



APPLETON-WHITTELL RESEARCH RANCH

of the

NATIONAL AUDUBON SOCIETY



ANNUAL REPORT - 2015

The Research Ranch is a collaborative effort among Audubon, Bureau of Land Management, Swift Current Land & Cattle Company, The Nature Conservancy, The Research Ranch Foundation, and U.S. Forest Service. The 8,000 acre sanctuary for native biota and ecological research facility is located in southeastern Arizona.

MISSION of the RESEARCH RANCH: To be a living laboratory to determine and demonstrate methods to safeguard and rehabilitate grasslands and related ecosystems, and to assist policy makers and other citizens in the care and protection of our native ecosystems, natural resources, and quality of life.

GOALS

- Conservation– to be a premier semi-arid grassland ecosystem that fosters a natural diversity of native species.
- Research – to understand how grasslands and related ecosystems function, and to recognize the key elements that safeguard these ecosystems.
- Outreach and Education– to advocate for grassland ecosystems by encouraging citizens and policy makers to safeguard and rehabilitate native ecosystems throughout the region.

From the Director

This is the latest “Annual Report” written since we started pulling the highlights of the year together in one place for future reference. Not because 2015 wasn’t a busy year, but because in January (2016), just after we started compiling information for this report, we received the draft Environmental Assessment from the Bureau of Reclamation detailing their plans to construct a concrete “fish barrier” in O’Donnell Canyon. We’ve been dealing with this issue for 10 years, so it wasn’t a total surprise but it was a priority to not only send in our comments, but make sure all the affected parties (researchers, partners, ranchers) had the opportunity to comment, too. Hopefully in the 2016 Annual Report we can share news of a favorable outcome.

Consequently, the 2015 Annual Report got shoved to the side and almost got scrapped, but we decided that we needed to document at least some of the highlights for posterity!

~Linda Kennedy, Ph.D., Director

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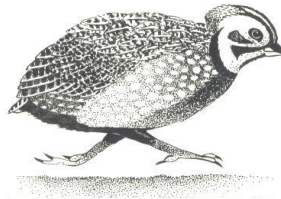


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CONSERVATION

Precipitation: 2015 started out with a snowfall on New Year's Day (photo, right), and ended up with 17.56" for the annual total at the gage at Headquarters. Over 6 inches of this total came in September or later, which meant there was not much fall flower display or forb seed production.



Precipitation at Research Ranch Headquarters (inches)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2000	0.01	0.28	0.41	0.02	0.00	3.60	1.45	3.80	1.05	10.50	0.60	0.00	21.72
2001	1.40	1.80	0.00	1.81	0.00	1.11	3.50	3.10	2.53	0.00	0.09	0.22	15.56
2002	0.45	0.00	0.02	0.00	0.00	0.00	3.03	0.40	2.77	0.58	0.38	0.98	8.61
2003	0.00	2.02	0.20	0.00	0.00	0.00	3.49	4.58	1.50	1.75	0.95	0.32	14.81
2004	1.58	1.01	0.63	1.03	0.00	0.22	2.26	1.81	0.71	0.17	0.58	1.13	11.13
2005	2.08	1.21	0.25	0.24	0.87	0.09	2.02	4.51	2.07	0.61	0.00	0.09	14.04
2006	0.03	0.00	1.01	0.00	0.00	1.79	6.96	5.81	2.98	0.09	0.00	0.44	19.11
2007	1.29	0.00	0.80	0.27	0.00	0.17	7.05	2.27	1.73	0.59	0.74	2.16	17.07
2008	0.65	0.72	0.05	0.00	0.35	1.78	4.82	3.77	0.91	0.53	0.85	0.12	14.55
2009	0.35	0.35	0.26	0.13	0.32	0.62	3.01	2.40	2.01	0.64	0.26	0.62	10.97
2010	4.57	2.05	0.62	0.57	0.00	0.04	6.05	5.83	0.75	0.17	0.04	0.73	21.42
2011	0.00	0.26	0.03	0.12	0.00	0.00	4.44	2.53	2.23	0.23	0.69	2.42	12.95
2012	0.16	0.26	0.42	0.00	0.50	0.13	10.78	1.87	1.18	0.00	0.20	1.97	17.47
2013	1.01	0.44	0.23	0.04	0.00	0.36	3.92	3.03	3.07	0.00	1.38	0.77	14.25
2014	0.00	0.12	2.02	0.11	0.00	0.00	3.24	5.49	7.17	1.07	0.00	0.71	19.93
2015	2.85	0.08	1.29	0.71	0.38	0.43	2.41	3.07	3.12	1.51	1.05	0.66	17.56
Mean 00-15	1.03	0.66	0.52	0.32	0.15	0.65	4.28	3.39	2.24	1.15	0.49	0.83	15.70



The first **Coordinated Resource Management Plan (CRMP)** for the Research Ranch is on track to be delivered to all partners by fall, 2016. The last vegetation transect was established in November on the Forest Service portion of AWRR with Steve Bluemer (USFS) and Alisha Phipps (USDA-NRCS). Photo at right.



Fire: Three small fires were recorded on AWRR in 2015, all ignited by lightning and extinguished by the accompanying rain. The Sonoita-Elgin Fire Department responded to the largest (just over 50 acres), but it was out by the time they arrived. The photo (left) was taken by Roger Cogan from the north patio of the Grassland Center.

Threatened or Endangered Species:

Chiricahua Leopard Frogs are back on the Research Ranch! After being extirpated by unknown causes in the 1980s, this threatened species has been reintroduced to two locations (see photo). Both populations are doing well and we anticipate new populations will result as individuals mature and begin migrating away from the release sites. Thanks to all who made the return of this species possible: staff from BLM, AZGF, USFWS, the Phoenix Zoo, and the Frog Project!



