

**APPLETON-WHITTELL RESEARCH RANCH**  
**of the**  
**NATIONAL AUDUBON SOCIETY**



**ANNUAL REPORT 2009**

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 SE Arizona.

**MISSION:** 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

- Land Stewardship– to be a premier semi-arid grassland that fosters a natural diversity of native species. *The Research Ranch must be safeguarded to insure that natural processes are not compromised by human activities. To this end, we are restoring fire to historic levels, reducing the threats from non-native species, and excluding domestic livestock, poachers, and off-road traffic.*
- Research – to understand how grasslands and related ecosystems function, and to recognize the key elements that safeguard these ecosystems. *We must effectively monitor environmental trends (weather, plant succession, animal communities, etc.) and carefully archive all findings to take full advantage of the Research Ranch as a reference site. A majority of the research projects on the Research Ranch must focus on applications that will guide human stewardship of native semi-arid grasslands.*
- Outreach and Education– to advocate for grassland ecosystems by encouraging citizens and policy makers to safeguard and rehabilitate native ecosystems throughout the region. *We must use the knowledge gained through our land stewardship and research to help citizens and decision-makers make informed choices. We must foster cooperation and communication among professionals, officials, and citizens.*



Pronghorn doe and  
twin fawns in  
grassland burned  
in the Canelo Fire  
May 2009

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Hello again Friends,

This has been another exciting year at the Ranch! The first ever Science Symposium of the Sonoita Plain was held in the Grassland Center just a few days after the Canelo Wildfire burned almost 2,500 acres within the Research Ranch. Five great interns have honed their conservation and research skills while advancing the mission and goals of the Research Ranch. No flooding this year, darn it, but we're hoping for a wet winter!

One of Audubon's conservation goals is to reduce carbon emissions, and as part of that effort a survey was conducted to examine Audubon's own carbon footprint. As a result of that survey, the Research Ranch was selected to be featured in the case study documenting the results of the survey – they were astounded at the extensive efforts we've made over the years to conserve water, energy and natural resources.

Next year I hope that we are able to showcase the next big step in reducing our carbon footprint by lessening our reliance on energy generated from coal. We're working hard to raise the money needed to install a photovoltaic system on the Grassland Center. If successful, this solar system will provide enough electricity for the Center, Chris' house, and the house I live in.

Wish us luck!

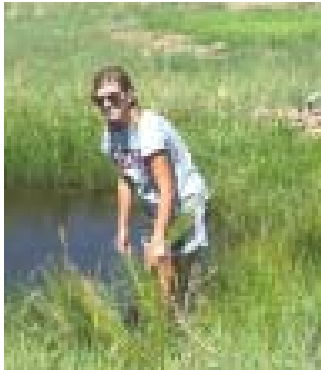
Linda Kennedy, Ph.D.  
Director

## Audubon Staff at the Research Ranch

Linda Kennedy, Ph.D., Director  
Christine Hass, Ph.D., Assistant Director  
Pat Kugler, Office Manager  
Leo Gonzalez, Maintenance

## Interns

This year we've really been lucky—FIVE great students conducted (or are conducting) educational internships on the Research Ranch!



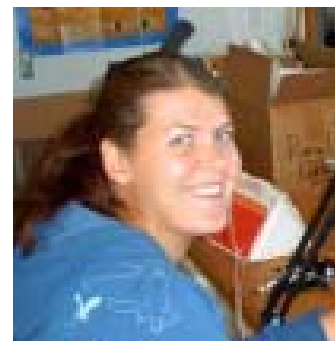
**Rachel Burand** is very interested in the policy aspects of environmental work, and is pursuing a dual major in Environmental Studies and Electronic Arts at Linfield College. Along with other projects, she created “Renewable Energy, a How to Guide for Southern Arizona Residents,” available on the Ranch website, which was a great blending of her academic interests.

**Gavin Cude's** H.S. senior exit project (“shadowing” a professional in a potential career choice) grew into a full summer internship at the Ranch. He fixed an evaporative cooler that hasn't worked for years, tagged and recorded data from hundreds of cacti after the Canelo fire, and helped Chris run bird banding stations.



**Sarah Lapidus**, an undergraduate at Amherst, came to us with a strong interest in conservation biology. As her personal project, she expanded the small mammal monitoring program and developed a picture key to small mammals of the Research Ranch

**Lindsay Reifel** came to us after completing another internship working with sea turtles. She's currently developing a photographic key to grasshoppers of the Ranch and identifying bobcats from remote-camera photos. In her spare time—she's painting the Ranch House!





**Sandy Volentine** is a graduate student at Prescott College who is very interested in protecting our native reptiles and amphibians. For her special project, she developed a conservation plan to guide reintroduction efforts for Chiricahua Leopard Frogs which included site evaluation, monitoring efforts and threat assessments.

## Volunteers

Volunteers are a great source of inspiration and enthusiasm, and help with a wide range of projects around the Research Ranch.

**Sandy and Betsy Kunzer** read the wells (depth to ground water) and assist with painting.

**John Kugler** assists with bird banding, provides graphical illustrations, and helps monitor our native fish.

**Harold Hass** (Chris' dad) helps produce signs for roads and buildings.

**Ruth Dyson and Harry Coyle** help with painting, updating our bibliography, and other projects too numerous to mention.

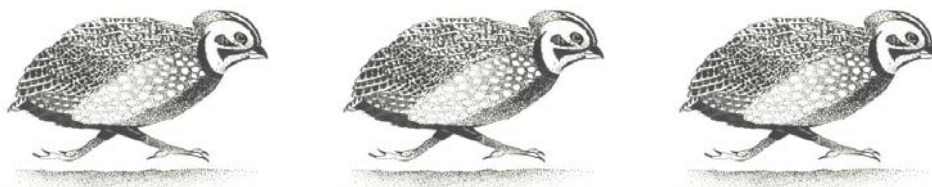
The **Sierra Club Service Tour group** gets a huge amount of work done in a single week; from repairing and pulling fence, to painting buildings, transplanting sacaton, to burying 600 feet of pipe to bring water to Telles Tank. Special thanks to **Ralph Dinsman** (leader) for bringing this group out for the past 6 years!



**Jim Koweek**, left, (Arizona Revegetation) and **Dan Robinett** (Robinett Rangeland Resources) helped Linda with vegetation monitoring. Dan also helped Leo construct the water harvesting systems for the Grassland Center and the Barn.



The **Audubon Expedition Institute** of Lesley College always volunteers during their Southwest Ecosystem Field trip – and no job is too dirty for them to tackle! This year they transplanted salvaged sacaton into a floodplain degraded by non-native Bermudagrass. Sadly, this might be their last trip to study the ecology of the Southwest, as budget cuts have dictated that this program be terminated. **Hank Colleto** (seated front row, left) has been bringing his class out for years – we’ll miss them greatly.



