



APPLETON-WHITTELL RESEARCH RANCH
of the
NATIONAL AUDUBON SOCIETY



ANNUAL REPORT - 2013

The Appleton-Whittell Research Ranch of the National Audubon Society 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 plants and animals and ecological research facility is located in southeastern Arizona.

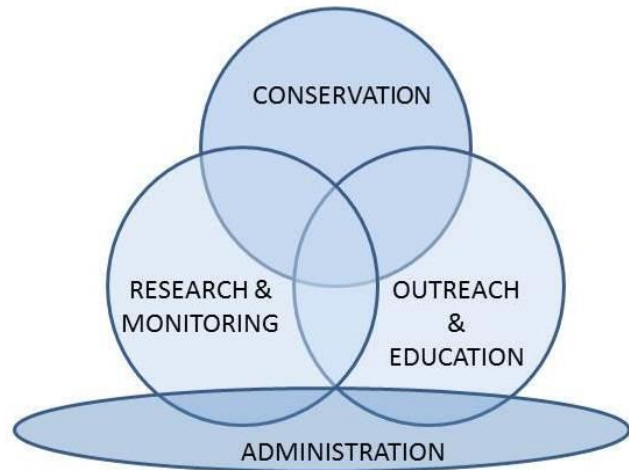
MISSION of the RESEARCH RANCH: To be a living laboratory to determine and demonstrate methods to safeguard and rehabilitate southwestern grasslands, and to assist policy makers and other citizens in the care and protection of our native ecosystems, natural resources, and quality of life.

GOALS

- Conservation– to be a premier semi-arid grassland 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

The goals appear so discrete – conservation, research, outreach/education. But they’re really not separate. Our efforts in conservation point out research questions, provide platforms for research projects and demonstrate sustainable land management. The research and monitoring program allows us to make conservation decisions based on sound science. Outreach and education efforts share what we and others have learned.



And supporting all of those efforts is what is generally called “Administration.” The paperwork’s certainly not as much fun as the other three, but work towards achieving our goals is only possible because the bills are paid, the reports are submitted.

This has been a tough year – the challenges haven’t lessened just because the funding is diminished. We’ve had to make hard decisions and have had to let some activities go. Not because they’re not important – we just haven’t had the staff or the funding to participate.

But we’ve worked hard and with the support of donors and volunteers we’ve made progress. We hope you enjoy reading about our efforts in this, the 2013 Annual Report of the Appleton-Whittell Research Ranch of the National Audubon Society.

~Linda Kennedy, Ph.D. Director

Audubon Staff on the Research Ranch

Roger Cogan, Conservation Coordinator
Linda Kennedy, Ph.D., Director
Pat Kugler, Office Manager

Audubon Staff in Phoenix:

Sarah Porter, V.P. and Executive Director
Becky Gilbreath, Finance & Office Manager
Randy Harper, Custodian
Zee Peters, Director of Development
Steve Prager, Teacher/Naturalist
Valerie Ramos, Development Associate
Tice Supplee, Director of Bird Conservation
Cathy Wise, Education Director

<http://researchranch.audubon.org> & <http://az.audubon.org>



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CONSERVATION

Fire: Fire is a natural process that is necessary to keep grassland ecosystems healthy, but naturally occurring wildfires and accidental ignitions are often suppressed by entities charged with fire management. This can result in fire-starved ecosystems. The last burn plan for the Research Ranch was superseded by the Ryan Fire of 2002, but now we have areas which will benefit from fire. Consequently we have begun the process of again developing a plan for prescribed fires on the Research Ranch.

Although we recognize fire is an important contributor to ecosystem health, we don't want to lose our facilities. We spend a significant amount of time and effort every year to create defensible space around all buildings and this year we installed a 2000 gal poly tank by inserting it into the shell of a leaky metal tank at Headquarters (right). This will provide an emergency supply of water to fight fires even if we lose power.



This year we didn't have any reported wildfires on the Research Ranch so we didn't test our preparedness efforts. Our work wasn't wasted, however, as the Research Ranch also serves as a demonstration site - visitors see what steps we take to prepare for fire. We were very pleased this year when the Audubon/Babacomari Ranch FireWise Community expanded with the inclusion of The Nature Conservancy's Canelo Hills Preserve. (Appendix 1)

Precipitation at Headquarters (Appendix 2): After a dry winter (2.08" from January through June), the monsoon was most welcome (10.02" from July through September). No rain fell in October, but 1.38" in November and 0.77" in December boosted the total to 14.25". We are still well short of the long-term average of 17.5". If we examine the years 2000-2013, we see that the total precipitation of 3 years (2000, 2006, and 2010) are above average; 1 year is average (2012); leaving 10 years below average. The cumulative deficit for this time span is 31". Maybe it's time to determine another "long-term average." In addition to lower annual totals, we've experienced a slight shift away from winter precipitation. Less winter precipitation may mean there will be less soil moisture available to the plants during the dry period before monsoon, which may cause major vegetation changes.

Endangered species: Two more populations of Desert Pupfish (an endangered species) were established this year, one in the Bald Hill tank and another in Antelope tank (photo at right). We monitor the new populations and the earlier release in the Headquarters pond regularly and report to AZGF and USFWS.