Invasive Species: Work continues to protect native diversity in both upland and riparian grasslands with financial assistance from Arizona State Forestry Division (Grants #PTG 14-901 and IPG 13-701).



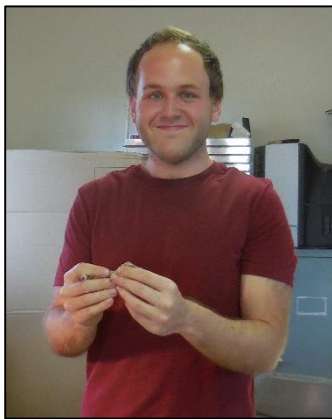
The spring of 2015 brought a huge influx in *Cardaria draba* (Whitetop), a state Noxious Weed. Several populations were found in O'Donnell Canyon, in and near sacaton. This species is known to reduce native biodiversity in grasslands and may be toxic to cattle, which is not directly a concern here, but we are taking all possible steps to prevent it from traveling downstream to the Babacomari Cattle Ranch, including the Babacomari Cienega.

A new species was added to the Research Ranch list of amphibians – Cogan found **Arizona Tree Frogs!** This tiny frog (1.5” snout to tail) was known to occur in the Canelo Hills, but had never been reported here.



Sacaton Grassland/Floodplain Rehabilitation: The RIESTER Conservation Foundation continued their financial support again this year for our effort to rehabilitate a floodplain dominated by non-native Bermudagrass in Post Canyon. This foundation has contributed over \$18,000 towards this effort over the past years and their support is deeply appreciated.

Erosion Control: What would we do without volunteers like this crew from the Sierra Club Service Tours who formed a human chain to shuffle and position rocks to stop erosion caused by a road? Some projects are much easier (and more fun) if done by a team. The Sierra Club group helped with many projects like this!



RESEARCH & MONITORING

The **2015 Apacheria Fellowship** was awarded to Anthony Gilbert (Ohio University) to expand his doctoral research into comparison of the thermal dependence of multiple levels of locomotor performance for the ornate tree lizard, *Urosaurus ornatus*.

The summer season was one of the busiest in recent memory for research and monitoring. Examples of external (non-AWRR staff) projects include:

- Erik Andersen**, University of Arizona, and crew continued his dissertation work on the effects of woody encroachment on grassland birds,
- Anthony Gilbert** and crew, University of Ohio, studied thermal dependence on locomotor performance for *Urosaurus ornatus*,
- Greg Joder**, independent researcher, established a network of trail cameras,

Matthew Lattanzio, Ph.D. and crew, Christopher Newport University, continued previous work on tree lizards and spiny lizards, plus collected data on historic collection sites of tree lizards,

Tony Leonardini, Research Ranch volunteer, continued his year-round avian survey, **Andrew Salywon**, Ph.D., Desert Botanical Garden, and **Ron Tiller**, Ph.D., continued their hydrological studies on the Research Ranch and in nearby cienegas,

Richard Simpson (photo at right), Arizona State University, studied black-chinned hummingbirds for his dissertation: "Evolution of Hummingbird Visual Ornaments,"



Tice Supplee, Audubon Arizona, and crew conducted one survey for Yellow-billed Cuckoos, and another for the Research Ranch Important Bird Area,

Corynne Wright and **Michael Meyer**, Ph. D., Christopher Newport University, were onsite to study the responses of ground beetles to fire,

Justin Zweck, Saint Louis University, returned to continue his work on the pollination ecology of *Dalea*.

Biologists from **federal and state agencies** collected data on soils (NRCS), atmospheric conditions (NOAA and USDA-ARS), plants (BLM,CNF,NPS, USFWS), and vertebrates (AZGF, USFWS).



Kathryn Miller (left), a senior at Patagonia Union High School, is working on her volunteer project, development of an herbarium and flora for TNC's Canelo Hills Cienega Preserve. Kat collected 2 voucher specimens of each species, 1 for CHCP and 1 to add to the Research Ranch herbarium.

AWRR staff and volunteers continue monitoring upland vegetation, mesquite encroachment, precipitation, depth-to-groundwater, reptiles, and amphibians plus the annual Appleton-Whittell Christmas Bird Count.

To see a complete list of active research/ monitoring projects and also publications associated with the Research Ranch, see pages 12-23.



EDUCATION & OUTREACH

Living Gently on the Land

Potlucks & Presentations: Once a month through winter, spring and fall the Research Ranch hosts a seminar on topics of general conservation interest. The presentations are preceded by a potluck – a great way for our neighbors (especially those new to the area) to get acquainted in this rural community and to the Research Ranch!



September 12 - **The Expeditions and Discoveries of George Bird Grinnell, Father of Glacier National Park and Founder of the First Audubon Society** by Hugh Grinnell, sponsored by Arizona Humanities.

October 10 - **Grass Fed Beef Operation**, by Dennis Moroney, BS Animal Science & Agriculture Owner, 47 Ranch

November 14 - **Bald Eagle & Golden Eagle Status**, by Kurt Licence, Raptor Management Coordinator, Arizona Game & Fish

January 10 – **Soils (the other kind of dirt)**, by Dan Robinett, Robinett Rangeland Resources

February 14 – **60 Years of Research at the Walnut Gulch Experimental Watershed**, Phil Heilman, USDA-ARS Southwest Watershed Research Center

March 14 – **FIREWISE**, by Joseph DeWolf, Chief of Sonoita-Elgin Fire Department (at right).

April 11 – **Alaska Adventures**, presented by John Hoffman and Mary Ellen Morbeck

May 9 – **Retirement party for Pat Kugler.**



The **Science on the Sonoita Plain** symposiums were established to bring together and share the results of scientific investigations that are occurring within and informing us about the unique and diverse resources of the Sonoita Plain in the upper watersheds of Cienega Creek, Sonoita Creek, and the Babocomari River. SoSP is sponsored by the Cienega Watershed Partnership, the Nature Conservancy and Audubon. The 7th annual event was held on the Research Ranch on June 6th and included updates from agencies and NGOs, scientific posters, presentations from researchers on a variety of topics, plus the morning's topic of the year "Water Management." (see agenda, page 24)



Each year during the SoSP Doug Duncan, USFWS, conducts the annual survey of Desert Pupfish in the HQ pond which gives participants the opportunity to see this federally listed species up close.