# CONSERVATION and LAND STEWARDSHIP

## Precipitation

This year was a very dry year for the Research Ranch, with only 10.6” precipitation recorded at the Headquarters by mid-December. Especially noticeable was the light monsoon (July 3.01”, August 2.4” and September 2.01”). Very few washes flooded, resulting in few tanks filling up and very little water available for wildlife or recharge. Few annual plants flowered this fall, and the production of seed by grasses was light.

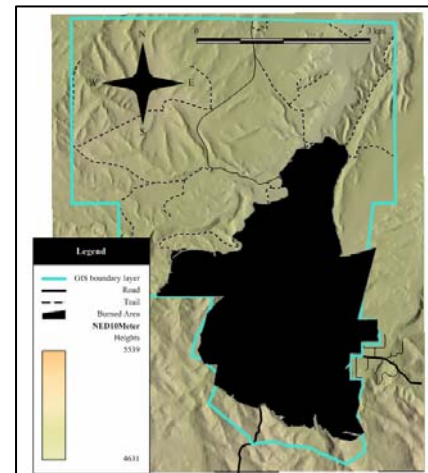
## Fire

The Canelo Wildfire, May 5-7, included about 2,500 acres of the Research Ranch. The fire, which started on private land southwest of the Research Ranch, burned swiftly to the east, sadly causing much damage to some homes in the Westgate community. The fire moved northward much more slowly. The Research Ranch is part of the Audubon-Babacomari FireWise Community, and our FireWise preparations to create defensible space around buildings were noted and appreciated by the firefighting personnel. Members of the Sonoita-Elgin Fire Department were on site for the duration of the fire as were firefighters from many other agencies. Although, as ecologists, we promote the return of natural fire regimes to grasslands, the dry winter of 08/09 didn’t produce much ground moisture and the plants were stressed, so we weren’t surprised or saddened by the decision made by the incident commander to try to halt the northern spread of this fire by lighting backfires, using roads within the Research Ranch as ignition lines.



Lighting a backfire south of the Swinging H Ranch House.

Extent of the Canelo Fire on the Research Ranch.







View of the  
Canelo fire from  
the Headquarters

## **Cross-border traffic**

We saw a substantial decline in cross-border traffic this year. Traffic during the spring and early summer was about average, but we detected no sign of any crossers from late August until early December. Northbound traffic increased during early December or so. We work closely with Border Patrol agents, who respond quickly when needed and are very respectful of the Research Ranch's special status as a sanctuary and research facility.

## **Wildlife-friendly fence**

The Canelo Fire damaged a portion of the boundary fence on the north and south sides of Cimarron Road, and along the east side of the Research Ranch. This was all repaired by the end of the summer and no encroachment by livestock was noted due to the downed fence.

Eighteen fenceposts (t-posts) were stolen from the fence delineating the boundary of the Forest Service within the Research Ranch and replaced immediately. We'd have given them some old t-posts if they'd just asked!

## **69kV power line**

Construction of the proposed power line across the Babacomari Ranch, immediately north of the Research Ranch boundary, has been put on hold by the Arizona Corporation Commission,

pending completion of a feasibility study examining all alternatives. This line, if installed as planned, would have grave detrimental effects on cross-fence research.

## **Water for wildlife**

The BLM installed a new solar array and pump on the well at Bald Hill, and we now have water available for wildlife there again.

Six hundred feet of pipeline were dug up and replaced by volunteers from the Sierra Club Service Tour. This pipeline will ensure that water is available at Telles Tank.

The USDA-NRCS awarded us funding for a Wildlife Habitat Improvement Project – water harvesting to provide water for wildlife. Three 4,600 gallon tanks were installed near the Grassland Center and Party Barn. These tanks hold rainwater collected from the Center and the barn, which is then piped to wildlife waterers. The Headquarters Pond is the future home of endangered Desert Pupfish, and remote cameras have documented the use of the barn waterer by deer, raccoons, bobcats, skunks, coyotes, and many species of birds such as this great horned owl whose image was captured by one of the cameras that Chris uses to track wildlife.



## **Endangered species**

The Rio Sonoyta - Quitoboquito population of pupfish that were living in the Headquarters Pond was transferred to a more appropriate site by Arizona Game & Fish. The tank was dried up for several months, then refilled. The waterer at Pronghorn Well went dry during the late summer after the pipeline was chewed by a packrat. This resulted in the loss of a small population of Rio Sonoyta - Quitoboquito pupfish that was also scheduled for transfer by AZGF. The BLM is looking into ways to replumb the system so it is not vulnerable to packrat damage. We are awaiting transplants of desert pupfish, also an endangered species, but a species that is native to this watershed.

## Non-native invasive species

We continued our efforts to keep non-native invasive species from compromising the native communities of the Research Ranch. One adult bullfrog was removed from Post Canyon; 5 juveniles and 2 tadpoles were removed from O'Donnell Creek. The presence of young stages of bullfrog in this stream was especially troubling as it shows evidence of a breeding population. Bullfrogs are native to North America, but were brought to Arizona by humans. They are very damaging to native reptiles, amphibians and fish. Green sunfish and mosquito fish were



Charlie Schulz of the Sierra Club Service Tour transplanting sacaton into floodplain dominated by non-native Bermudagrass

removed from tanks within the Post and O'Donnell drainages. Lehmann Lovegrass was treated with glyphosate in the sandy loam ecological site (see Monitoring section for more information on the spread of Lehmann lovegrass on the Research Ranch). One bright spot can be seen in our efforts to reclaim a sacaton floodplain currently dominated by Bermudagrass.

Thanks to generous

grants from the RIESTER Foundation and help from many volunteers, our plan to transplant sacaton into the Bermudagrass has taken a great step forward. Several hundred sacaton plants have been transplanted into the floodplain, and with careful nurturing, survival rates of transplants have been high.



## RESEARCH and MONITORING

### Apacheria Fellowships awarded

This year we awarded three fellowships to support student projects!



**Ginger Allington**, a graduate student at Saint Louis University, used her fellowship to fund laboratory tests on soil samples in support of her project **“Is long-term livestock exclusion in an arid grassland associated with differences in soil chemical properties?”** Ginger’s advisor, Dr Tom Valone, also has conducted research here!

**Clay Nichols** completed his B.S. at the University of Eastern New Mexico and was accepted into the Master’s program there. His senior project, **Effects of Fire and Grazing on Grassland Bird Diversity and Abundance in an Arizona Oak Savanna,** grew into his Master’s thesis. Dr. Zach Jones is Clay’s advisor, and has a long history of research projects on the Research Ranch.



**Wayne Porter** is a graduate student at the School of Sustainability at Arizona State University. His project, **“A Proposal for the Design and Development of a Plan to Reduce Carbon Emissions in Rural Southeastern Arizona”** earned a fellowship funded through a grant from *Together Green*. (For more information about the *TogetherGreen* initiative, see page 17)



## Research highlights

The Ranch hosted more than forty projects during 2009 (see appendix for more detail). New projects include: **“Modeling impacts of habitat alterations on habitat use and diet selection of desert reptile communities”** by Matthew Lattanzio, Ph.D. student at Ohio University, **“Babacomari River Protection”** by Dan Robinett, Robinett Rangeland Resources, and **“Population Dynamics and Habitat Characteristics of Montezuma (Mearn’s) Quail in Southeastern Arizona”** by Pedro Chavarria, Ph.D. student at Texas A & M University (below).