The Research Ranch is included in the designation of critical habitat (Federal Register 7-10-13) for Northern Mexican Garter Snakes, a species proposed as threatened under the Endangered Species Act.

Invasive species: Cogan and Kennedy treated invasive, non-native lovegrasses and bluestems in several locations. Cogan removed three bullfrogs under the auspices of a Scientific Collecting permit issued by AZGF.



Streamside stabilization and floodplain rehabilitation: Two groups of volunteers helped with a new streambank stabilization project. Participants from a Sierra Club Service Tour and students from the University of Arizona planted desert willow poles along the banks of O'Donnell and Post Canyon. If the cuttings take root they will help prevent undercutting and erosion.

Sierra Club Service Tour volunteers and others also transplanted sacaton plants into a floodplain dominated by non-native bermudagrass. This is part of a long running rehabilitation effort that has received financial support from the RIESTER Conservation Foundation for many years, including an award of \$2000 received this March.

A “Conservation” effort we are not supporting:

The Bureau of Reclamation (BOR) has again launched an effort to construct fish barrier(s) (aka dams) in O'Donnell Canyon. One alternative described in their scoping notice is to construct an entirely new dam on the USFS a few feet south (upstream) of the boundary of the Research Ranch. Another alternative is to enlarge an existing structure on the BLM portion of the Research Ranch.

As described in the scoping notice, the construction will prevent non-native, predatory fish from invading native fish habitat upstream in O'Donnell. However, in a direct quote from the scoping notice: “The purpose of the project is to satisfy a key conservation measure of the 2008 CAP biological opinion which requires Reclamation to construct a fish barrier in O'Donnell Canyon...” Consequently, their efforts are constrained to construction projects, not

conservation efforts. Significant staff time has been devoted to an effort to halt this project as described for many reasons, including:

- 1) The project provides little or no measurable protection to native fish.
- 2) Either construction project will cause degradation of an intact, stable riparian ecosystem.
- 3) Either construction project may cause dewatering of pools downstream that provide habitat for Northern Mexican Garter Snakes (proposed for listing under the Endangered Species Act).
- 4) Construction as described will damage the Research Ranch as an undisturbed reference area/control for ecological research.



One of the sites proposed for construction of a fish barrier – a concrete dam that would span the entire channel.

Our concern with this project is shared by others - we have received copies of letters from scientists, neighbors and supporters of the Research Ranch to BOR protesting either construction alternative. We and many others who voiced their concerns have encouraged BOR to revisit the Biological Opinion that mandates construction and instead seek out productive methods to protect native fish populations.

RESEARCH & MONITORING

2013 Apacheria Fellowship Recipients

This year we were able to provide support to two Ph.D. students, one at the end of his Ph.D. program and one just beginning his!



Matt Lattanzio (left), has successfully defended his dissertation at Ohio University! He earned his fellowship in support of his work on the ecological and phenotypic responses of lizard populations to historical disturbances.



Erik Andersen (right) is a Ph.D. student at the University of Arizona studying the effects of mesquite encroachment into desert grasslands on bird diversity, density, and reproductive success.

Updates on Research Activities:

Christmas Bird Count: Results have been tabulated by Robert Weissler, compiler, for the 2012 Appleton-Whittell Christmas Bird Count held on Jan 5, 2013. Participants tallied 3642 individuals of 100 species including 794 individuals of 60 species on the Research Ranch. The 2013 AWCBC will be held January 4, 2014.

The Borderlands Habitat Restoration Initiative has launched their project "Habitat Restoration and Monitoring for Multiple Species: An Integrated Landscape-Scale Approach." On the Research Ranch they plan to repeat some of Dr. Ron Pulliam's work on grassland sparrows first conducted in the 1970s.

Karl Wyant, ASU graduate student, began his work on “Comparison of the soil ecology and nutrient cycling in adjacent viticulture and native grassland habitats” this summer. Although the Research Ranch has been used as the control or reference area for many studies, this is the first time for comparison to vineyards.

Conservation Coordinator, Roger Cogan’s “Herpetofauna of the Appleton-Whittell Research Ranch” reports on the reptiles and amphibians found on the Research Ranch and can be viewed or downloaded from the library tab at <http://researchranch.audubon.org>.

Janet Ruth, USGS, continued her work unraveling the mysteries of grassland sparrows with her work on the breeding ecology of the Arizona Grasshopper Sparrow subspecies (*Ammodramus savannarum ammorequs*) with field work both in January and in the summer.

Christian d’Orgeix, Virginia State University, and his field crew (right) continued work on Northern Mexican Gartersnakes and Slevin’s bunchgrass lizards.