Access to the Research Ranch is restricted to protect both the habitat and the research values for which the facility was established, but that doesn't mean that humans are banned! **Field Trips and Meetings** are opportunities to share AWRR's mission with a broad audience, including:

Arizona State Parks Natural Areas Program Advisory Committee met here and had many questions about the mission and strategic importance of the Research Ranch. They especially enjoyed a field trip to see the area where we are treating invasive plant species.



The **Green Valley Birders** (left) enjoyed a tour led by Cogan and Tony Leonardini (AWRR Volunteer).

USDA-Plant Materials Center offered technical advice on invasive species treatment.

AWRR was the lunch stop for **Arizona Historical Society's** tour of area ranches.

The architectural team that is designing a plan for **Florida Field Station of the Santa Rita Experimental Range** visited the facilities.

The **Coronado Forest Service** held their Leadership Team meeting at AWRR.



Dr. Pedro Chavarria (far left) brought his **Ecology and Hydrology of the Southwest** class (Northern New Mexico College) to AWRR for several days. Andres Romero (below, left) won the Grass Identification Contest and was congratulated by Kennedy!



But AWRR's outreach efforts don't stop at the boundaries of the Research Ranch – Cogan has become a regular speaker at **Southwest Wings** (2015 was his 4th year), where he weaves the story of AWRR through his lectures on reptiles and amphibians. And both Cogan (left) and Kennedy taught classes (Herpetiles of SE AZ & Grassland Ecology, respectively) through the **University of Arizona's Life Long Learning** program in Green Valley.

FACILITIES

The Swinging H Ranchhouse is now available for occupancy year-round! Thanks to the generosity of Ruth Dyson and many other donors, plus the expertise (and generosity) of Elgin Energy, a mini-split heating system has been installed and is working great.

ADMINISTRATION



Suzanne Wilcox is AWRR's new Office Manager, taking over from Pat Kugler, who retired in 2015 after more than 9 years of service. In addition to the traditional responsibilities of the position, Suzanne will be taking the Audubon training to become the GIS lead for the Research Ranch.



Roger Cogan, who has been with the Research Ranch for 5 years as Conservation Coordinator, recently accepted a promotion to a new position: Conservation Program Manager. The position change better acknowledges his responsibilities, especially his work with Species of Greatest Conservation Need as designated by AZGF (Federal and State Threatened & Endangered, species of concern).

Distributions from the Research Ranch endowment to the operating account totaled \$201,014, \$10,193 more than the prior fiscal year. The market value of the endowment fund on July 1, 2014 equaled \$4,838,902, but had decreased to \$ 4,706,678 by June 30, 2015. See page 12 for Auditor's report.



NATIONAL AUDUBON SOCIETY, INC.
Research Ranch
Schedules of Activities - Research Ranch and Changes in Surplus Fund
For the years ended June 30, 2015 and 2014

	<u>2015</u>	<u>2014</u>
REVENUE		
Contributions	\$ 21,850	\$ 15,501
Grants	6,004	-
Rentals	5,760	4,455
Pooled investment income - appropriated	201,014	190,821
Other income	7,290	10,137
Assets released from restrictions	5,000	945
Total revenue	<u>246,918</u>	<u>221,869</u>
EXPENSES		
Salaries and fringe benefits	157,296	157,306
Travel	-	937
Professional and Consulting Fees	1,615	-
Postage - general	296	522
Grants	1,500	1,000
Gas and electricity	1,623	1,893
Building and office maintenance	18,393	594
Telephone	4,664	5,055
Insurance	5,411	7,024
Maintenance - general, road and vehicles	6,420	4,357
Office and household supplies	2,202	2,603
Education materials	-	179
Equipment rental	108	-
Furniture and fixtures	1,477	-
Computer equipment and software	372	441
Farm supplies	1,314	1,482
Printing	478	2,593
Research Equipment	94	-
Licenses, permits and registrations	37	422
Dues and subscriptions	20	20
Support services allocation	38,043	38,253
Other	-	15
Depreciation	1,708	1,708
Total expenses	<u>243,291</u>	<u>226,404</u>
Excess (deficit) of revenues over expenses	<u>\$ 3,627</u>	<u>\$ (4,535)</u>
Surplus, beginning of year	\$ 107,087	\$ 111,622
Funds added (released into operations)	<u>3,627</u>	<u>(4,535)</u>
Surplus, end of year	<u>\$ 110,714</u>	<u>\$ 107,087</u>