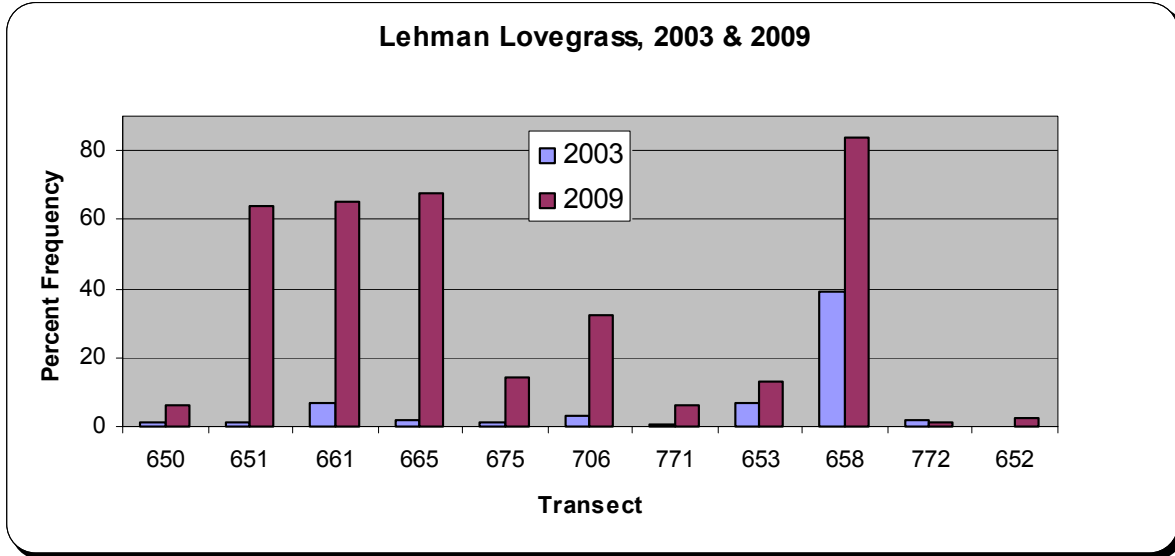


## Monitoring efforts

### Vegetation Monitoring

Fifteen transects established on ecological sites were read this year out of a total of nineteen. Linda Kennedy and Carissa Woonka, an intern, established these transects in 2003, based on the ecological site map generated by NRCS in 2000. Some, if not all, transects have been re-examined each year (with some transects missed in some years due to time constraints). On transects with Lehmann Lovegrass present at the start of monitoring, all showed an increase in the percent frequency of Lehmann, with some transects showing increases of more than 500% between 2003 and 2009.





Percent frequency of Lehmann Lovegrass on vegetation monitoring transects on the Research Ranch, 2003 and 2009.

Weather

Weather is monitored at several weather stations around the ranch. USDA-ARS maintains several stations that monitor precipitation, temperature, soil temperature and other variables. These data are telemetered to Tucson. Links to these data are available on the Research Ranch website. NOAA maintains a Climate Reference Network station near headquarters. This stations records hourly temperatures, wind speed, precipitation, solar radiation, and other variables, and data are transmitted via modem to Knoxville, TN. Chris has set up a database to record data from this station, which is updated periodically. Data summaries are available on our website, and these data were used to produce the “Appleton-Whittell Research Ranch Calendar”, which provides the average high and low temperatures and precipitation for each day of the year.

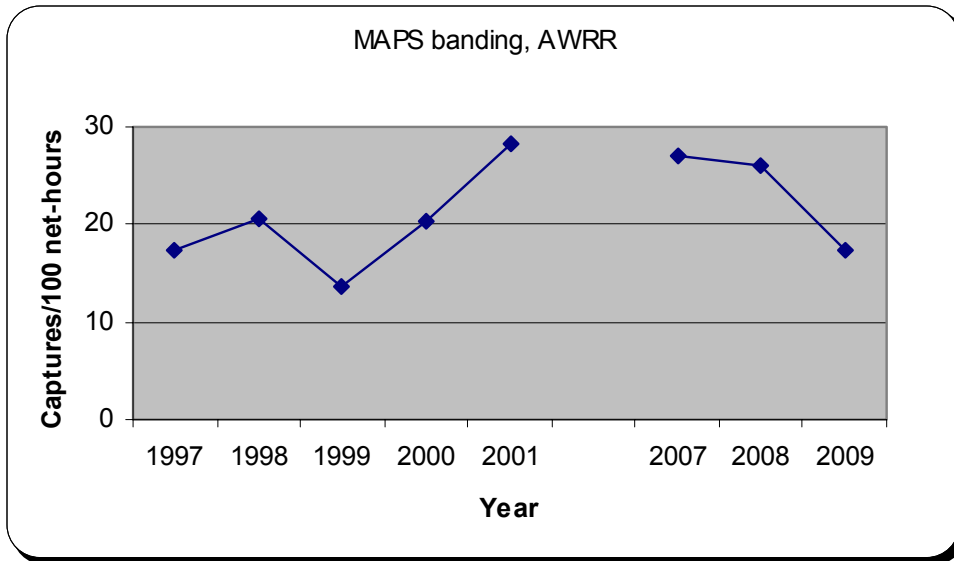
In addition to the above weather stations, precipitation is recorded at more than a dozen sites across the ranch, in association with the vegetation monitoring. The BLM has recently provided 6 tipping-bucket data-logging precipitation gages, which will allow us to expand and refine our data collection.

Birds

MAPS: The Research Ranch has participated intermittently in the Monitoring Avian Productivity and Survivorships (MAPS) program since 1997, depending on the availability of qualified bird banders. When Chris arrived at the Ranch, she restarted participation in the program, in conjunction with banding she had been doing at the Empire Ranch portion of Las Cienegas NCA. The MAPS station on the Research Ranch is near Post Dam. The number of total birds captured has fluctuated over time, but appears to be in a decline since 2007 (see graph

at left). The station has suffered a severe overgrowth of non-native Johnsongrass, resulted in the loss of half of the net runs. That site is being abandoned, and a new location will be sought for 2010.

Total bird captures at Post Dam as part of the Monitoring Avian Productivity and Survivorship Program at the Research Ranch.



Christmas Bird Count: The Research Ranch is totally within the Appleton-Whittell Christmas Bird Count and 2009 saw our third sanctioned count. Robert Weissler, of Huachuca Audubon Society, is the official compiler of this CBC. Results are available at [www.audubon.org/bird/cbc/index.html](http://www.audubon.org/bird/cbc/index.html). Every year we are reminded of Robert Whitcomb, who was the driving force to develop this CBC circle and who passed away shortly after the site was sanctioned.