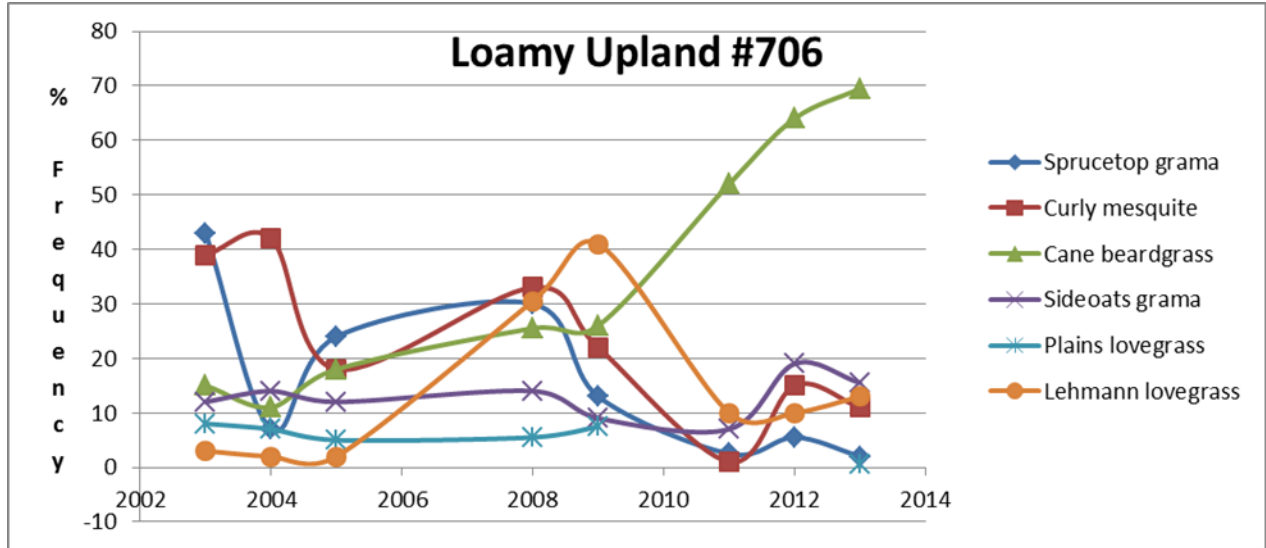


Carl and Jane Bock may be retired from their professorial positions at the University of Colorado, but they have not retired from research! They returned to the Research Ranch this year for their work on Effects of Wildfire on Riparian Trees in Southeastern Arizona.



2013 marked the final year of funding through a grant from the Arizona Water Protection Fund for the Babacomari River Protection Project. Dan Robinett, of Robinett Rangeland Resources LLC., established and read vegetation transects and geomorphological cross-sections on the Babacomari River within the Babacomari Cattle Ranch and two tributaries on the Research Ranch, Turkey and O’Donnell.

We began monitoring upland vegetation in 2003, based on the Ecological Site mapping conducted by Breckenfeld and Robinett in 2000. This effort allows us to document short-term changes and longer-term trends in cover and vegetation. These data are important to us and are appreciated by others. Please see Appendices 3 and 4 for letters from two US Department of Agriculture scientists with whom we have shared these data. This year we were able to read all 18 transects. Selected results of one transect 2003-2013 are shown, below:



(Points are linked to show trends and do not indicate continuous data collection)

In the past decade, frequencies of sprucetop grama (*Bouteloua chondrosiodes*) and curly mesquite (*Hilaria belangeri*) are trending down; sideoats grama (*B. curtependula*) fairly stable. Plains lovegrass (*Eragrostis intermedia*) has nearly disappeared. The most surprising results are those evidenced by the exotic Lehmann lovegrass (*Eragrostis lehmanniana*), which peaked in frequency in 2009 at over 40%, but declined to 12% in 2013, and cane beardgrass (*Bothriochloa barbinodis*), which has become the dominant species at nearly 70% frequency. This is the only site on the Research Ranch where a decline in Lehmann lovegrass has been documented concomitant with an increase in a native grass.

To see a complete list of active research and monitoring projects and publications associated with the Research Ranch, see pages 17-21 of this report.



EDUCATION & OUTREACH:

Living Gently on the Land

Attendees at our “almost monthly” education events (and potlucks!) were treated to a wide range of information in 2013!

- January —Phoenix Zoo’s efforts to recover native Arizona species from Stuart Wells, Director of Conservation & Science.
- February - Using satellite images and long-term datasets to estimate climate and land-use landscape changes by Dr. Miguel Villarreal, Mendenhall Fellow U.S.G.S.
- March - Tips for birding by ear by Robert Weissler, VP of Huachuca Audubon and Executive Director of the Friends of the San Pedro River.
- April—Riparian ecosystems and the services they provide by Tom Meixner, Ph.D., University of Arizona
- May— Field Guides for National Parks of Arizona and The Flora Project by Steve Buckley, doctoral candidate, University of Arizona
- September— An introduction to caves and speleology by Tom Strong, Ph.D. WestLand Resources, Inc.