**Reports and Publications Associated with the Research Ranch
Received since 2014 Annual Report**

- Arizona Antelope Foundation Inc. (2015) Pronghorn. Tracy Unmacht, Ed. 21:19.
- Arizona Antelope Foundation Inc. (2015) Pronghorn. Tracy Unmacht, Ed. 21:17.
- Biederman, J. , R. Scott, M. Litvak, W. Oechel, T. Kolb, M. Goulden, E. Yezpe, G. Ponce-Campos, S. Papuga, G. Maurer, D. Krofcheck, S. Dore, T. Meyers, P. Krishnan, D. Bowling. 2015 Ecosystem carbon balance in a drier future: land-atmosphere exchanges of CO₂, water and energy across semiarid southwestern North America (B13F-0670: Terrestrial Biome Fluxes and Biogeochemical Impacts of Forest Disturbances: Measurements and Modeling from Minutes to Millennia, December 14, 2015), AGU Fall meeting 2015. Poster.
- Bock, C.E. and J.H. Bock. 2014. Effects of wildfire on riparian trees in Southeastern Arizona. *The Southwestern Naturalist* 59(4): 568-574.
- Crawford, J. 2015. *Pectis inberbis* survey in tributary of O'Donnell Canyon: *Lilaeopsis schaffneriana* ssp. *recurva* surveys in Lone Mountain Canyon-exclosure area.
- Gilbert, A. 2015. Examining the ecological plasticity of thermal performance for a color-polymorphic lizard. Society for Integrative and Comparative Biology. Poster Abstract. West Palm Beach, FL.
- Hall, L.S., M.L. Morrison, L.L. Christoferson, J. Martin, C.E. Bock, and T. Strong. 2002. Bird populations in riparian areas of southeastern Arizona in 1985-867 and 1994-95. *Western North American Naturalist* 62(3): 370-376.
- Kay, Jenna. 2012. Collaborative Adaptive Management in Practice: Case Studies from Arizona and New Mexico. Thesis. Massachusetts Institute of Technology. 101 pgs.
- Krishnan, P., T. P. Meyers and M. Heuer. 2015. Post-Fire Evapotranspiration and Net Ecosystem Exchange over A Semi-Arid Grassland in Arizona (B33C: Biosphere-Atmosphere Greenhouse Gas Fluxes in Terrestrial Ecosystems, December 16, 2015),AGU Fall Meeting 2015. Poster.
- Nabhan, G.P., S. Buckley & H. Dial. 2015. Pollinator Plants of the Desert Southwest: Native Milkweeds (*Asclepias* spp.). USDA-Natural Resources Conservation Service, Tucson Plant Materials Center, Tucson, AZ. TN-PM-16-1-AZ. 35 pgs.
- Rocky Mountain Bird Observatory. 2015. Responses to Desert Grassland Restorations. Brochure.
- Ruth, J.M., T.R. Stanley and C. E. Gordon. 2014. Associations of wintering birds with habitat in semidesert and plains grasslands in Arizona. *The Southwestern Naturalist*. 59(2): 199-211.
- Salvucci, G. D., and P. Gentine. 2013. Emergent relation between surface vapor conductance and relative humidity profiles yields evaporation rates from weather data. *PNAS*. 110(16)6287-6291.
- Schwilk, D.W., T.E. Brown, R. Lackey, and J. Willms. In Press. Post-fire resprouting oaks (genus: *Quercus*) exhibit plasticity in xylem vulnerability to drought. *Plant Ecology*.
- U.S. Geologic Survey. 2005. Plant Assessment: *Cardaria chalapensis*, *Cardaria Draba*, *Cardaria pubescens*.
http://sbscwr.usgs.gov/research/projects/swepic/SWVMA/PLANTPDF/Cardaria_chalapensis_AZ_PAF.pdf.
- Wang, W., S. Liang and T. Meyers. 2008. Validating MODIS land surface temperature products using long-term nighttime ground measurements. *Remote Sensing of Environment* 112: 623-635.
- Wheeler, Jr., A.G. 2013. *Harmostes reflexulus* (Say) (Hemiptera: Rhopalidae): New western U.S. host records, analysis of host-plant range, and notes on seasonality. *Proc. Entomol. Soc. Wash.* 115(3): 274-285.
- Williams. M and K. McReynolds. 2015. Agave Monitoring, Appleton-Whittell Research Ranch Report. Bureau of Land Management & University of Arizona Cooperative Extension.
- Zhang, X. 2012. Improvements of a soil-atmosphere-transfer model for the simulation of bare soil surface energy balances in semiarid areas. *Asia-Pacific J. Atmos. Sci.*, 48(1): 97-105.

Summary of Active Research/Baseline Projects - 2015

Active: One or more of following: Proposal approved but project not commenced; Field work/research within past two years; Publication received within past two years; Publications pending; Publications in demand within past two years; Projects with return intervals >1 year; Long term efforts.

Investigating the effect of livestock on the physical properties of soil in an arid grassland

Allington, Ginger. Michigan Univ. and Thomas J. Valone; Saint Louis University.

Subject: Collect water infiltration and soil compaction data on grazed and ungrazed land

Application: Evidence of impacts of livestock on physical properties may assist restoration efforts at desertified sites.

Effect of mesquite cover on avian diversity, density and reproductive success in desert grasslands

Andersen, Erik and Dr. Robert Steidl. SNRE, University of Arizona.

Subject: Sites on Research Ranch to be used as control/reference compared to grazed grasslands

Application: Better understanding of ecological processes driving grassland ecosystems and aid development of sound management practices.

Chiricahua Leopard Frog Recovery

Arizona Game & Fish Dept.: Hunter McCall (2015), Cody Mosley (2014)

Subject: Establish and support populations

Application: Enhance long-range stability of federally threatened species.

Springsnail Survey

Arizona Game & Fish Dept.: Jeff Sorensen (2015).

Subject: Determine presence/absence of snail species in Finley Tank

Application: Baseline population information.

Northern Mexican Gartersnake Management

Arizona Game & Fish Dept.: Tom Jones (2014), Taylor Cotton. Roger Cogan & Linda Kennedy, Volunteers, covered under AZGF Section 6 authority to manage federally threatened species.

Subject: Capture, mark, process and release Mexican Gartersnakes

Application: Document recruitment and recaptures of federally threatened species.

Desert Pupfish

Arizona Game & Fish Dept.: Ross Timmons (2010).

