts on mid-sized predator visitation at tortoise burrows. The press release can be found here:

<https://www.usgs.gov/centers/sbbsc/news>, and contains several videos of predators. The study that the press release is based on is titled, "**Mammalian mesocarnivore visitation at tortoise burrows in a wind farm**", and can be found here:

<http://onlinelibrary.wiley.com/wol1/doi/10.1002/jwmg.21262/abstract>.

Mickey Agha (University of California, Davis) is the lead author, and Amanda Smith*, Jeff Lovich*, and Shellie Puffer* are SBSC co-authors on the paper.



Photo of a bobcat investigating a desert tortoise. Image was taken by a motion-activated camera. (Photo credit: Mickey Agha, UC Davis)

Public and Partner Outreach Activities

Outreach event at Marble Canyon

SBSC staff Eric Kortenhoeven*, Anya Metcalfe*, and Megan Daubert* participated in the annual Guides Training Seminar convened by the Grand Canyon River Guides Association. This event was intended to

provide Grand Canyon river guides with interpretive information about the ecology and natural history of Grand Canyon that they can draw upon when interacting with their passengers on guided river trips. SBSC staff ran an informational table and provided SBSC monthly updates, Fact Sheets, and scientific publications about Grand Canyon that were authored by SBSC scientists. SBSC staff also recruited participants for their ongoing citizen science aquatic insect monitoring program, which was first started in 2012.

High school outreach event

Jeff Muehlbauer* assisted a Coconino High School AP Environmental Science class in Fossil Creek, AZ from April 13-15. A group of ~30 kids study the ongoing effects of dam removal and native fish restoration in Fossil Creek. Their teachers have been taking their classes to Fossil Creek for this project since 2000, including in 2002 when Jeff participated as a high school student! There are a series of research stations the kids rotate through, including fish, aquatic insects, and water quality stations. Jeff assisted with the instruction associated with these research stations.

Children's Health & Wellness Fair outreach event

Ken Sheehan* and Ben Vaage* attended the North Country HealthCare Children's Health & Wellness Fair. The fair had a STEM theme and Ken and Ben had displays of fish for the public to see, including a catfish larger than some of the children. It is estimated that approximately 400 children and 200 adults attended the fair. Ken's and Ben's display was particularly popular.

SCIENCE

Presentations, Posters, Lectures, Workshops, and Panels

Bunting, E.L.*, Munson, S.M.*, Bradford, J.B.*, and Andrews, C.*, 2017, Inter-regional comparisons of plant production responses to climate and soil water across the southwestern United States [presentation]: American Association of Geographers Annual Meeting.

Kennedy, T.*, 2017, Little bugs, big data, and Colorado River adaptive management [presentations]: Nicholas School of the Environment at the Duke University and to the Department of Biological Sciences at Idaho State University.

Lovich, J.E.*, Puffer, S.R.*, Agha, M., Ennen, J.R., Meyer-Wilkins, K., Tennant, L.A.*, Smith, A.L., and Vamstad, M.S., 2017, Fecundity and reproductive phenology of female Agassiz's desert tortoises (*Gopherus agassizii*) in the Sonoran Desert region of Joshua Tree National Park [presentation]: Desert Symposium 2017.

Metcalf, A.N.*, and Mixan, R. 2017. Do dams affect bat diets? [poster]: Western Bat Working Group annual meeting.

Puffer, S.R.*, Agha, M., Smith, A.L., Lovich, J.E.*, Delaney, D., Ennen, J.R., Briggs, J., Fleckenstein, L.J., Tennant, L.A.*, Walde, A., Price, S.J., and Todd, B.D., 2017, Mesocarnivore visitation and interactions with Agassiz's desert tortoises (*Gopherus agassizii*) and their burrows [presentation]: Desert Symposium 2017.

Sankey, J.*, Kasprak, A.*, Caster, J.*, East, A., and Fairley, H.*, 2017, Sediment connectivity at source-bordering aeolian dunefields along the Colorado River in the Grand Canyon, USA [presentation]: European Geoscience Union Conference.

Sankey, T., Sankey, J.*, and Donager, J., 2017, UAV hyperspectral and lidar data analysis for vegetation applications [presentation]: European Geoscience Union Conference.

Thomas, K.*, 2017, Establishing traits that may determine the impacts of introduced herbivorous insects on North American conifers [presentation]: Entomological Society of America Annual Meeting, Pacific Branch.

Published Papers, Reports, Data Releases, etc.

Agha, M., Smith, A.L.*, Lovich, J. E.*, Delaney, D., Ennen, J.R., Briggs, J., Fleckenstein, L.J., Tennant, L.A.*, Puffer, S.R.*, Walde, A., Arundel, T.R.*, Price, S.J., and Todd, B.D., 2017, Mammalian mesocarnivore visitation at tortoise burrows in a wind farm: *The Journal of Wildlife Management*, <http://onlinelibrary.wiley.com/wol1/doi/10.1002/jwmg.21262/abstract>.

Bottero, A., D'Amato, A.W., Palik, B.J., Bradford, J.B.*, Fraver, S., Battaglia, M.A., and Asherin, L.A., 2017, Density-dependent vulnerability of forest ecosystems to drought: *Journal of Applied Ecology*, <http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12847/full> and <http://dx.doi.org/10.1111/1365-2664.12847>.