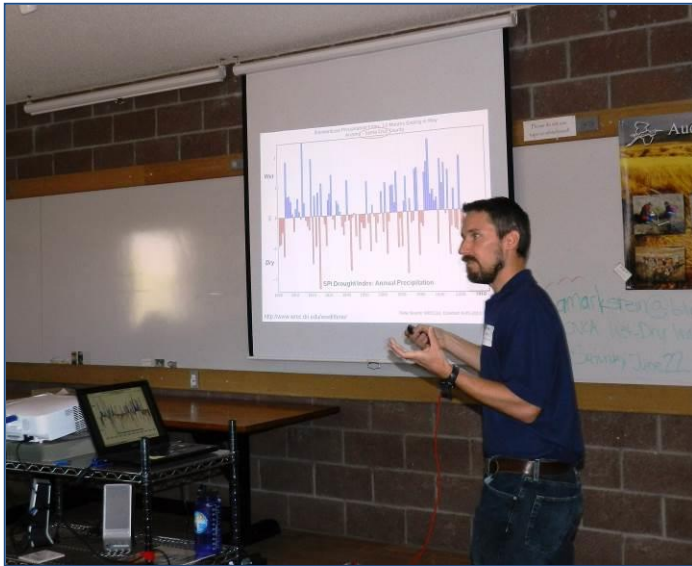
- October—Collared peccaries- nuisance or adaptation success story? by Tice Supplee, Director of Bird Conservation, Audubon AZ. Photo at left.
- November—Conservation in Cuba by Dan Robinett, Robinett Rangeland Resources, and Linda Kennedy, the Research Ranch.

Science on the Sonoita Plain

Again this year the Research Ranch was honored to host the quarterly meeting of the Sonoita Valley Planning Partnership that was dedicated to science. Sponsoring organizations included the Cienega Watershed Partnership, The Nature Conservancy, Audubon and BLM . The broad topic of this year’s symposium was climate and climate change. The keynote address was presented by Gregg Garfin, Ph.D. (Climate Assessment for the Southwest [CLIMAS], University of Arizona). The morning was devoted to reports on scenario planning for montane, riparian and upland/desert ecosystems and for cultural resources.

Afternoon presentations at the symposium included:

- Mike Crimmins, Ph.D. (below) (Associate Professor, Extension Specialist, University of Arizona): Tracking Drought in a Changing Climate.



- Thomas Meixner, Ph.D. (University of Arizona, Hydrology/Water Resources): Mountain Front Recharge.
- Claire Zucker (Pima Association of Governments) and Brian Powell (Pima County): Historical Changes in Groundwater and Surface Water in the Cienega Creek Natural Preserve and Surrounding Areas.
- Miguel Villarreal, Ph.D. (U.S. Geological Survey): Trends in Landscape and Vegetation

Change, and Implications for the Watershed.

- Kristen Egan and/or Emilio Carrillo (USDA-NRCS): Drought Preparation and Drought Response - Guidelines for Ranchers.

Updates were presented by:

- Gita Bodner, Ph.D. (The Nature Conservancy) and Amy Markstein (Bureau of Land Management): Water Monitoring Coordination.
- Ian Tomlinson (Vera Earl Ranch): Rancher's Perspective on Drought and Range Management.
- Kelly Mott-Lacroix (Water Resources Research Center): Water and the Environment, Gaps for the Cienega Watershed.
- Aimee Roberson (U.S. Fish & Wildlife Service – Desert Landscape Conservation Cooperative): Climate Change, Ecosystem Management, and Water.

Desert Pupfish were released into the Headquarters pond during the 2011 Science symposium and the population was evaluated during the lunch break by Doug Duncan (USFWS) and Ross Timmons (AZGFD). This gave participants the opportunity to see this endangered species up close.



Field Trips

A variety of groups visited the Research Ranch in 2013 including the following.

The Elgin School 7th graders from Mrs. Koweek's science class learned about grassland ecology and research during their field trip to the Research Ranch. At right is Conservation Coordinator Roger Cogan explaining about packrat middens. Below is a student taking careful notes in his field log.



Each student proudly sported a Research Ranch t-shirt!

Dr. Jeff Fehmi's Vegetation Management class (University of Arizona) learned about management techniques used here on the Research Ranch and helped plant desert willow poles in an experimental effort at streamside stabilization.





Staff of Borderlands Habitat Restoration Initiative and Cuenca Los Ojos journeyed to the Research Ranch to examine the results of various erosion control efforts. They were especially impressed with the durability and efficacy of the various check dams installed by the Appletons during the days when the Research Ranch was the Elgin Herford Cattle Ranch.

Ecology of Grassland Birds

Sometimes you just have to make adjustments! Tucson Audubon Society and the Research Ranch attempted to hold an Institute of Grassland Ecology based on the model of TAS's Institute of Desert Ecology but low enrollment numbers forced us to cancel the event. But a last minute substitution was a success! We organized a one-day workshop on the Ecology of Grassland Birds that filled immediately. Experts Dr. Ron Pulliam and Homer Hansen combined classroom lectures and activities with field trips that enthralled the participants.



Biological Planning



Twice a year an unofficial subcommittee of the Sonoita Valley Planning Partnership meets to discuss management issues associated with Las Cienegas National Conservation Area, of which the Research Ranch forms the southernmost portion of the planning area. This spring the meeting was held at the Grassland Center and included a field trip to examine the O'Donnell sacaton as a potential site for prescribed fire.

Audubon Convention

Roger Cogan gave a presentation about the Research Ranch and participated in a panel discussion on species specific conservation efforts.

