



## 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



Havasu Creek just before it connects with the Colorado River. The fish near the sandbar are thought to be native bluehead suckers (*Catostomus discobolus*)  
(photo credit: David Goodenough, USGS)

## OUTREACH

### Media, Broadcasts, and Films

#### Keep track of USGS activities in Arizona using our Twitter account

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, native plant restoration approaches, water sampling, volcanoes, wildlife, and beautiful natural areas.



#### Rare sighting of a western pond turtle

A recent USGS press release was published about the sighting of a rare western pond turtle in the lower Mojave River, California. Jeff Lovich\* was working with the staff from The Living Desert Zoo and Gardens when the turtle was found. The title of the press release is title, "Searching to study the remaining few", and can be found here

<https://www.usgs.gov/centers/sbsc>. The Bureau of Land Management – California also mentioned this sighting on their Facebook page (<https://www.facebook.com/blmcalifornia/posts/1563994416958560>).



A rare sighting of a western pond turtle in the lower Mojave River. (Photo credit: Jeff Lovich, USGS)

#### Potential consequences of overlapping land uses and climate change in the Southwest

A recently published paper evaluating the effects of climate change and land use on recreation-based economics, habitat, cultural and spiritual values, water availability, soil productivity, and agricultural productivity has been receiving press attention. The authors of the paper are Stella Copeland\* (lead author, SBSC and Northern Arizona University), John Bradford\* (SBSC), Mike Duniway\* (SBSC) and Rudy Shuster (USGS, Fort Collins Science Center). The title of their paper is, "Potential impacts of overlapping land-use and climate in a sensitive dryland: a case study of the Colorado Plateau, USA", and can be found here: <http://onlinelibrary.wiley.com/doi/10.1002/ecs2.1823/abstract>. Below are links to press activity.

- A Northern Arizona University press release: "Increasing aridity and land-use overlap have potential to cause social and economic conflict in dryland areas",

<http://www.newswise.com/articles/view/675229/>

- An Arizona Daily Sun article: "Mapping the Colorado Plateau's land use hotspots", [http://azdailysun.com/news/local/mapping-the-colorado-plateau-s-land-use-hotspots/article\\_da273274-953c-54b3-8034-58aa126a8c0c.html](http://azdailysun.com/news/local/mapping-the-colorado-plateau-s-land-use-hotspots/article_da273274-953c-54b3-8034-58aa126a8c0c.html)

- ScienceDaily covered the press release:

<https://www.sciencedaily.com/releases/2017/05/170523171256.htm>



Dried up water source for cattle. (Photo credit: Mike Duniway, USGS)

#### Effects of a wind turbine facility on potential predators of desert tortoises

Jeff Lovich\* from the SBSC was interviewed by Popular Science about his recently published work regarding the effects a wind turbine facility had on potential predators of desert tortoises. The link to the Popular Science piece is here: <http://www.popsci.com/wind-farm-predators>. The link to Jeff's recently published paper is here: <http://onlinelibrary.wiley.com/wol1/doi/10.1002/jwmg.21262/abstract>.

## **Drought and the reproductive strategy of desert tortoises**

Two articles have been published on Jeff Lovich's\* research on the effects of drought on desert tortoises near Joshua Tree National Park.

- A Los Angeles Times article titled, "An 'evolutionary gamble' may be killing Joshua Tree's mother tortoises" was published. Jeff Lovich was quoted in the article as was Kristen Lalumiere (Joshua Tree National Park) and Debra Hughson (Mojave National Preserve). The link to the article is here: <http://www.latimes.com/local/california/la-me-tortoise-survival-20170515-story.html>.

- The Associated Press published an article titled, "California tortoises died trying to reproduce during drought", and the link to the article is here: [http://www.bakersfield.com/ap/state/california-tortoises-died-trying-to-reproduce-during-drought/article\\_d53dbb2e-5894-5b59-bdda-9c6d35d03434.html/](http://www.bakersfield.com/ap/state/california-tortoises-died-trying-to-reproduce-during-drought/article_d53dbb2e-5894-5b59-bdda-9c6d35d03434.html/).

