**2017-18 WATERS COLLABORATIVE ACCOMPLISHMENTS**

The WATERS Collaborative boosts funding, logistics support, and awareness of water-related studies on the SSU campus. Not all projects included in the list below received direct support through the collaborative. All were eligible for the Best Water Poster award.

**The Year in Numbers**

* 415 students participated in 47 projects with 25 faculty. Participants included students in 20 courses, 13 departments, and 3 schools.
* 1500 additional students, faculty, staff and community members participated at 2 events:
	+ SSU Symposium on Research and Creativity, May 3, 2018 - WATERS collaborated with the School of Science & Technology, the Office of Undergraduate Research and Creative Experiences (SOURCE), and others to host a two-day campus-wide symposium that celebrated the achievements of SSU students engaged in inquiry. This year, 31 posters were submitted to the symposium on water-related topics and were judged by a panel of community and faculty judges. Winner of the Best Water Poster award was presented by SCWA General Manager Grant Davis to Carlye Chandler (Geography, Environment and Planning) for her poster, “Anthropological and environmental factors impacting climate change mitigation through carbon sequestration: an evaluation of elevation, vegetation, fire and land use”
	+ Living with Fire Symposium May 9-12, 2018 - The symposium brought together experts in fire ecology and management, community planning, fire safety and preparedness, and global change. The audience included property owners, policy makers, planners, managers, scientists, educators, and any others who are interested in the intersection of human communities and fire. The event was sponsored by a coalition of educational, fire and resource management, and extension organizations.
* 28 organizations worked with faculty and students on water projects: Sonoma County Water Agency, SSU Facilities, Center for Environmental Inquiry, California Department of Water Resources, Americorps, JUMP – Join Us Making Progress, Vintners Square D’Argenzio Winery, City of Santa Rosa, US Fish & Wildlife, Sonoma Mountain Ranch Preserve, Department of Transportation, City of Rohnert Park, City of Penngrove, City of Petaluma, Sonoma RCD, Re-Oaking Coalition, Occidental Arts and Ecology Center, Annadel State Park, UC Davis Bodega Marine Laboratory, Colusa National Wildlife Refuge, Pepperwood Preserve, Sonoma County Regional Parks, Santa Rosa Creek Stewardship Program, California Conservation Corps North Bay, US Geological Survey, California Fire Science Consortium, Sonoma County Forest Working Group, University of California Extension, US Forest Service, CalFire
* A faculty curriculum development grant awarded to Owen Anfinson (Geology) supported the integration of an inquiry-based service-learning project on Copeland Creek into course GEOL 311/312 Sedimentary Geology.

**Project Results**

[***Land Use Planning Projects***](http://web.sonoma.edu/waters/projects/planning/index.html)

* **Integrating water and land use planning** – After further refinement, the “Integrated Water and Land Use Tool” developed by SSU’s Center for Sustainable Communities was identified as a strong teaching tool but not accurate or flexible enough to inform planning decisions about local development projects. Instead, Waters funding was used to launch a Land Use and Water Resources Planning course (GEP 379) that uses the tool to teach students about trade-offs in water resources development. Students then undertook projects that provide recommendations for integrating water resources planning into regional general plans (Accacain 2018, Deleissegues 2018, Di Mario 2018). We are currently exploring development of a collaborative student internship program with SCWA and County Planning.