Southwest Wings

Cogan's "The Value of Herps" was a hit at the Southwest Wings birding festival.

Getting the Word Out

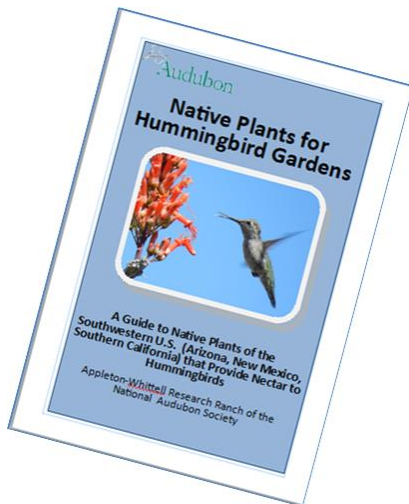
This fall Roger Cogan and Ron Pulliam (at right) were the stars of a sequence on Arizona Illustrated, as Tony Paniagua and video crew visited the Ranch for a segment on grasslands.

A segment of “Expeditions with Patrick McMillan” filmed on the Research Ranch has been shown on Arizona Public Broadcasting stations.



Courtesy of one of our land-owning partners, Resolution Copper Mining, videos describing the Research Ranch are under development. A video crew arrived in September in time to capture the Research Ranch decked in monsoon

green! The photo above is Kennedy, trying not to be nervous as she shares her enthusiasm for prairies and for the Research Ranch.



Thanks to Lois Albrecht (a wonderful volunteer from Iowa), a Horace Miller / Ginny Saylor Publication Grant from the Tucson Chapter of the Arizona Native Plant Society, contributions from the Friends of Sonoita Creek, Borderlands Habitat Restoration Initiative, and private individuals, plus lots of contributed effort by photographers and expert reviewers—“Native Plants for Hummingbird Gardens,” became a reality! This free booklet includes 65 plants native to Arizona, southern California or New Mexico that are known to provide nectar to hummingbirds. The first printing of 750 lasted less than a month, so one project for 2014 is to raise more money to print more booklets!

FACILITIES

This year the focus seemed to be on furniture!

Our days of borrowing folding chairs for big events are over. We put out a plea to our supporters and they came through with enough donations to purchase 84 folding chairs (each labeled with the name of the donor), and to buy lumber to



replace the tops of 6 picnic tables and construct 4 new “Leopold Benches” built by Roger Cogan and Ralph Dinsman, volunteer.

Furniture contributed by Jim & Karen Carson, Dot Rhodes, and Rob & Jeanne Horsmann gave a facelift to the entry of the Grassland Center and made the Ranch House and Bunkhouse more comfortable and efficient for volunteers and researchers.

In our spare time, we worked to develop a campground near the bunkhouse, spruced up the kitchen of the bunkhouse by painting the cabinets, rebuilt the courtyard wall after it collapsed under the weight of a fallen pine tree, and roofed the ramada with metal salvaged from the barn that had burned in the Ryan fire of 2002 (photo at right of Tony Leonardini, volunteer, and Roger Cogan, Conservation Coordinator).



ADMINISTRATION

For fiscal year we had to withdraw a net of \$8,078 from our reserves to balance our budget (\$10,424 – 1,644, see below). We will almost certainly have to transfer significant funds from our reserve account to cover an operating shortfall for FY 13/14. Even though the market value of the endowment established to support the Research Ranch is increasing, the funding available to the Research Ranch is decreasing. In 2009, the distribution was \$244,044, out of which \$35,989 was deducted for support services, leaving \$208,055 for salaries, insurance, depreciation and all other costs. This fiscal year the distribution will be \$190,823 with a deduction of \$39,360, for a net of \$151,463 available for operation. \$56,592 less than in 2009. We will quickly exhaust our reserves.

NATIONAL AUDUBON SOCIETY, INC.
Research Ranch
Schedules of Activities -
For the year ended June 30, 2013

	2013
REVENUE	
Contributions	\$ 9,940
Grants	-
Bequests	-
Rentals	8,630
Pooled investment income - appropriated	198,444
Other income	4,140
Assets released from restrictions	10,424
Total revenue	<u>231,578</u>
EXPENSES	
Salaries and fringe benefits	158,979
Travel	75
Vehicle operations	-
Staff training	25
Postage - general	328
Professional and consultant fees	-
Gas and electricity	2,493
Building and office maintenance	1,700
Telephone	4,756
Insurance	7,210
Maintenance - general, road and vehicles	7,727
Office and household supplies	1,820
Education materials	153
Furniture and fixtures	2,187
Computer equipment and software	897
Research equipment	-
Farm supplies	1,105
Printing	270
Advertising	25
Licenses, permits and registrations	165
Dues and subscriptions	165
Support services allocation	38,134
Other	12
Depreciation	1,708
Total expenses	<u>229,934</u>
Excess of revenues over expenses	<u>\$ 1,644</u>