IBA: The Research Ranch has been recognized as an IBA (Important Bird Area) and we assist staff from Audubon Arizona in IBA monitoring each summer.

### Mammals

Several monitoring projects are underway for mammals. John Millican (Arizona Game and Fish) has conducted surveys for large mammals for many years. Remote cameras placed throughout the ranch document animal presence. Chris is working on methods to use the camera data to identify individuals and index abundance. Track surveys are also used to document presence of wildlife on select transects in different parts of the ranch. Small mammals have been sampled as part of various research projects, and we recently determined a subset of plots that will be monitored by Ranch staff and interns each year. Lastly, Audubon staff conducts a nocturnal road survey for jack rabbits and cottontails by driving the road from headquarters to the Elgin-Canelo Road during the first part of each month.

## OUTREACH and EDUCATION

### **Professional activities**

Chris attended the Ecological Society of America annual meeting in Albuquerque in August, where she presented a paper on “Distribution and habitat affiliations of 4 species of skunks in Arizona and New Mexico” (coauthored with Dr. Jerry Drago).

Chris attended the International Society for Professional Trackers annual conference, in Warner Springs, CA, in October, where she presented 2 talks: “Tracking white-nosed coatis on the Arizona borderlands” and “Using sign to examine ecological relationships between sympatric bobcats and mountain lions.”

Chris attended a workshop on “Forecasting climate impacts on wildlife of the arid southwest at regional and local scales using downscaled climate models” presented by the USGS National Climate Change and Wildlife Science Center Research Project in Flagstaff, AZ in October.

Linda attended the Society for Range Management Meeting in annual meeting in Albuquerque, NM and an Invasive Species workshop held in Phoenix, hosted by the Department of Defense.

### **Service**

Ranch personnel actively participated in several organizations or committees in 2009, including:

Arizona Native Plant Society  
Bureau of Land Management Resource Advisory Council  
International Society of Professional Trackers – Program committee  
Jaguar Conservation Team  
Mountain Empire Energy Project  
Society for Range Management  
Sonoita Chamber of Commerce  
Sonoita Crossroads Community Forum Board of Directors (Chair: Energy Subcommittee)  
Sonoita Valley Planning Partnership - Natural Resource Team

## Workshops/Field Trips

In May, along with the Bureau of Land Management, the Sonoita Valley Planning Partnership, and Cienega Watershed Partnership we hosted the first annual “Science on the Sonoita Plain” symposium, which brought scientists and interested parties together at the Research Ranch. Presenters from University of Arizona, The Nature Conservancy, Texas A & M, the Research Ranch (Chris discusses her work at the MAPS station, see photo at right), USDA, and Robinett Rangeland Resources shared the results from their research.



We also hosted field trips from the University of Arizona on rangeland inventory and monitoring, the Audubon Expedition Institute of Lesley University, Prescott College, and groups including the Arizona Historical Society, Arizona Riparian Council, RIESTER Board of Directors, Tucson Audubon Society, and Huachuca Audubon Society.



Janet Ruth, Ph.D., Research Ecologist with U.S.G.S. presented an excellent workshop entitled “Identifying Southern Arizona’s Wintering Sparrows.”

## Potlucks & Presentations

Our almost-monthly Potlucks & Presentation series continues to be a hit. This year’s talks included:  
“Population Dynamics and Habitat Characteristics of

- Montezuma (Mearn’s) Quail in Southeastern Arizona” by Pedro Chavarria;
- “Bird Migration across a changing landscape” by Jherime Kellermann;
- “In Search of Self: One girl’s schlepping around Morocco: by Susan Shields;
- “Introduction to wildlife tracking” by Chris Hass, Ph.D.;
- “Rattlesnake: the colorful natural history of Arizona’s most famous natives” by Melissa Amarello,
- “Bats in Southern Arizona” by Christa D. Weise, Ph.D.;
- “Abundance and distribution of Arizona Grasshopper Sparrows: current and historical surveys” and “Australia (Queensland) from a birder’s perspective” both by Janet M. Ruth, Ph.D.

## ***It Pays to Save!***



The Sonoita Crossroads Community Forum (SCCF) and the Research Ranch teamed up for a successful grant application to the *TogetherGreen* Innovation program, funded by Toyota through Audubon. The *TogetherGreen* initiative supports projects that will connect people and inspire them to protect the environment.

Our project, “**Reduce Carbon Emissions: a Model for Rural Communities,**” was only one of three projects (out of 148 applicants) that received full requested funding. The selection committee was very excited about our project!

We are developing a grassroots information network with the slogan “**It Pays to Save!**” that will encourage and enable action on:

- Individual conservation efforts,
  - Energy efficient upgrades on existing structures,
  - Renewable energy systems on homes and businesses,
  - Energy efficiency standards on new construction.
- And discovering funding sources for residences/businesses/non-profits.

Jeanne Horsmann, member of SCCF and project manager, is organizing community events and educational opportunities. Wayne Porter, ASU graduate student and Apacheria Fellow, will be assisting Jeanne and documenting our community’s efforts in a case study that will provide a template for other communities who are trying to reduce dependence on fossil fuels. Karen LaFrance, Tempe, is sharing her expertise as a community organizer. The Cienega Watershed Partnership is assisting with communication channels, and many volunteers are contributing their time and effort.

### **KPUP Radio Show features Together Green Project!**

Wayne Porter (Apacheria Fellow), Julie Holding, (KPUP host), and Jeanne Horsmann (Project Team Leader)





## Website

We continue to expand our website (<http://researchranch.audubon.org>) and add more useful information for people living in the Sonoita area. We've added GIS maps, species lists, weather data, and more information on living gently on the land. Check out our new "Library" section for downloadable reports and other information.

## Publications

This year saw the culmination of a long term joint effort among the Santa Cruz Natural Resource Conservation District, Coronado Resource Conservation and Development, USDA/Natural Resources Conservation Service, University of Arizona Extension, Santa Cruz County, and National Audubon Society. The 73-page booklet "**Rural Living in Santa Cruz County, Arizona**" edited by Fish, Kennedy, Hass, Egen, and Magruder is now in print and is also available on the Research Ranch website

Chris' paper, "**Competition and coexistence in sympatric bobcats and pumas,**" was published in a recent issue of the Journal of Zoology (see appendix for abstract and full citation). Linda was one of several co-authors of a chapter on "**Mycorrhizal Ecology in Desert Riparian Ecosystems**" in the recently published book "Ecology of Desert Riparian Ecosystems: The San Pedro Example" edited by Julie Stromberg and Barbara Tellman.

See Appendix for more examples of publications associated with the Research Ranch.