Subject: Monitor and protect population of pupfish introduced into ranch stockponds and wildlife waters

Application: Conserve native species

Survey of Gould's Turkeys near Huachuca Mountains

Arizona Game and Fish Dept.. John Millican (ret); 555 North Greasewood; Tucson, AZ 85745

Project: Estimate populations

Application: Track success of re-introduction effort

Avian Monitoring for Research Ranch IBA

Audubon staff: Tice Supplee, Steve Prager

Project: Monitor bird species on AWRR

Application: Support IBA nomination, examine longterm trends

Bullfrogs: Monitoring and removal on the Research Ranch

Audubon Staff: L. Kennedy, R. Cogan

Subject: Discover and eradicate individuals within boundary of ARR

Application: Protect native fish, reptiles and amphibians from predatory, non-native species

Christmas Bird Count – Appleton Whittell Circle

Audubon staff. Suzanne Wilcox, Compiler (Audubon) and Tony Leonardini, volunteer

Subject: Conduct bird count as per Audubon standards.

Application: Pooled data yield important information re avian populations, movement, trends.

Depth to groundwater on Research Ranch

Audubon Staff & Volunteers

Project: Monitor the depth to groundwater of the wells on Research Ranch.

Application: This study helps establish a water consumption baseline for the Sonoita Valley.

Upland Vegetation (Ecological Site) Monitoring (ESM)

Audubon Staff– Linda Kennedy

Project: Establish permanent points to monitor vegetation change.

Application: Identify trends in vegetation change

Precipitation at Ecological Sites

Audubon Staff – Linda Kennedy

Project: Establish range gages to correspond with ESM.

Application: Correlate precipitation with changes in vegetation.

Wild Turkeys on the Research Ranch

Audubon Staff

Project: Record sightings of wild turkeys.

Application: Document spread of sub-species reintroduced in Huachuca Mtns.

Effects of fire and climate change on mesquite

Audubon Staff: Kennedy, Linda

Project: Monitor the effects of fire and climate change on mesquite.

Effects of fire and climate change on cacti

Audubon Staff: Kennedy Linda,

Project: Monitor the effects fire and climate change on native cacti

Application: Baseline information for future research

Small mammal populations on the Appleton-Whittell Research Ranch

Audubon Staff: Linda Kennedy

Project: Develop long-term monitoring program based on Jones, Bock and Kennedy

Applicability: Indicate trends in small mammal populations

Survivorship of Riparian Trees in the Southwest

Bock, Carl & Jane Bock. University of Colorado (retired)

Project: Resurvey the riparian trees tagged in the 1980s.

Application: Determine the survivorship of native trees after fires, flood and drought

Agave Site Monitoring

BLM (Tucson Field office) and University of Arizona (Cochise Co. Extension). Kristen Duarte (BLM), Kim McReynolds (U of A)

Project: Establish permanent transects to monitor agave numbers, class and herbivory.

Application: Ungrazed land to function as control.

Assessing condition of O'Donnell Creek

BLM. Simms, Jeffrey, BLM Fish Biologist, Tucson Field Office, Nate Dietrich, BLM Hydrologist.

Project: Use Proper Functioning Condition Standards to evaluate the condition of a portion of O'Donnell Creek

Application: Environmental Assessment

Minimizing the effects of Green Sunfish (*Lepomis cyanellus*) on native competition.

Carter, Sean. Colorado College.

Project: Remove predatory, non-native sunfish from South Post Canyon pools

Application: Study changes in behavior of Sonora mud turtle when experiencing levels of competitive release.

Population dynamics and habitat characteristics of Montezuma (Mearns's) Quail in southeastern Arizona

Chavarría, Pedro Mazier, Ph.D., Northern New Mexico College and Louis Harveston, Ph.D., Sul Ross State University

Subject: Monitoring life history of Montezuma quail.

Application: Fill knowledge gaps about life history and determine how behavior and genetic viability is affected in areas where hunting is, and is not, allowed.

Annotated Bibliography of Lehmann Lovegrass

Chasey, Richard Adam. San Francisco State University

Project: Gather all known publications associated with non-native, invasive *Eragrostis Lehmanniana*

Application: Aid to research and management

Arizona Tree Frog documentation

Cogan, Roger C., Conservation Program Manager, AWRR.

Project: Discovered amphibian species new to AWRR. Document all sightings.

Application: Species is candidate for federal listing. May inform critical habitat designation.

Survey of herpetofauna (reptiles and amphibians) including den sites of Crotalids on the Research Ranch

Cogan, Roger C., Conservation Program Manager, AWRR.

Project: Document sightings of herps and monitor winter den sites

Application: Survey for new species, determine if species earlier recorded are extant, plus document sites of critical importance to rattlesnake survival.

Use of Cover Boards to Locate and Monitor Reptile Species

Cogan, Roger C., Conservation Program Manager, AWRR.

Project: Distribute coverboards in specific locations across AWRR

Application: Evaluate technique to further baseline knowledge about reptiles.

A History of the Lands in the National Audubon Society's Research Ranch Near Elgin, in Santa Cruz County, Arizona

Collins, Glendon E. , Bureau of Land Management (retired), Arizona State Trust Lands (retired).

Subject: Compile and document history of land transactions involving federal and state lands.

Application: Historical background

Honeybee communication and the ecological context

Donaldson-Matasci, Matina. Assistant Professor. Harvey Mudd College

Project: Explore relationship between resource distribution and value of communication.

Application: Basic science on species

Current Distribution and Status of Slevin's Bunchgrass Lizard, *Sceloporus slevini*, in southeastern Arizona

d'Orgeix, Christian, Ph.D. Virginia State University;

Project: Survey for bunchgrass lizard.

Application: foundation for determining genetic relatedness of different populations and effects of bottlenecks on populations

Survey of Appleton-Whittell Research Ranch Drainages and Ponds for the Mexican Garter Snake

d'Orgeix, Christian, Ph.D., Virginia State University

Project: Survey for presence of Mexican garter snakes (Telles tank, O'Donnell Canyon, Post Canyon), and conduct long-term study of population at Finley tank.

Application: Management implications for Threatened species

Annotated bibliography of selected reports, publications and theses

Dyson Ruth E, Mason, Mi.

Project: Prepare annotated list/bibliography of publications of particular interest to ARR.