## **Snapping turtle relocation**

Charles Drost\* responded to a call about a large, nonnative snapping turtle in Montezuma Well National Monument. Charles captured the 40-pound turtle and safely transported it to Flagstaff, and Brent Sigafus\* delivered the turtle to its new home at the Phoenix Zoo. Jeff Lovich\*, Charles, and Brent were interviewed by a reporter with the Camp Verde Bugle about the snapping turtle and turtles in general. Here is the link to the piece: <http://m.cvbugle.com/news/2017/apr/25/40-pound-snapper-turtle-found-montezuma-well/>.

## **SBSC scientist and U.S. Secretary of the Interior Ryan Zinke meet near Canyonlands National Park**

Mike Duniway's\* meeting with U.S. Secretary of the Interior Ryan Zinke near Canyonlands National Park was covered by the Salt Lake NPR station KUER. The link to the piece is here: <http://kuer.org/post/zinke-talks-climate-science-rancher-hopes-solutions#stream/0>. Additionally, a photograph of Mike and Secretary Zinke was posted on the Department of the Interior Flickr page: <https://www.flickr.com/photos/usinterior/34526382016/in/album-72157683501074886/>.

## **Public and Partner Outreach Activities**

### **Fish identification at an elementary school**

On April 28<sup>th</sup>, David Ward\* and Ken Sheehan\* conducted a fish show and tell for 3rd and 5th graders of the Sechrist Elementary School in Flagstaff, AZ. They taught hands-on fish identification of AZ native and nonnative fishes as well as discussed problems caused by invasive fish that get released into the wild.



Endangered humpback chub. (Photo credit: Scott VanderKooi, USGS)

### **Discussion with educators at a local school district**

Kirsten Ironside\* gave a presentation titled "Natural Resources and Educational Opportunities" to the staff of Maine Consolidated School District in Parks, AZ. Kirsten covered Department of the Interior programs about pollinators such as bats, hummingbirds, butterflies, and other pollinator insects. She also provided information on curricula available to incorporate into their lesson plans.

### **Turtle education for zoo patrons**

Brent Sigafus\* assisted Cristina Jones (Turtle Project Coordinator, with the Arizona Game and Fish Department) on May 19-21 with the 12th Annual Turtle Trapping at the Phoenix Zoo. This event, led by Arizona Game and Fish, brings together the Phoenix Zoo, non-government organizations, university

students, federal partners, and the general public to educate thousands of zoo patrons on the issues of releasing non-native turtles into the wild.

### **SBSC scientist filmed for an educational module**

On May 10th, Sasha Reed\* was filmed as part of an effort to create a short educational module for Utah State University's extension program, which aims to provide accessible knowledge for resource managers, decision-makers, and the general public. The topic of the module is biological soil crusts in the context of dryland restoration, land use, and climate variability.



Sasha Reed in field next to automated soil CO<sub>2</sub> chamber. (Photo credit: Jennifer LaVista, USGS)

## SCIENCE

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

Copeland, S.M.\*, Bradford, J.B.\*, Duniway, M.C.\*, and Schuster, R.M., 2017, **Potential impacts of overlapping land-use and climate in a sensitive dryland: a case study of the Colorado Plateau, USA:** Ecosphere, <http://onlinelibrary.wiley.com/doi/10.1002/ecs2.1823/abstract>.

Dibble, K.L.\*, Yard, M.D.\*, Ward, D.L.\*, and Yackulic, C.B.\*, 2017, **Bioelectrical impedance analysis for an endangered desert fish—Data:** U.S. Geological Survey data release, <https://doi.org/10.5066/F7CF9NMV>.