## Fiscal Situation

FY 08/09 was again a challenge, but although contributions were down compared to FY 07/08, the distribution from the Research Ranch endowment increased (see FY 08/09 Financial Report, Page 30). This, plus careful cost cutting measures allowed us to meet our budget for the year. Cost cutting will continue for the remainder of FY10, making it difficult to maintain the high level of conservation efforts necessary to protect the grasslands, facilitate research and provide educational information to citizens and policymakers. Staff will continue to solicit contributions from those who believe in the mission of the Research Ranch and pursue grants that are consonant with Research Ranch goals.

## Appendices

### Abstracts/Papers by C.C. Hass

#### **Distribution and habitat affiliations of 4 species of skunks in Arizona and New Mexico.**

Chris Hass, Ph.D. Appleton-Whittell Research Ranch, National Audubon Society, and Jerry Drago, Ph.D., Museum of Southwestern Biology, University of New Mexico.

**Abstract:** The southwestern United States is home to 4 species of skunks (striped skunks, *Mephitis mephitis*; hooded skunks, *Mephitis macroura*; American hog-nosed skunks, *Conepatus leuconotus*; and western spotted skunks, *Spilogale gracilis*), but their biology in this region is poorly understood. We examined distribution within Arizona and New Mexico from sightings, museum specimens, remote camera photos, and trapping records. We determined coarse-grained habitat affiliations for all 4 species using distributional data and digital habitat maps. We determined finer-grained habitat affiliations by recording habitat variables around den sites for radio-collared hooded and striped skunks. 94<sup>th</sup> meeting of the Ecological Society of America, Aug 2009, Albuquerque, NM



Photo by C. Hass

**Using sign to examine ecological relationships between sympatric bobcats and mountain lions.** Chris Hass, Ph.D. Appleton-Whittell Research Ranch, National Audubon Society

**Abstract:** Competition for space and food resources is a major topic in community ecology. Recent studies have revealed that the presence of a larger carnivore may influence the space use and diet of a smaller carnivore. Although bobcats and mountain lions occur together over much of western North America, few studies have been conducted of both species in the same locale. I studied food habits and space use of bobcats and mountain lions in southeastern Arizona from 1997-2002 using scat analysis and track surveys. Diets differed substantially, with bobcats eating primarily rodents and lagomorphs, and mountain lions eating primarily ungulates and carnivores. Bobcats appeared to use grassland, scrub, riparian and woodland habitats equally, whereas mountain lions were more active in riparian and woodland habitats. There was little evidence that bobcats avoided mountain lions spatially. However, I present the hypothesis that bobcats may be consuming fewer deer than expected to avoid conflicts that may result in losing a kill to, and/or being killed by a mountain lion. In this presentation, I will also discuss the strengths and weaknesses of non-invasive methods for studying carnivores. International Society of Professional Trackers, Oct 2009, Warner Springs, CA.

**Tracking white-nosed coatis on the Arizona borderlands.** Chris Hass, Ph.D. Appleton-Whittell Research Ranch, National Audubon Society

**Abstract:** White nosed coatis are tropical relatives of the raccoon, whose distribution includes the southern borders of Arizona, New Mexico and Texas. They are unique among carnivores in having separate social organizations of group living females and solitary males. I review a 5 year study of coati ecology which I conducted in southeastern Arizona, including social organization, home range, food habits and predators. I then relate coati ecology to coati sign and how to distinguish it from other carnivores commonly found in the area.

International Society of Professional Trackers, Oct 2009, Warner Springs, CA.

**Competition and coexistence in sympatric bobcats and pumas.** Chris Hass, Ph.D. Appleton-Whittell Research Ranch, National Audubon Society

**Abstract:** Space use and diets of sympatric bobcats (*Lynx rufus*) and pumas (*Puma concolor*) were compared using sign surveys and scat analysis during 1997-2002 in southeastern Arizona, USA. Bobcats appeared to use grassland, scrub, riparian, and woodland habitats equally, but pumas had higher activity in riparian and woodland habitats. There was little evidence that bobcats avoided pumas in space use. Bobcats ate primarily rodents (33% of items in scats), lagomorphs (32%), and ungulates (16%) whereas pumas ate primarily ungulates (69%) and carnivores (21%). Pumas had a narrower dietary niche breadth than bobcats, and puma diet overlapped bobcat diet by 56%, suggesting that pumas may be more vulnerable to changes in prey density than bobcats. Pumas also killed and consumed bobcats, indicating that interference competition may be manifesting through intraguild predation. *Journal of Zoology* (London) 278:174-180 (2009).

### **Publications associated with the Research Ranch Received in 2009**

Fish, D., L. Kennedy, et al., Eds. (2009). Rural Living in Santa Cruz County, Arizona A guide to resources and regulations for country living, Santa Cruz Natural Resource Conservation District, Coronado Resource Conservation and Development, USDA/NRCS, U of A Extension, National Audubon Society, and Santa Cruz County.

Hass, C. C. (2009). "Competition and coexistence in sympatric bobcats and pumas." Journal of Zoology 278: 174-180.

Koike, H. (2007). Genetic Structure of Refuge Populations of the Desert Pupfish Complex. Zoology. Stillwater, OK, Oklahoma State University. MS Thesis..

Koike, H., A. A. Echelle, et al. (2008). "Microsatellite DNA analysis of success in conserving genetic diversity after 33 years of refuge management for the desert pupfish complex." Animal Conservation 11: 321-329.

Loescher, H. W., C. V. Hanson, et al. (2009). "The Psychrometric Constant Is Not Constant: A Novel Approach to Enhance the Accuracy and Precision of Latent Energy Fluxes through Automated Water Vapor Calibrations." Journal of Hydrometeorology 10: 1271-1284.

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Wheeler, Jr. A.G.. and R. A. Rakitov (2009). "Pinyon Pines as Host Plants of Three Proconine Leafhopper Species (Hemiptera: Cicadellidae: Cicadellinae)." Proceedings of the Entomological Society of Washington 111(2): 515-526.

## Science on Audubon's Appleton-Whittell Research Ranch Summary and Status of Active Research/Baseline Projects – updated 12 10 2009

**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; Collaborative efforts. \* Denotes projects with fieldwork/research in 2009

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

Allington, Ginger; Thomas J. Valone; Saint Louis University. St. Louis, Mo 63116  
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.  
Keywords: water infiltration, soil compaction, grassland, grazing, soil, soil physical properties  
*Status: Field work conducted in Summer, 2008, Lab work, 2009 (Apacheria Fellow)*

### Future planning for Sonoita Crossroads

Andersen, Kent G., Research Ranch intern; Wm. V. Branan, director (then)  
Subject: Develop report integrating public surveys, traffic conditions and development options  
Application: Guide future decisions  
*Status: Complete, report in file. Used by Crossroads Community Forum (2005,06, 08, 09).*

### \*Survey results for mule deer, javelina and whitetail deer on the Research Ranch

Arizona Game & Fish Department; John Millican, 555 North Greasewood; Tucson, AZ 85745  
Project: Estimate populations  
Application: Analyze impacts of hunting, climate on populations  
*Status: Ongoing, annually. Millican retired 2009.*