Application: Facilitate information exchange and document publications

Genetic approach for using pollen to determine plant resources used by nectarivorous bats.

Ferguson, George, University of Arizona, Tucson Arizona

Project: Collect tissue samples from *Agave parryii* v *huachucaensis*

Application: Determine usage of this species by Lesser Long Nosed Bats (Endangered Species)

Using soil moisture to assess ecosystem function following exotic lovegrass invasion in semiarid grasslands of southeastern Arizona

Fernald, Alexander G. (Sam), Ph.D., New Mexico State University

Project: Measure soil moisture under Plains lovegrass (*Eragrostis intermedia*), a native species, and Lehmann lovegrass (*E. lehmanniana*), an exotic species.

Application: Determine whether a semiarid grassland retains its functional integrity following invasion by introduced, exotic grass.

Merging functional ecology and phylogenetics to predict the response of grasslands to global change

Forrestel, Elisabeth, Melinda Smith, Ph.D., Yale University.

Project: Compare natural grassland sites across broad precipitation gradients in North America, Australia and South Africa.

Application: Provide evolutionary history and functional biology of ecologically and economically important grass species.

Ecological and evolutionary responses of lizards to resource limitation

Gilbert, Anthony. Ohio University

Project: Quantify how resource limitation impacts lizard performance, fitness and social dominance.

Application: Furthering knowledge of how lizards may respond to anthropogenic disturbances such as climate change.

Research Ranch boundary surveying and mapping

Greene, Dale and Kristen L. Greene. TerraData AZ. LLC.

Project: Survey and map Audubon property boundary and certain water catchments.

Application: The exact perimeters of property owned by Audubon will be determined.

Survey of high desert grasslands Hymenoptera

Grissell, Eric, Sonoita, AZ

Project: Study insect diversity in southwest

Application: Significant contribution to state of knowledge

Linking individual behavior, microhabitat use, and spatial population structure with fitness

Jaworski, Kortney. Christopher Newport University

Project: Study behavior of adult male mountain spiny lizards (*Sceloporus jarrovii*)

Application: Insight onto the relationship between individual traits and population spatial structure and influence upon fitness.

Camera-trap Network

Joder, Greg., Tucson, AZ

Project: Collect photographic or video for archival purposes.

Application: Augmentation of research, ecosystem conservation and outreach goals of AWRR.

Photo-herbarium for the Research Ranch

Kennedy Linda, Director, Research Ranch

Project: Document life stages of plant species found on the Research Ranch.

Application: Baseline information for future research; Aids identification.

Sacaton Rehabilitation

Kennedy Linda, Ph.D., Roger Cogan. Research Ranch

Project: Re-establish *Sporobolus wrightii* in appropriate degraded sites.

Application: Improve wildlife habitat, bioremediation of sites dominated by exotic, invasive Bermudagrass.

Oak (*Quercus*) water use strategies in Sky Island Systems

Lackey, Russell, Dylan Schwilk. Texas Tech University,

Project: Determine physiological drought tolerance of native oak species

Application: Explain current patterns in community composition and distribution in relation to water balance.

Modeling impacts of habitat alterations on habitat use and diet selection of desert reptile communities

Lattanzio, Matthew S. Christopher Newport University, Newport News, VA.

Project: Determine how management practices and climatic variability affect resource availability and use by grassland reptiles

Application: Management practices may be altered to enhance habitat and use

Avian Survey/Monitoring on the Research Ranch

Leonardini, Tony. Volunteer, Appleton-Whittell Research Ranch

Project: Document avian species composition and population size.

Application: Baseline information and trends. Develop database to track and archive data.

Evaluating Avian Use of Restored Desert Grasslands

Levandoski, Greg. Rocky Mountain Bird Observatory

Project: Determine wintering abundance, distribution and habitat needs of grassland birds.

Application: Enable conservation of grassland birds by establishing baseline (control) response to restoration.

Flora of the Appleton-Whittell Research Ranch

McLaughlin Steven P., Ph.D., University of Arizona, (Ret.) Tucson AZ, Erika L. Geiger; USGS ; Janice E. Bowers; U.S.G.S. (Ret) Tucson AZ

Project: Compile a flora –a complete list of all flowering plants, ferns, and conifers on the Research Ranch.

Flora of Upper O'Donnell Canyon

Miller, Kathryn. Patagonia Union High School

Project: Collect plant specimens at TNC's Canelo Hills Cienega Preserve

Application: Creation of flora and herbarium for CHCP will establish baseline presence via voucher specimens. Duplicate specimens will be lodged at AWRR herbarium.

Long-term meteorological, evaporation and carbon flux measurements

National Oceanic & Atmospheric Administration (NOAA); Tilden P. Meyers, Ph.D. Meteorologist; NOAA, Oceanic and Atmospheric Research, Oak Ridge, TN; John Hughes, NOAA, National Data Climatic Center, U.S. Climate Reference Network, Ashville, NC

Subject: Climate Reference Network site – to characterize the water and carbon balance for typical ecosystem for arid southwest grasslands.

Application: Data will be used to improve the current land use models for climate change

The Effects of Fire and Grazing on Grassland Bird Diversity and Abundance in an Arizona Oak-Savanna

Nichols, Clay. Eastern New Mexico University, Portales, New Mexico

Project: Re-survey bird diversity on oak transects established by Bock & Bishop after Ryan fire.

Application: Effect of wildfire on avian diversity and abundance

Impacts of grazing, fire and precipitation variability on woody plant cover in Chihuahuan Desert grasslands, USA

O'Neal, Kelley. Department of Geography, University of Maryland,

Project: Quantify changes in woody plant cover, map occurrence of grazing, fire and precipitation using (in part) Landsat and MODIS satellite data

Application: Identify trends, develop methodology

The Babacomari Restoration Project

H. Ron Pulliam. Borderlands Restoration, L3C

Subject: Re-establish avian plots from 1970s & 1980s to serve as control/reference areas.