[***Habitat Management Projects***](http://web.sonoma.edu/waters/projects/vegmanagement/index.html)

* [**Copeland Creek Restoration Project**](http://web.sonoma.edu/waters/projects/vegmanagement/ssu_copeland.html) – This multi-year project engages students in developing grant applications, restoration planning and implementation, plant propagation, and monitoring of a 1-acre restoration project on the campus portion of Copeland Creek. This year, we continued invasive species removal and planted the first natives (propagated in the greenhouse during Spring 2017): grasses, rushes, and sedges. To facilitate survivorship monitoring, we established four planting zones of roughly the same size (800 m2): two in drier meadow areas near the bike path, and two in a seasonal “wetland” nearer the creek. Yellow flagging was installed to discourage joggers and bicyclists from cutting through the newly planted restoration site. Teams of students and community volunteers were organized by JUMP, the Watershed Stewards Program, and the North Bay Conservation Corps. Student monitoring projects this year included:
	+ **History of restoration on Copeland Creek** - (Lambert et al. 2018).
	+ **Bird monitoring on Copeland Creek -** We found more bird species on the campus section of Copeland Creek than was documented in 1999 (Jackson et al. 2018)
	+ **Vertebrate surveys on Copeland Creek** - Camera traps documented 8 new species on the SSU section of Copeland Creek (Rodriguez et al. 2018)
	+ **Vegetation monitoring on Copeland Creek** – We found 10 new plant species on our vegetation monitoring transects (Rodriguez and St. John 2018)
	+ **Cover board monitoring on Copeland Creek** – Vertebrates and invertebrates were not found under cover boards located closer than 10 meters from the creek bank (Schwartz et al. 2018)
	+ **Blackberry monitoring** – native and non-native blackberries were mapped as part of a long term restoration success monitoring – (Goman data 2018).
* **Carbon sequestration of riparian soils** - ***Winner of the 2018 Best Water Poster Award*** - Wetland and woodland soils store more carbon than grasslands, suggesting that restoration of these habitats is important for climate change mitigation (Chandler 2018)
* **Vernal pool habitat for endangered California tiger salamanders –** We found more salamander larvae in deeper pools and no salamanders in pools less than 42 cm (Pennella et al. 2018).
* **Using DNA to detect aquatic species** - We successfully used eDNA to detect bullfrogs and crayfish in ponds of the Sacramento Valley (Nabor et al. 2018). Designed primers consistently amplified products and could be applied to detect California Tiger Salamander in pools on the Santa Rosa plain (Torres et al. 2018).
* **Dominant plant type affects arthropod diversity in aquatic systems** - Arthropod diversity was greater in habitats dominated by Tule (*Schoenoplectus acutus*) than those dominated by Smart Weed (*Persicaria punctate*) at the Colusa National Wildlife Refuge (Bartolone et al. 2018)
* **Diet comparison among populations of invasive American bullfrogs -** Bullfrogs consuming more invasive crawfish were less likely to consume native vertebrate species (Lozano et al. 2018)
* **Effects of the 2017 North Bay fires on lizards near ponds** – Abundance of southern alligator lizards and western fence lizards near ponds was greater after the Tubbs Fire. (Cimmiyotti et al. 2018)
* **Basking sites in red-legged frogs** – Basking distance from ponds, pools and creeks varied significantly with frogs basking furthest from the water edge in ponds and the closest in pools (Jain et al. 2018).
* **Newt identification** - We found that the newts *Taricha granulosa* and *T. torosa* can be identified using measurements of tail length and snout-vent length (Morales et al. 2018).
* **Land Management Training -** CEI’s Land Management Program trained 20 students in restoration techniques and they worked on five restoration projects with partners in west Sonoma County.
* **Freshmen studies in habitat management -** Where they occurred, the non-native red-eared sliders were either more abundant than the native western pond turtles, or they were the only turtle present (Zogg et al. 2018).

[**Sediment and Erosion Projects**](http://web.sonoma.edu/waters/projects/sediment/index.html)

* **Copeland Creek flood modeling** – The US Army Corps of Engineers HREC model indicates that Copeland Creek jumps it banks when flows reaches 1700 cubic feet per second, a flow characterized as a 10-year flood. Downstream areas affected are the cities of Rohnert Park, Penngrove and Petaluma (Gebauer 2018).
* **Characterization of the Copeland Creek alluvial fan** – We established baseline measurements for longitudinal profile and cross sections of the alluvial fan at the avulsion site (Russo 2018).
* **Geologic weathering and landslide susceptibility in the Copeland Creek watershed –** The composition of material (basalts were stable, volcanoclastics were unstable) rather than weathering effects is the key factor affecting land stability at the Osborn Preserve (Zander and Waters 2018).
* **Freshmen studies in erosion and sedimentation** - Crane Creek Regional Park’s grazing history had no correlation with the severity of soil compaction (Azevedo et al. 2018).