Gillan, J.K., Karl, J.W., Elaksher, A., and Duniway, M.C.\*, 2017, **Fine-resolution repeat topographic surveying of dryland landscapes using UAS-based structure-from-motion photogrammetry: assessing accuracy and precision against traditional ground-based erosion measurements:** Remote Sensing, <http://www.mdpi.com/2072-4292/9/5/437>.

Ironside, K.E.\*, Mattson, D.J.\*, Arundel, T.R.\*, and Hansen, J.R.\*, 2017, **Is GPS telemetry location error screening beneficial?:** Wildlife Biology, <http://www.bioone.org/doi/abs/10.2981/wlb.00229#>.

Ironside, K.E.\*, Mattson, D.J.\*, Choate, D., Stoner, D., Arundel, T.\*, Hansen, J.\*, Theimer, T., Holton, B., Jansen, B.\*, Sexton, J. O., Longshore, K., Edwards, T.C. and Peters, M., 2017, **Variable terrestrial GPS telemetry detection rates: addressing the probability of successful acquisitions:** Wildlife Society Bulletin, <http://onlinelibrary.wiley.com/doi/10.1002/wsb.758/epdf>.

Kasprak, A.\*, Caster, J.\*, Sankey, J.\*, and Bangen, S., 2017, **Geomorphic process topographic form, Colorado River, Grand Canyon—Data & Models:** U.S. Geological Survey data release, <https://doi.org/10.5066/F73776X6>.

Korman, J., Yard, M.D.\*, and Kennedy, T.A.\*, 2017, **Trends in rainbow trout recruitment, abundance, survival, and growth during a boom-and-bust cycle in a tailwater fishery:** Transactions of the American Fisheries Society, <http://www.tandfonline.com/doi/full/10.1080/00028487.2017.1317663>.

McCoy-Sulentic, M.E., Kolb, T.E., Merritt, D.M., Palmquist, E.C.\*, Ralston, B.E., and Sarr, D.A.\*, 2017, **Variation in species-level plant functional traits over wetland indicator status categories:** Ecology and Evolution, <http://dx.doi.org/10.1002/ece3.2975>.

McCoy-Sulentic, M.E., Kolb, T.E., and Palmquist, E.C.\*, 2017, **Plant functional traits, Colorado River, Grand Canyon, 2012-2014—Data:** U.S. Geological Survey data release, <https://doi.org/10.5066/F7BV7DTQ>.

Nauman, T.\*, 2017, **Automated Reference Toolset (ART)—Data**: U.S. Geological Survey data release, <https://doi.org/10.5066/F7XS5SW0>.

Wildman, R.A., and Vernieu, W.S.\*, 2017, **Turbid releases from Glen Canyon Dam, Arizona, following rainfall event of September 2013**: Lake and Reservoir Management, <http://dx.doi.org/10.1080/10402381.2017.1293756>.

Yackulic, C.B.\*, Blake, Stephen, and Bastille-Rousseau, Guillaume, 2017, **Full annual cycle bioenergetics model of migration applied to Galapagos tortoises—Data**: U.S. Geological Survey data release, <https://doi.org/10.5066/F7154F7P>.

Yackulic, C.B.\*, 2017, **Full Annual Cycle Bioenergetics model of migration applied to Galapagos tortoises—Model**: U.S. Geological Survey software release, <https://doi.org/10.5066/F78K777N>.

## **New Grants and Other Funded Opportunities**

### **Soil-ecohydrologic framework for Colorado Plateau drylands**

SBSC's Mike Duniway\*, John Bradford\*, Seth Munson\*, and Travis Nauman\* were informed that their proposal to develop a soil-ecohydrologic framework for Colorado Plateau drylands climate change response was selected for funding in the National Park Service FY 2019 Natural Resources Servicewide Comprehensive Call. Their proposal was developed in close collaboration with NPS partners from Canyonlands National Park (Mark Miller), Capital Reef National Park (Terry Fisk), and the Northern Colorado Plateau Inventory and Monitoring Network (Dana Witwicki and David Thoma). This 3-year research project will support climate-change adaptation and associated conservation actions in Canyonlands and Capitol Reef national parks by developing a decision support framework and analytical tools that encapsulate plant species assemblages and soil influences on ecosystem vulnerability to climate change. The framework and tools will facilitate site-specific, science-based decision making pertinent to ecosystem restoration and other management actions in the context of climate change. Researchers and NPS collaborators anticipate the resulting decision-support frameworks, interpretations, and vulnerability maps will be critical tools for NPS management.