Applicability: Evaluate effectiveness of rehabilitation efforts on Babacomari Cattle Ranch.

Babocomari River Protection

Robinett, Daniel G., Robinett Rangeland Resources, Elgin, AZ;, Coronado RD & D., Inc.

Project: Establish transects, monitor streamside conditions of Babocomari River, O'Donnell and Turkey Creek.

Application: Results will enable sound management decisions to maintain and/or improve vegetation conditions on Babocomari watershed.

Effects of the Ryan Wildfire (April 2002) on Wintering Grassland Birds in the Sonoita Valley, Arizona

Ruth, Janet M. Ph.D., (Ret.) USGS

Project: Compare pre-fire data collected on the Audubon Appleton-Whittell Research Ranch in 1999-2001 with post-fire data collected on the same transects and plots.

Application: Evaluate the effect of wild fire on wintering avian abundance/densities and vegetation structure/composition in desert grassland habitats.

Wintering habitat use by priority grassland birds

Ruth, Janet M. Ph.D., (Ret.) USGS

Project: How do high priority grassland birds use habitats during the winter season? How is winter habitat use affected by land use practices such as grazing?

Distribution and abundance of breeding Arizona Grasshopper Sparrow (*Ammodramus savannarum ammoregus*), and associated priority grassland species, throughout its known range in the Southwest U.S.

Ruth, Janet M. Ph.D., (Ret.) USGS

Project: Document current distribution and abundance of Arizona Grasshopper Sparrows and associated priority grassland bird species. Test methodologies.

Application: Understanding status and distribution, population trends, ecology and habitat relationships is essential for conservation of avian species of concern.

Continuously Monitor Groundwater Levels

Salywon, Andrew, Ph.D., and R.J. Tiller, Ph.D., Desert Botanical Garden, Phoenix, AZ 85008

Project: Install pressure transducers in wells and piezometers to expand research program begun on northern portion of Las Cienegas NCA.

Application: Enhance ability to record temperature and water depth and data sharing capability.

Locate Native *Pectis imberbis*

Schmalzel, Robert (Bob). Sonoran BioQuest, LLC. Tucson, AZ

Project: Relocate historic sites of rare plant. Document habitat.

Application: Information may be used in support of or against federal listing.

Biomass of grassland in proximity to Thomas study plots and inspection of dead cactus carcasses for evidence of insect

Schmalzel, Robert (Bob). Sonoran BioQuest, LLC.

Project: Determine above-ground biomass and examine cacti for weevils

Application: comparison of biomass associated with Thomas study plots to Altar Valley grasslands

Evolution of Hummingbird Visual Traits

Simpson, Richard (Rick). Arizona State University, Tempe, AZ

Project: Film male hummingbird courtship displays and measure plumage coloration

Application: Understand the mechanisms by which multiple ornaments evolved

Population and habitat assessment of *Spiranthes delitescens*

Stromberg, Juliet, Ph.D., and Dustin Wolkis. Arizona State University, Tempe, AZ. Kimberlie McCue, Ph.D., and Steve Blackwell, Desert Botanical Garden

Project: Survey for and assess population size of *Spiranthes delitescens* (Canelo hills ladies tresses) and the wetland habitat.

Application: Information for development of recovery plan for federally Endangered species.

Wet-Dry Mapping

The Nature Conservancy. Miller, J.B., Canelo Hills Cienega Preserve

Project: Map extent of open water in O'Donnell Canyon

Application: Track the health of the San Pedro river by monitoring surface water during driest time of year.

Research and reintroduction effort for Huachuca Water Umbel

Titus, Jonathan H., Ph.D., SUNY-Fredonia, Fredonia, NY; Priscilla Titus, Fredonia NY

Project: Transplant plugs and monitor success

Application: Protect listed species, aid in development of recovery plan for species

Meteorological Station

USDA-ARS. Keefer Tim, Hydrologist; Southwest Watershed Research Center; Tucson, AZ

Project: Station jointly owned by ARR & USDA

Application: Baseline information on climate available to researchers and land managers
Pre-monsoon post-fire sediment survey

Conservation Effects Assessment Project on the Cienega Creek Watershed

USDA-ARS. Goodrich, David C. and Haiyan Wei. Southwest Watershed Research Center, Tucson,

Project: Use data from the Research Ranch as a control to judge vegetation cover and condition for a non-grazed condition for a number of years.

Application: Quantify the benefits of conservation management and practices.

Soil inventory update

USDA-NRCS. Breckenfeld, Donald J.,(ret.) Daniel Robinett; Tucson, AZ (ret.)

Project: A soil inventory update that coincides with soil surveys that have been done elsewhere in southern Arizona – updating the old soil survey to the new soil series and map units used in MLRA 41-1.

Application: Baseline information needed by other research projects.

Inventory of ecological sites, their present day condition, trend and rangeland health

USDA-NRCS: Robinett Dan, Don Breckenfeld, Tucson, AZ

Project: Mapped the ecological sites on ARR and compared present day plant communities to what our site guides show as potential for MLRA 41.

Application: Baseline information for future research and land management. Control area for comparison by ranch managers.

Natural Resources Inventory – Primary Site Unit

USDA-NRCS. Tucson, AZ. Emilio Carrillo (2004), Christine Egen (1992), Steve Barker (1982)

Project: Repeated measures: vegetation and soil. Transects established in 1982; resampled on approximately decadal basis.

Application: Identification of trends – reference area for MLRa-41

Rangeland Health Reference Areas

USDA-NRCS (Natural Resources Conservation Service). Wilma Renken (2014), Ecological Site Inventory Specialist. Tucson Soil Survey Office. Tucson, AZ

Project: Determine reference areas for Ecological Sites Descriptions in MLRA-41 (high functioning rangelands with minimal human and livestock impacts)

Application: Reference areas to support rangeland health descriptions in 2-3 mil. acres of SW.