### \*Leopard frog surveys

Arizona Game & Fish Dept. (AZGF): Abigail Dinsmore, Wildlife Specialist, (2005) Phoenix, Arizona 85023 (602) 789-3362, Adinsmore@azgfd.gov.  
Subject: Survey leopard frogs, primarily in Post Canyon area  
Application: Protect native species  
*Status: Ongoing. 2009 – discussion w/Tom Jones (AZGFD) regarding Safe Harbor agreement & releasing populations into Post, Telles. Intern Sandy Volentine conducted surveys in summer 2009*

### Native Fish Reintroduction in Turkey Creek

Arizona Game & Fish Dept. (AZGF(D)): Suzanne Ehret Fisheries biologist, Tucson, AZ 85745.  
Subject: Reintroduce Gila chub, longfin dace into Turkey Creek on Steen's property.  
Application: Protect listed species  
*Status: Preliminary report – successful. Report in file. Reports (S. Ehert AZGF) of green sunfish in Turkey, 2008, 2009)*

### \*Fish Surveys

Arizona Game and Fish Department. Fisheries biologists: Suzanne Ehret, Tucson, AZ 85743; 5  
Subject: Conduct periodic surveys of the riparian systems of the Research Ranch and neighboring properties  
Application: Evaluate stability of populations of native species, recommend management actions  
*Status: Conducted survey of O'Donnell in May, Post in June 2008. Report (e- & paper) on file.*

### \*Pupfish (Cyprinodon)

Arizona Game & Fish Dept. (AZGF): Ross Timmons (2009) Susanne Ehert (2008), Jeremy Voetz (2003) Rebecca Davidson (2001), Timmons, Weedman, Brown, Bagley, Hendrickson  
Subject: Monitor and protect population of pupfish introduced into ranch stockponds and wildlife waters  
Application: Conserve native species, protect endangered fish  
*Status: Ongoing. 2009: Surveyed Pronghorn & Headquarters tank. Report to come. Received excerpt documenting initial release of Quitobaquito pupfish in Finley Tank, see Kynard (1979) in library. Removed from Headquarters Tank in April 2009 and moved to safe site in Tucson. August 2009 – pronghorn tank dry due to leak in pipe. All pupfish lost. Notified AZGF – they were still waiting for permission from USFWS to move them. Also notified BLM. Anticipate release of desert pupfish in early spring 2010.*

### \*Survey of Gould's Turkeys near Huachuca Mountains

John Millican; Arizona Game & Fish Department; 555 North Greasewood; Tucson, AZ 85745  
Project: Estimate populations  
Application: Track success of re-introduction effort  
*Status: Ongoing. Most recent survey – April, 2009 by LKennedy ( see also "Wild Turkeys Audubon staff projects). Millican retired 2009.*

### \*Avian Monitoring for Research Ranch IBA

Audubon staff: Tice Supplee, L Kennedy, C. Hass.  
Project: Establish transects to monitor bird species on Research Ranch

Application: Support IBA nomination (see also Wonkka), examine longterm trends  
Status: *Established transect on East Mesa, ran 2x in 2009. Need to expand into Post, O'Donnell, Telles.*

**\*Bullfrogs, Monitoring and Treatment on the Research Ranch**

Audubon Staff: L. Kennedy  
Subject: Discover and eradicate individuals within boundary of Research Ranch  
Application: Protect native fish, reptiles and amphibians from predatory, non-native species  
Status: *Continual – under auspices of AZGF permit. Monitor and remove bullfrogs prior to monsoon. 2009: Rebuilt fence around Finley Tank. 1 adult, 5 juveniles, 2 tadpoles removed June, 2009 from O'Donnell Creek.*

**\*Christmas Bird Count – Appleton Whittell Circle**

Audubon staff; Robert Wessler (Huachuca Audubon Society) – organizer and compiler; weissler@aves.org  
Subject: Conduct bird count as per Audubon standards.  
Application: Pooled data yield important information re avian populations, movement and trends.  
Status: *Unofficial first count conducted Jan 2006. First Sanctioned CBC on 12 23 2006 – 111 species. Second CBC 1 4 2008, 123 species. Third CBC 1 5 2009 – 111 species. Fourth scheduled for 1 2 2010.*

**\*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.  
Status: *Ongoing. 2009: 11 wells monitored quarterly by volunteers, Sandy & Betsy Kunzer. Depths in measured wells holding steady with some seasonal variation. Added piezometer (Tiller) in O'Donnell canyon*

**\*Ecological Site Monitoring (ESM)**

Audubon Staff– Linda Kennedy  
Project: Establish permanent points to monitor vegetation change. Based on Ecological Site Map (Robinett & Breckenfeld)  
Application: Identify trends in vegetation change  
Status: *15 of 19 completed in 2009.*

**Geographic Information System**

Audubon Staff and see : Geiger, Loomis, Seltzer

**\*Precipitation at Ecological Sites**

Audubon Staff – Linda Kennedy  
Project: Establish range gages to correspond with ESM. Based on Ecological Site Map (Robinett & Breckenfeld)  
Application: Correlate precipitation with changes in vegetation.  
Status: *Read 2X annually – 2009: 10-12”.*

**\*Recording Precipitation with Data Loggers**

Audubon Staff: Linda Kennedy, Christine Hass  
Project: Install tipping gages equipped with dataloggers in key areas.  
Application: Provide detailed information relevant to stream flows and changes in vegetation  
Status: *2008: installed 4 gages, 3 near northern boundary and 1 near Turkey Creek. Received 6 new tipping gages from BLM in fall, 2009*

**\*Wild Turkeys on the Research Ranch**

Audubon Staff; Linda Kennedy, Assistant Director  
Project: Record sightings of wild turkeys.  
Application: Document spread of sub-species reintroduced in Huachuca Mtns.  
Status: *Ongoing. Participated in AZ G&F field survey 2009. Tracks seen, April 2009.*

**\*MAPS (Monitoring Avian Productivity and Survivorship)**

Audubon staff: Christine Hass , assistant director, Pat Kugler, office manager, and volunteers See also, Chase.  
Project: MAPS station established under guidelines of continent-wide program to provide critical conservation and management information for populations of landbirds breeding within the United States and Canada. Post Canyon is one of over 500 stations. Birds are mist-netted, recorded, banded and released.  
Application: Increases knowledge of landbirds breeding within the US and Canada  
Status: *2009: ran station w/ half of net runs. May abandon, due to Johnsongrass, and relocate to Audubon property.*

**\*Monitoring wildlife in and near the Appleton-Whittell Research Ranch using trail cameras**

Audubon Staff: Hass, C.C. Assistant Director  
Project: Use trail cameras to identify and monitor various species of terrestrial wildlife.  
Application: Identify habitat specific wildlife use and develop index for long-term trends.  
Status: *4-8 cameras operating on since late 2006. 2009: One camera destroyed in Canelo Fire.*

**\*Agave Monitoring on the Coronado National Forest**

Biedenbender, Sharon, Ph.D., USFS. Rangeland Management Specialist, Sierra Vista Ranger District, Coronado National Forest, 5990 S. Highway 92, Hereford, AZ 85615. [sbiedenbender@fs.fed.us](mailto:sbiedenbender@fs.fed.us)  
Project: Monitor impacts of livestock grazing on florivory of agave  
Application: Management of food source for lesser long-nosed bat  
Status: *Re-sampled i, spring 2009, report to follow.*



**Subdivision versus ranching: Effects of livestock grazing and exurban development on the biodiversity of a southwestern grassland/savanna**

Bock, Carl (Carl.Bock@colorado.edu), Dr. Jane Bock (Jane.Bock@colorado.edu); Department of Environmental, Population, and Organismic Biology; University of Colorado (Ret.)