Reports and Publications associated with the Research Ranch Received in 2013

- Albrecht, L. & L. Kennedy. 2013. Native plants for hummingbird gardens. Appleton-Whittell Research Ranch of the National Audubon Society. 65 pgs.
- Aguirre, G., D.J. Morfka, & G.A. Adest. (1997). Conservation strategies for the Bolson Tortoise, *Gopherus flavomarginatus*, in the Chichuahuan Desert. Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles. New York Turtle and Tortoise Society. Pp. 333-338.
- Allington, G. R. H. and T. J. Valone (2013). "Islands of fertility: A byproduct of grazing?" Ecosystems: 17.
- CEC (2013). "North American Grasslands Alliance: A framework for change." Montreal, Canada, Commission for Environmental Cooperation: 25 pages.
- Chavarria, P. M. (2013). "Ecology of Montezuma Quail in southeast Arizona. Dissertation." College Station, TX, Texas A & M. 120 pages.
- Chen, F. & Y. Zhang (2009) On the coupling strength between the land surface and the atmosphere: From viewpoint of surface exchange coefficients. Geophysical Research Letters 36: L10404, doi:10.1029/2009GL037980. 5 pages.
- Cogan, R. (2012). "Herpetofauna at the Appleton-Whittell Research Ranch." Merging Science and Management in a Rapidly Changing World: Biodiversity and Management of the Madrean Archipelago III. Tucson, AZ, USDA Forest Service Rocky Mountain Research Station: 466-467.
- d'Orgeix, D. C., T. Mathies, et al. (2013). "Northern Mexican Gartersnakes, *Thamnophis eques megalops*, feeding on *Spea multiplicata* in an Ephemeral Pond." Herpetological Review 44(2): 213-215.
- Duellman, W. E. (2013). "In memory of Hobart Muir Smith (1912-2013): From humble beginnings to worldwide recognition." Herpetological Review 44(3): 365-372.
- Federal-Register (2013). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Mexican Gartersnake and Narrow-Headed Gartersnake; Proposed Rule. D. o. t. Interior and I. Fish and Wildlife Service, National Archives and Records Administration Federal Register. 78: 60.
- Hinds, D.S. & R.E. MacMillen (1985). Scaling of energy metabolism and evaporative water loss in Heteromyid rodents. Physiological Zoology. 58(3): 282-298.
- Kaspari, M., L. Alonzo & S. O'Donnell. (2000). Three energy variables predict ant abundance at a geographical scale. Proc. Royal Society London. 267: 485-489.
- Kennedy, L. (2013). "Is there such a thing as being too successful? Sky Island Alliance. Spring 2013: 1.
- Kennedy, L. (2013). "What? A ranch with no cows?" Vermillion Flycatcher. Tucson Audubon. April-June 2013: 1.
- Kennedy, L. and D. Robinett (2012). "Vegetation monitoring on semi-arid grasslands ungrazed by domestic livestock." Merging Science and Management in a Rapidly Changing World: Biodiversity and Management of the Madrean Archipelago III. Tucson, AZ, USDA Forest Service Rocky Mountain Research Station: 479-481.

- Leeuwen, W. v., K. Hartfield, et al. (2012). "Remotely sensed mapping of woody cover in semi-desert grasslands of the Cienega Creek Basin and Sonoita Plain." Final report by the Arizona Remote Sensing Center and The Nature Conservancy. National Fish and Wildlife Foundation. 43 pages + appendices.
- Paruelo, J.M. & W.K. Lauenroth. (1996). "Relative abundance of plant functional types in grasslands and shrublands of North America." *Ecological Applications* 6(4): 1212-1224.
- Qi, J., Y. H. Kerr, et al. (2000). "Leaf Area Index Estimates Using Remotely Sensed Data and BRDF Models in a Semiarid Region." *Remote Sensing of Environment* 73: 18-30.
- Robinett, D. (2012). "Babocomari River riparian protection project." *Merging Science and Management in a Rapidly Changing World: Biodiversity and Management of the Madrean Archipelago III*. Tucson, AZ, USDA Forest Service Rocky Mountain Research Station: 491-492.
- Salvucci, G. D. and P. Gentine (2013). "Emergent relation between surface vapor conductance and relative humidity profiles yields evaporation rates from weather data." *PNAS Ecology* 110(16): 6287-6291.
- Webb, A.D. (2013). 5th Annual Science on the Sonoita Plain. Proceedings. Sonoita Valley Planning Partnership and the Cienega Watershed Partnership. Elgin, AZ. 37 pages.



Science on the Research Ranch

The following projects meet one or more criteria: 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; Collaborative, long term efforts.

* Indicates field work or data harvesting in 2013.

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

Allington, Ginger (Missouri Botanical Garden) & Thomas J Valone (Saint Louis University)

***Effect of mesquite cover on avian diversity, density and reproductive success in desert grasslands.** Anderson, Erik and Dr. Robert Steidl (SNRE, University of Arizona).

Fish Surveys. Arizona Game and Fish Department.