National Soil Health & Sustainability

USDA-NRCS Dial, Heather. Tucson Plant Materials Center.

Project: Haney Soil Test on loamy upland, sacaton bottom, Boer monoculture

Application: Reference for comparison through time and against other land uses.

Agave Monitoring on the Coronado National Forest

US Forest Service. Biedenbender, Sharon, Ph.D. (Ret), James Heitholt

Project: Monitor impacts of livestock grazing on florivory of agave

Application: Management of food source for lesser long-nosed bat

Pectis imberbis surveys

USFWS. Julie Crawford. Tucson, AZ.

Project: Survey reported sites

Application: Information on species that may become federally listed.

Examining long-term effects of drought and fire on vegetation using high-resolution satellite phenometrics

Villarreal, Miquel. U.S.G.S. Tucson, AZ

Project: Field truth satellite imagery.

Application: Estimate changes on cover and phenology related to climate and fire

Chiricahua Leopard Frog reintroduction to the Research Ranch, a conservation strategy

Volentine, Sandy. Prescott College, Prescott AZ

Project: Explore opportunities and suitability for reintroduction effort of *Lithobates [Rana] chiricahuensis* to historic habitat

Application: Protect federally listed species

Inventory of native plant-feeding insects Arizona

Wheeler, Alfred G., Department of Entomology, Clemson University, Clemson, SC

Project: Collect insects that feed on *Eragrostis* spp. and other plants to identify species, and compare species composition with collections from NM, OK and TX.

Application: Baseline information on species occurrence and host plants

Ground Beetle (Coleoptera: Carabidae) assemblage responses to fire in southern Arizona.

Wright, Corynne A., Dept. of Organismal and Environmental Biology, Christopher Newport University, Newport News. Virginia

Project: Study Carabid diversity at four sites with varying fire histories.

Application: Contribute to understanding of how ground beetle assemblages respond to fire and habitat succession.

Comparison of the soil ecology and nutrient cycling in adjacent viticulture and native grassland habitats

Wyant, Karl. Arizona State University, Tempe, AZ

Project: Compare soil characteristics and fauna between ungrazed grassland and vineyards

Application: Elucidate the detrital food web associated with desert grasslands and adjacent viticulture operations.

Pollination without a keel: an investigation of floral form change in the genus *Dalea* (Fabaceae)

Zweck, Justin. Saint Louis Univ. St. Louis MO

Project: Compare pollination biology of *Dalea* species with “closed” and “open” floral forms

Application: May encourage planting of specific *Dalea* species to serve as host plants for pollinators that are important for legume crops.



Agenda - Science on the Sonoita Plain Symposium
Saturday, June 6, 2015 – at the Appleton-Whittell Research Ranch

- 8:00 Registration and refreshments (Cienega Watershed Partnership & Audubon)
- 8:30 Welcome and introductions (Shela McFarlin/Linda Kennedy)
- 8:45 Introduction to water management on the Sonoita Plain (Julia Fonseca)
- 9:00 1) What Lies Below: Groundwater Controls on Surface Water in the Cienega Creek Basin (Jeanmarie Haney)
2) Harnessing Runoff on the Sonoita Plains; a Primer for Watershed Resilience (Laura Norman)
3) Private Water Wells and Their Place In Future Plans (Gary Hix)
4) Legal and policy considerations (Linda Stitzer)
- 10:45 BREAK (live-work-play mapping)
- 11:00 Panel discussion (Fonseca, Haney, Norman, Hix, Stitzer)
- 11:55 Pupfish monitoring (Doug Duncan)
- 12:00 LUNCH
- 1:00 Presentations – Session I (Tom Meixner, moderator)
- 1) Shrub Encroachment and Brush Management: Research Priorities For Competing Land-Use Objectives, Steve Archer
- 2) The 2015 Soil Moisture Active Passive Validation Experiment (SMAPVEX15) in the Sonoita Plain, Phil Heilman
- 3) Recovery Efforts of Native Aquatic Species in the Cienega Creek basin, Doug Duncan, Dennis Caldwell, and Jeff Simms
- 4) Effects of Wildfire on Riparian Trees in Southeastern Arizona, Carl E. Bock and Jane H. Bock
- 5) Tracking wetland conditions of an effluent-dependent river: the Lower Santa Cruz Living River Project, Claire Zugmeyer
- 2:45 BREAK
- 3:00 Presentations – Session II (Gita Bodner, moderator)
- 6) Flora of the Cienega Creek Natural Preserve, Julia Fonseca
- 7) The Evolution of Hummingbird Visual Signals, Richard Simpson
- 8) Las Cienegas NCA program update, Amy Markstein and Karen Simms
- 9) The Shared History of the Watershed Curriculum Project, Annamarie Schaecher
- 4:30 Summary wrap up and evaluation (Tahnee Robertson, moderator)
- 5:00 Adjourn

Poster presentations

- Preliminary Results from an Investigation of Pollination and Floral Form Change in the Genus *Dalea*, Justin Zweck, Peter Bernhardt, Saint Louis University and the Missouri Botanical Garden
- Quantifying rates and patterns of mesquite cover in Las Cienegas National Conservation Area using repeat aerial imagery and land use records from 1936 to 2014, Scott Jones and Steve Archer
- Sources of recharge to groundwater in Davidson Canyon, SE Arizona: an isotopic tracer study, Rachel Tucci and Jennifer McIntosh
- Flow regimes and infiltration potential of streams in southern Arizona, T. Meixner, E. Gallo, and K. A. Lohse
- Predicting Treatment Windows for Invasive Buffelgrass in Southern Arizona using MODIS and Climate Data, Cynthia S.A. Wallace, Susan M. Skirvin, Caroline Patrick-Birdwell, Jake F. Weltzin, Helen Raichle