Subject: What are the impacts of conversion of ranches into housing developments?

Application: Guide human population growth to minimize negative impacts on native species.

Status: Bock et al., *Oasis effect* (2008). See Nichols (2008) for follow-up on birds. Bocks to resample selected plots in August, 2010.

**\*Response of rodents, birds, and vegetation to the Ryan Fire, Sonoita Valley, AZ -a unique opportunity to examine the ecological consequences of fire in grassland/savannas of the Arizona Borderlands**

Bock, Carl, E., Professor; Department of Environmental, Population, and Organismic Biology; University of Colorado; (Ret); Linda J. Kennedy, Audubon

Subject: Quantify effects of wildfire on assemblages of small mammals, birds and vegetation.

Application: Help land managers predict response of species to large scale rangeland fire

Status: 2009 rodents sampled (see Lapidus) Bocks to resample selected plots in Summer, 2010.

**Soil inventory update**

Breckenfeld, Donald J., Daniel Robinett; U.S.D.A. N.R.C.S. 2000 E. Allen, Tucson, AZ

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.

Status: Information requested often by researchers and others, i.e. Baker (Aug 05), Nauman (July 05). Mattias (2009) Now available at <http://researchranch.audubon.org/Library.html>

**\*Renewable energy options for Southern Arizona**

Burand, Rachel (Intern) and Linda Kennedy, Audubon

Project: Develop educational material outlining alternatives to electricity generated from coal

Application: Assist residents and business owners reduce carbon emissions

Status: Summer, educational internship completed. Report: “Renewable Energy – A how-to guide for southern Arizona residents” is on website [http://researchranch.audubon.org/OutreachEdu\\_LivingGently\\_GenInfo.html](http://researchranch.audubon.org/OutreachEdu_LivingGently_GenInfo.html)

**Wildland Philanthropy: An American Tradition (working title)**

Butler, Tom, Researcher/Writer/ Woodshed Communications, Huntington VT 05462; Antonio Vizcaino, Photographer

Project: Book on natural areas conserved wholly or partly by private funding and initiative. Profile of Appleton-Whittell Research Ranch included.

Application: Promote wildland philanthropy

Status: Published 2008.

**Comparison and impacts of Bronzed and Brown-headed Cowbird parasitism in southeastern Arizona**

Chace, Jameson F. and Dr. Alexander Cruz; Department of Environmental, Population, and Organismic Biology; University of Colorado

Project: Study the impact of cowbird parasitism on songbird communities in southeastern Arizona, a region of high biological diversity and thus of concern for the preservation of faunal communities

Application: Help wildlife managers evaluate whether control of brood parasites is necessary to protect other species

Status: Has accepted position at Salve Regina Univ. Newport, RI Publication received 2009

**\*Population dynamics and habitat characteristics of Montezuma (Mearn’s) Quail in southeastern Arizona**

Chavarria, Pedro Mazier; Texas A & M University, 319 Sonoita Ave. P.O. Box 602, Patagonia AZ 85624. and Louis

Harveston, Ph.D., Sul Ross State University, Department of Natural Resources, P.O. Box C-16, Alpine, TX. 79832.

Subject: Monitoring movement of 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.

Status: Many days and nights on the ground. Project halted in fall of 2009, funding issues. Will resume in Dec 2009 w/support from ABCI grant.

**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). Phoenix.

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

Application: Background and history

Status: Received, June 2008. Incorporated into library and posted on website:

<http://researchranch.audubon.org/Library.html>

**Boer Lovegrass on the Research Ranch: Update 2008**

Crawford, David. (Intern). University of Iowa, Iowa City IA.

Subject: Use GPS and GIS to map locations of Boer Lovegrass (*Eragrostis curvula* var. *conferta*) on the Research Ranch

Application: Compare with previous work to assess trends. Provide time specific information re spread.

Status: Report & map on file.