***Desert Pupfish.** Ross Timmons (Arizona Game & Fish Dept.).

***Survey of Gould's Turkeys near Huachuca Mountains.** Arizona Game & Fish Department.

***Avian Monitoring for Research Ranch IBA.** Tice Supplee (Audubon Arizona).

***Bullfrogs, Monitoring and Treatment on the Research Ranch.** Audubon Staff

***Christmas Bird Count – Appleton Whittell Circle.** Audubon staff; Robert Wessler (Huachuca Audubon Society).

***Depth to groundwater on Research Ranch.** Audubon Staff & Volunteers

***Ecological Site Monitoring (ESM).** Audubon Staff– Linda Kennedy

***Precipitation at Ecological Sites.** Audubon Staff – Linda Kennedy

Effects of fire and climate change on mesquite. Audubon Staff – Linda Kennedy

***Effects of fire and climate change on cacti.** Audubon Staff – Linda Kennedy

***Small mammal populations on the Research Ranch.** Audubon Staff - Linda Kennedy

Agave Monitoring on the Coronado National Forest. Biedenbender, Sharon (USFS).

***Effects of Wildfire on Riparian Trees in Southeastern Arizona.** Bock, Carl & Jane Bock. (University of Colorado, retired).

Soil inventory update. Breckenfeld, Donald J. & Daniel Robinett (U.S.D.A. N.R.C.S, retired).

Population dynamics and habitat characteristics of Montezuma (Mearn's) Quail in southeastern Arizona. Chavarria, Pedro Mazier (Texas A & M University).

***Herpetofauna of the Research Ranch.** Cogan, Roger (Research Ranch).

***Rattlesnake Wintering Sites.** Cogan, Roger (Research Ranch).

A History of the Lands in the National Audubon Society's Research Ranch Near Elgin, in Santa Cruz County, Arizona. Collins, Glendon E. (BLM (retired), AZ State Trust Lands (retired)).

Honeybee communication and the ecological context. Donaldson-Matasci, Matina. (University of Arizona).

***Current Distribution and Status of Slevin's Bunchgrass Lizard, *Sceloporus slevini*, in southeastern Arizona.** d'Orgeix, Christian, Ph.D., Virginia State University.

***Survey of Appleton-Whittell Research Ranch Drainages and Ponds for the Mexican Garter Snake.** d'Orgeix, Christian. (Virginia State University).

- Finding effective strategies for adding native diversity into heavily invaded grasslands**
Fehmi, J.S., (University of Arizona).
- Genetic approach for using pollen to determine plant resources used by nectarivorous bats.**
Ferguson, George (University of Arizona).
- *Using soil moisture to assess ecosystem function following exotic lovegrass invasion in semiarid grasslands of southeastern Arizona.** Fernald, Alexander G. (Sam), (New Mexico State University).
- Merging functional ecology and phylogenetics to predict the response of grasslands to global change.** Forrestel, Elisabeth, Melinda Smith, Ph.D., Yale University.
- *Conservation Effects Assessment Project on the Cienega Creek Watershed.** Goodrich, David C. and Haiyan Wei. (USDA-ARS).
- *Research Ranch boundary surveying and mapping.** Greene, Dale and Kristen L. Greene. (TerraData AZ. LLC).
- Survey of high desert grasslands Hymenoptera.** Grissell, Eric (USDA retired).
- Monitoring wildlife in and near the Appleton-Whittell Research Ranch using trail cameras**
Hass, C.C. (Borderland Carnivore Studies).
- Introduction of Species Diversity into Boer Lovegrass Monocultures.** Hershdorfer, Mary and Ramona Gardner (USDA-NRCS).
- *Photo-herbarium for the Research Ranch.** Kennedy Linda (Research Ranch).
- *Sacaton Rehabilitation.** Kennedy Linda (Research Ranch).
- Oak (*Quercus*) water use strategies in Sky Island Systems.** Lackey, Russell (Texas Tech University)
- *Modeling impacts of habitat alterations on habitat use and diet selection of desert reptile communities.** Lattanzio, Matthew S. (Ohio University).
- *Avian Survey/Monitoring on the Research Ranch.** Leonardini, Tony. (Volunteer).
- Flora of the Appleton-Whittell Research Ranch.** McLaughlin Steven P., (University of Arizona, Ret.), Erika L. Geiger (USGS) ; Janice E. Bowers (USGS Ret.).
- *Meteorological Station.** USDA-ARS, Keefer Tim.
- Natural Resources Inventory – Primary Site Unit.** USDA-NRCS, Carrillo, Emilio.
- *Rangeland Health Reference Areas.** USDA-NRCS, Renken, Wilma.
- *Long-term meteorological, evaporation and carbon flux measurements.** National Oceanic & Atmospheric Administration; Meyers, Tilden P. & John Hughes.
- The Effects of Fire and Grazing on Grassland Bird Diversity and Abundance in an Arizona Oak-Savanna.** Nichols, Clay (Eastern New Mexico University).
- Pre-monsoon post-fire sediment survey.** Nichols Mary (USDA-ARS).
- Impacts of grazing, fire and precipitation variability on woody plant cover in Chihuahuan Desert grasslands, USA.** O’Neal, Kelley (University of Maryland).
- *The Babacomari Restoration Project.** Pulliam, H. Ron. (Borderlands Restoration, L3C).
- Inventory of ecological sites, their present day condition, trend and rangeland health.**
Robinett, Dan & Don Breckenfeld, (U.S.D.A. –N.R.C.S. both retired).
- *Babocomari River Protection.** Robinett, Daniel G. (Robinett Rangeland Resources, LLC.)
- *Effects of the Ryan Wildfire (April 2002) on Wintering Grassland Birds in the Sonoita Valley, Arizona.** Ruth, Janet M. (USGS).