## **OTHER NOTABLES**

Scott VanderKooi\*, Chief of SBSC's Grand Canyon Monitoring and Research Center (GCMRC), attended an Executive Committee Retreat for the Middle Rio Grande Endangered Species Collaborative Program in Taos, NM on April 26, 2017. VanderKooi was invited to give a presentation on adaptive management from the perspective of a practitioner. His presentation included an overview of the Glen Canyon Dam Adaptive Management Program and examples of how approaches to managing sediment, endangered species, and sport fish in the Colorado River in Glen and Grand Canyons have evolved through experimentation and learning since the program was established in the mid-1990s.

Cecil Schwalbe\*, an SBSC emeritus ecologist, spoke about the natural history and black market trade of amphibians and reptiles on Saturday, May 6. The title of his talk is, "**Herps, Perps, and Twerps: 40+ Years of Slitherin**". The talk and slideshow will take place at the National Parks Store (WNPA), 12880 North Vistoso Village Drive, Oro Valley.

Research Ecologist and Soil Scientist Mike Duniway\* participated in a tour of the Canyonlands Research Center (CRC) by Interior Secretary Zinke on May 9<sup>th</sup>. The CRC is a Nature Conservancy lead collaborative research center (including Universities, USGS, BLM, NPS, USFS) and working cattle ranch located in the

new Bear's Ears National Monument. The USGS and university collaborators conduct a variety of climate change, restoration, and ecological research at the CRC. Zinke and his staff visited the CRC as part of his tour of the Bear's Ears NM. Mike had an opportunity to inform the Secretary on the important land management relevant research the USGS is conducting in the area and discuss the importance of the USGS's close collaborations with our DOI partners.

Jeff Lovich\* briefed Senator Feinstein's staff on May 22 about his desert tortoise research in and around Joshua Tree National Park over the last couple decades.

Mike Duniway\* led a field soil characterization training for the BLM Assessment Inventory and Monitoring (AIM) program on May 23 in Grand Junction, Colorado. The one-day soils training is part of a weeklong training for ~60 participants. AIM (<http://aim.landscapetoolbox.org/introduction-to-aim/>) is a national BLM effort for collecting land condition across all BLM lands, and soil and ecological site characterization is an important part of the AIM data.

The first Amazon Dams Network workshop was held in Flagstaff, AZ during the week of May 15. The SBSC, University of Florida, and Northern Arizona University organized the meeting, which brought people from the Brazil, Mexico, Canada, and the United States together to share scientific ideas about the biological, ecological, economic, and social consequences of dams, and to further develop a research network between scientists working in the Colorado River Basin and in the Amazon River Basin. SBSC's Ted Melis\*, Lucas Bair\*, Charles Yackulic\*, Scott VanderKooi\*, and David Ward\* participated in this workshop.

Mike Moran\* and Kathryn Thomas\* participated in the Southwest Region Science Exchange conference in Denver from May 23-25. The purpose of the meeting was to foster informed development and optimal implementation of science programs through collaborative discussion and sharing of resources and expertise. Representatives of all science centers in Arizona, Utah, Texas, Colorado, Oklahoma, and Kansas provided updates on their center's activities and capacities. Interdisciplinary and collaborative research conducted by SBSC's Grand Canyon Monitoring and Research Center and SBSC's Terrestrial Dryland Ecology branch were presented by Mike and Kathryn, respectively.



Galapagos tortoise on Santa Cruz Island, Galapagos. (Photo credit: Charles Yackulic, USGS)