[***Water Quality Projects***](http://web.sonoma.edu/waters/projects/water_quality/index.html)

* **Effects of wastewater treatment on pharmaceuticals** - Chlorination does not effectively deteriorate Azithromycin; UV light radiation may be more efficient at deteriorating molecular structure (Oliva et al. 2018)
* **Development of a modular biotreatment system for winery and brewery wastewater** – Passage of winery wastewater through the microbial fuel cell and biochar/sand filter improves its value for use in crop irrigation but phytoinhibitory components still remain at the end of the treatment process (Monahan et al. 2018). The system displays COD removal and biogas production similar to a full-scale high-efficiency anaerobic digester. Colored compounds are recalcitrant to degradation (Ramirez et al. 2018).
* **Bacteria levels in the Copeland Creek watershed** – Coliform bacteria levels in Copeland Creek were nine times higher than the EPA limit for recreational waters (Myhre and Potter 2018).
* **Sediment nutrients and water quality credit trading –** At the Stony Point Road crossing, the Laguna de Santa Rosa had significantly higher levels of phosphorus and nitrogen than creek sediments upstream. Removal of these sediments could be used for water quality credit trading (Langan et al. 2018).
* **Wastewater treatment effects on antibiotics –** Chlorination processing typical of treatments at wastewater plants is not effective at deteriorating antibiotics(Oliva et al. 2018).
* **Nitrogen, phosphorus, and metals in stream sediments downstream of the Tubbs Fire** - Although nitrogen and phosphorus levels were elevated at some of our sampling sites, we did not detect unsafe levels of chromium, copper, nickel, zinc, antimony, arsenic, beryllium, cadmium, lead, selenium, or thallium in sediments downstream of Coffey Park and Fountaingrove after the 2017 Tubbs Fire (Hopkins et al. 2018)
* **Freshmen studies in water quality** – Dissolved oxygen levels were too low to support Coho salmon in reclaimed water discharge areas of the Russian River (Cardenas et al. 2018); Bacteria could increase growth of mint plants in aquaponics systems (Gonzales et al. 2018); Basil and rosemary but not mint grew better using aquaponics than traditional soil planting (Johnson et al. 2018); Copeland Creek water passing through Rohnert Park was more acidic and less oxygenated than water in the upper watershed at SSU’s Fairfield Osborn Preserve (Lovelace et al. 2018); Nitrogen runoff from boskashi (fermentation enriched soils) was less than nitrate runoff from chemically fertilized soils (Martin et al. 2018)

[***Water Availability and Use Projects***](http://web.sonoma.edu/waters/projects/availability_use/index.html)

* **Students learn about water from a social robot** - Students retained more information about water when taught by a human rather than a social robot (Beller et al. 2018).
* **Predicting extreme rainfall in the Copeland Creek watershed -** Rainfall data from Bodega Bay can be used to predict extreme rainfall in the Copeland Creek headwaters, providing an opportunity for development of an early flood warning system for Rohnert Park (no poster).
* **Interannual cumulative rainfall variability in Sonoma County –** on-going study (no poster)
* **Investigation of wind gusts in a heterogeneous environment** – on-going study (no poster)

[***Arts***](http://web.sonoma.edu/waters/projects/arts/index.html)

* **Santa Rosa Creek Stewardship Documentary** – Interviews with staff and coverage of volunteer Earth Day events hosted by the Santa Rosa Creek Stewardship Program (Daly et al. 2018)