- ***Wintering habitat use by priority grassland birds.** Ruth, Janet M. (USGS).
 - ***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. (USGS).
 - Preliminary mapping of archaeological sites revealed after Ryan Wildfire.** Schupp, Leslie.
 - Assessing condition of O'Donnell Creek.** Simms, Jeffrey & Nate Dietrich (BLM) .
 - The herpetofauna of the Research Ranch.** Smith Hobart (University of Colorado, deceased).
 - Research and reintroduction effort for Huachuca Water Umbel.** Titus Jonathan H. (SUNY-Fredonia) & Priscilla Titus.
 - Examining long-term effects of drought and fire on vegetation using high-resolution satellite phenometrics.** Villarreal, Miquel (U.S.G.S.).
 - Chiricahua Leopard Frog reintroduction to the Research Ranch, a conservation strategy** Valentine, Sandy. (Prescott College).
 - Inventory of native plant-feeding insects Arizona.** Wheeler, Alfred G. (Clemson University).
 - ***Comparison of the soil ecology and nutrient cycling in adjacent viticulture and native grassland habitats,** Wyant, Karl (Arizona State University).
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Appendix 1

December 15, 2013

Dear Linda,

Thanks for inviting The Nature Conservancy's Canelo Hills Cienega Preserve (CHCP) in joining the local FireWise partnership alongside the The Appleton-Whittell Research Ranch of the National Audubon Society and Babacomari Ranch. During the 2013 year CHCP has completed a number of projects in order to maintain wildfire readiness on its 225 acres including the following:

- Making the historic ranch compound Firewise, i.e. expanding firebreaks, making sure the water tank and fire hose outlet are operational, cleaning gutters, trimming ladder fuels from trees, moving woodpiles
- Continuing thinning efforts on the preserve as well as cleaning up potential fuels - downed cottonwood limbs etc.
- Taking GPS coordinates on wooden fence posts for eventual replacement and installing steel posts as needed.
- Making sure fire-smoke alarms are up to date as well as any extinguishers. Coming up with an alternative escape route as well as a Ready Set Go plan.
- Working with local fire district on these measures as well as helping immediate neighbors in fuel reduction efforts

Sincerely,
Jeffrey B. Miller, Preserve Steward
The Nature Conservancy, Canelo Hills Cienega Preserve



Appendix 2

Photo by J.B. Miller

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
Mean 00-13	0.97	0.74	0.35	0.30	0.15	0.71	4.48	3.27	1.82	1.13	0.48	0.86	15.26

Appendix 3



Research, Education, and Economics
Agricultural Research Service

June 7, 2013

Dr. Linda Kennedy
National Audubon Society
Appleton-Whittell Research Ranch
HC1 Box 44
366 Research Ranch Road
Elgin, Arizona 85611

Dear Dr. Kennedy,

We are conducting a pilot project in cooperation with NRCS and the Forest Service on the Cienega Creek watershed to assess the effectiveness of conservation practices on improving the condition of the rangeland and the watershed. Initial aspects of the investigation have revealed that during the majority of time when substantial EQIP rangeland conservation spending in Arizona occurred (1998-present) was also a period with many years of below average rainfall (2000-present). It is important that we present data on the condition of the rangelands that reflects the climatic effects of this period without managed grazing effects.

The Audubon Research Ranch is an ideal source of such data. The repeat vegetation monitoring that you and your staff collect on the ranch would provide valuable input to this study. It would be very much appreciated if you could share this data. Full acknowledgement and credit would of course be provided in any resulting publication that utilized your data.

Thank you for your consideration of this request.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Goodrich", is written over a white background.

David C. Goodrich
Lead Scientist

Appendix 4

United States Department of Agriculture



Natural Resources Conservation Service
Tucson Soil Survey Office
2000 East Allen Road
Tucson, AZ 85719
(520) 647-2994

National Audubon Society
Appleton-Whittell Research Ranch
366 Research Ranch Rd.
Elgin, AZ 85611

Attn: Linda Kennedy, Director

Dear Linda,

Thank you for sharing the ecological resources on the Research Ranch. One difficulty in rangeland ecological work is locating high-functioning rangelands with minimal human and livestock impact. Yet, the rangeland health reference team (Dan Robinett, Larry Humphrey, Scott Stratton, and I) was able to visit seven ecological sites on the Research Ranch. Thank you, too, for providing me with your monitoring information. I have used it to support rangeland health reference conditions and to augment the plant species lists for the Ecological Site Descriptions. I look forward to future work with you on the Research Ranch.

Thanks again,

A handwritten signature in black ink, appearing to read "Wilma Renken".

Wilma Renken, Ecological Site Inventory Specialist

Electronic cc:

Craig Prink, MLRA Soil Survey Leader

Cathy McGuire, Soil Survey Regional Director