Bottero, A., D'Amato, A.W., Palik, B.J., Kern, C.C., Bradford, J.B.*, and Scherer, S.S., 2017, Influence of repeated prescribed fire on tree growth and mortality in *Pinus resinosa* forests, northern Minnesota: *Forest Science*, v. 63, no. 1, p. 94-100, https://www.researchgate.net/profile/Alessandra_Bottero/publication/311820299_Influence_of_repeated_prescribed_fire_on_tree_growth_and_mortality_in_Pinus_resinosa_forests_northern_Minnesota/links/585bf57e08ae329d61f2e3e5.pdf.

Bradford, J.B.*, and Bell, D.M., 2017, A window of opportunity for climate-change adaptation: easing tree mortality by reducing forest basal area: *Frontiers in Ecology and the Environment*, v. 15, p. 11-17, <http://onlinelibrary.wiley.com/doi/10.1002/fee.1445/full>.

Chambers, J.C., Beck, J.L., Bradford, J.B.*, and others, 2017, Science framework for conservation and restoration of the sagebrush biome: linking the Department of Interior's Integrated Rangeland Fire Management Strategy to long-term strategic conservation actions: USDA General Technical Report, <https://www.treesearch.fs.fed.us/pubs/53983>.

Ennen, J.R., Lovich, J.E.*, Averill-Murray, R.C., Yackulic, C.B.*, Agha, M., Loughran, C., Tennant, L.*, and Sinervo, B., 2017, The evolution of different maternal investment strategies in two closely related desert vertebrates: *Ecology and Evolution*, <http://onlinelibrary.wiley.com/doi/10.1002/ece3.2838/pdf>.

Kasprak, A.*, Caster, J.*, Bangen, S.G., and Sankey, J.B.*, 2017, Geomorphic process from topographic form: automating the interpretation of repeat survey data in river valleys: *Earth Surface Processes and Landforms*, <http://onlinelibrary.wiley.com/doi/10.1002/esp.4143/full>.

Lovich, J.E.*, Quillman, M., Zitt, B., Schroeder, A., Green, D.E., Yackulic, C.*, Gibbons, P., and Goode, E., 2017, The effects of drought and fire in the extirpation of an abundant semi-aquatic turtle from a lacustrine environment in the southwestern USA: *Knowledge & Management of Aquatic Ecosystems*, <http://www.kmae-journal.org/articles/kmae/pdf/2017/01/kmae160179.pdf>.

Lovich, J.E.*, and Yamamoto, K., 2017, Measuring the impact of invasive species on popular culture: a case study based on toy turtles from Japan: *Humans and Nature*, v. 27, p. 1-11, <http://www.hitohaku.jp/publication/r-bulletin/2016-001.pdf>.

Muehlbauer, J.D.* , Kennedy, T.A.* , Copp, A.J.* , and Sabol, T.A.* , 2016, Deleterious effects of net clogging on the quantification of stream drift: Canadian Journal of Fisheries and Aquatic Sciences, online, p. 1-8, [dx.doi.org/10.1139/cjfas-2016-0365](https://doi.org/10.1139/cjfas-2016-0365).

Palmquist, K.A., Schlaepfer, D.R., Bradford, J.B.* , and Lauenroth, W.K., 2017, Spatial and ecological variation in dryland ecohydrological responses to climate change: implications for management: Ecosphere, <http://onlinelibrary.wiley.com/doi/10.1002/ecs2.1590/full>.

Yackulic, C.B.* , Blake, S., and Bastille-Rousseau, G., 2017, Benefits of the destinations, not costs of the journeys, shape partial migration patterns: Journal of Animal Ecology, <http://onlinelibrary.wiley.com/doi/10.1111/1365-2656.12679/abstract>.

Zipkin, E.F, Rossman, S., Yackulic, C.B.* , Wiens, J.D., Thorson, J.T., Davis, R.J., and Grant, E.H.C, 2017, Integrating count and detection-nondetection data to model population dynamics: Ecology, <http://onlinelibrary.wiley.com/doi/10.1002/ecy.1831/abstract>.

OTHER NOTABLES

Scott VanderKooi* , Chief of the Grand Canyon Monitoring and Research Center, gave a presentation to the Colorado River Energy Distributors Association on GCMRC science updates in support of the Glen Canyon Dam Adaptive Management Program.

Erin Bunting* chaired a session at the American Association of Geographers Annual Meeting on “**Land Change: Production in Land Systems**”.

Joel Sankey* helped organize the “**New Challenges in Land Degradation Restoration Research**” session at the European Geoscience Union Conference.

Scott VanderKooi* , Chief of SBSC’s Grand Canyon Monitoring and Research Center (GCMRC) and GCMRC staff attended the spring meeting of the Glen Canyon Dam Adaptive Management Program's Technical Working Group (TWG) in Phoenix, AZ on April 20-21, 2017. VanderKooi presented a summary of GCMRC's proposed next Triennial Work Plan (FY2018-20) and staff answered stakeholder's questions about individual project proposals. GCMRC scientists David Ward* and Charles Yackulic* also presented results of an external review of GCMRC's fisheries program conducted in August 2016.



The endangered humpback chub, found in the Colorado River, is a species that the GCMRC studies. (Photo credit: David Ward, USGS)