- \*Using soil moisture to assess ecosystem function following exotic lovegrass invasion in semiarid grasslands of southeastern Arizona**  
Cross Anne F., Ph.D.; 3740 E. 83rd St. Tulsa OK 74137; Alexander G. Fernald, Ph.D., 4637 Maxim Port, Las Cruces, NM 88011, fernald@nmsu.edu  
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 the invasion of an introduced, exotic grass.  
*Status: Fernald has taken charge of project. Field work ongoing. Working with Tim Keefer, USDA-ARS linked site via radio to USDA base. Will upload via FTP. Anticipate submitting publication in 2010.*
- \*Current Distribution and Status of Slevin's Bunchgrass Lizard, *Sceloporus slevini*, in southeastern Arizona**  
d'Orgeix, Christian, Ph.D.; Department of Biology; Virginia State University; [cdorgeix@vsu.edu](mailto:cdorgeix@vsu.edu). 2006: see also also Nakiesha D. Bridgers.  
Project: Survey for bunchgrass lizard. Collect tissue for DNA analysis to compare intrapopulation and interpopulation genetic variance.  
Application: foundation for determining genetic relatedness of different populations and effects of bottlenecks on populations  
*Status: d-Orgeix on site all summer, Mathias 2 weeks, volunteer 6 weeks in 2008 & 2009 See also: Mathias, Bridgers*
- \*Survey of Appleton-Whittell Research Ranch Drainages and Ponds for the Mexican Garter Snake**  
d'Orgeix, Christian, Ph.D.; Virginia State University; Petersburg, VA 23806;: [cdorgeix@vsu.edu](mailto:cdorgeix@vsu.edu)  
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 species of special concern (AZGF)  
*Status: Summer field work.; 2009.*
- Annotated bibliography of selected reports, publications and theses**  
Dyson Ruth E.; 2647 Lamb Road, Mason, Mi. 48854  
Project: Prepare annotated list/bibliography of publications of particular interest to ARR.  
Application: Facilitate information exchange and document publications  
*Status: Revised, winter of 2007/2008, available on website. <http://researchranch.audubon.org/Library.html>. Plan to update in winter of 09/10*
- Microsatellite DNA survey of desert pupfish**  
Echelle, Anthony A., Oklahoma Sate University, Zoology Department, Stillwater, OK [74078.echelle@okstate.edu](mailto:74078.echelle@okstate.edu).  
Field leader: Jeremy Voeltz, Arizona Game & Fish Dept. [Jvoeltz@gf.state.az.us](mailto:Jvoeltz@gf.state.az.us)  
Project: Assess genetic status of desert pupfish refugium populations and develop management protocols for exchange of genetic material among populations.  
Application: A conservation genetics protocol will be developed for long-term maintenance of desert pupfish populations.  
*Status: Are Quitobaquito pupfish. 2 publications received in 2009.*
- \*Finding effective strategies for adding native diversity into heavily invaded grasslands**  
Fehmi, J.S., Ph.D., 530 621 7268. [jfehmi@email.arizona.edu](mailto:jfehmi@email.arizona.edu); U of A; SNR, Tucson  
Project: RE-introduce native plants into areas dominated by naturalized, non-native plants  
Application: Increases proportion of palatable native plants  
*Status: Research ongoing., Spg 09. Fall 2009: Fehmi in Iraq until Jan 2011*
- \*Survey of high desert grasslands Hymenoptera**  
Grissell, Eric, PO box 739, 38 Terry Lane, Sonoita, AZ; [egrissell@dtg-llc.com](mailto:egrissell@dtg-llc.com)  
Project: Study insect diversity in southwest  
Application: Significant contribution to state of knowledge  
*Status: Two Malaise traps set up in Post Canyon in 2008. Two traps set near Finley in 2009. Javelina and crossborder traffic destroyed one trap.*
- \*Ecology of hooded skunks in southeastern Arizona**  
Hass Christine C., Ph.D., Appleton-Whittell Research Ranch, H. Sheridan Stone, USAIC & Fort Huachuca, Environmental and Natural Resources Division, ATZS-ISB (Wildlife), Fort Huachuca, AZ 85613-6000  
Project: Examine resource partitioning of hooded and striped skunks; to determine densities of skunks at four sites in southeastern Arizona, to review the current and historical distribution of hooded skunks from published and unpublished reports and museum collections; to examine the prevalence of rabies antibodies among live-trapped skunks and other carnivores, and determine the variants of rabies virus among sick animals and fresh mortalities.  
Application: Examine epidemiology of rabies in SE Arizona  
*Status: See also "Ecology of hooded and striped skunks in southeastern Arizona (I20001), Heritage Program AZGF.*
- Introduction of Species Diversity into Boer Lovegrass Monocultures**  
Hershdorfer, Mary and Ramona Gardner, Ph.D., USDA-NRCS Plant Materials Center. Tucson 520 292 2999.  
Project: Determine effectiveness of various methods to increase native biodiversity into monoculture created by non-native lovegrass.

Application: Protect native grasslands

Status: Established summer 2006, results monitored in summer, fall 2007. Hershendorfer moving to CA, July 2008. Monitored in Fall 2008. MS in prep.

**\*Meteorological Station**

Keefer Tim, Hydrologist, USDA-ARS; Southwest Watershed Research Center; Tucson, AZ 85711

tkeefe@Tucson.ars.ag.gov

Project: Station jointly owned by ARR & USDA

Application: Baseline information on climate available to researchers and land managers of region

Status: Radio-linked to USDA computer in Tucson (see also Cross/Fernald). Periodic site visits to check equipment.

**Arbuscular mycorrhizal fungi associated with big sacaton (*Sporobolus wrightii*)**

Kennedy Linda J., Audubon; Jean C. Stutz, Ph.D., Arizona State University, Department of Plant Biology Tempe AZ

Project: Examine the role of AMF in the life history of big sacaton.

Application: Aid revegetation and restoration of sacaton grasslands

Status: Stutz, Beauchamp, Kennedy & others co-wrote chapter for riparian text edited by J. Stromberg & B. Tellman, in Library (2009)

**\*Monitoring the effects of fire on semi-arid grassland and oak savannas after decades of fire suppression**

Kennedy Linda, Ph.D., Director Research Ranch

Project: Monitor the effects of prescribed burns and wildfire

Application: Baseline information for future research

Status: Flagged, tagged and measures 225 cacti in sandy loam upland south of Ranch House, burned (backfire) in Canelo fire of May 2009.

**\*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.

Status: progress slow but adding prints when possible

**\*Sacaton Rehabilitation**

Kennedy Linda, Ph.D. Research Ranch

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

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

Status: Moving forward w/Post Canyon transplants. See also Naumann. Funding received to provide pump in Post Canyon (2008), have transplanted over 300 plants in 2008, 2009.

**\*O'Donnell Creek Watershed Monitoring – Appleton-Whittell Research Ranch**

Kugler, John, Pat Kugler, both of Sonoita, AZ. Chris Hass, Research Ranch

Project Establish long-term monitoring protocol of stream systems within the Ranch

Application: baseline information and identification of trends

Status: Challenging this year because of drought

**\*A survey of rodent populations on the Appleton-Whittell Research Ranch**

Lapidus, Sarah. (Intern), Amherst; slapidus11@amherst.edu

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

Applicability: Indicate trends in small mammal populations

Status: 4 sites to be monitored at least yearly, generated pictorial key to rodents

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

Lattanzio, Matthew S.. Dept of Biological Sciences, Ohio University. Athens, OH.

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

Status: Matthew and r.a. (Natalie) spent most of summer, 2009, on site. Had to re-evaluate proposal – fewer lizards than anticipated. Burn sites (Canelo wildfire) were unproductive.

**Multi-scale invasive plant inventory, monitoring and prediction protocols for TER-S management support**

Lehnhoff, Erik A., Ph.D. Montana State University, 333 Leon Johnson Hall, Bozeman, Montana, 59717.

Project: Improve understanding of non-native invasive plants on Fort Huachuca.

Application: Generate methodology to predict future distributions of non-native, invasive plant species on Fort Huachuca and surrounding lands.

Status: Preproposal accepted, proposal to DOD submitted and rejected (4:1). P.I. plans to resubmit.

**DOE – Ameriflux QA/QC Site Comparison**

Loescher, Hank. Oregon State University, 321 Richardson Hall, Corvallis, OR 94331

Project: To enhance the quality of data and assurance of site instrumentation (NOAA). Provide national standard toward existing measurements.

Application: Indirectly through long term monitoring of climate & abiotic variables that may affect future populations

Status: Publication received 2009.

**Recommendations on Sustainability - Housing**

Lundgren, Erick, Intern, Audubon Research Ranch  
Project: Develop plan to upgrade buildings for sustainable energy use.  
Application: Conserve energy  
*Status: Report on file – referenced by Audubon’s Carbon Footprint case study, 2009.*

**Flora of the Appleton-Whittell Research Ranch**

McLaughlin Steven P., Ph.D., University of Arizona, (Ret.) Tucson AZ, Erika L. Geiger; University of Arizona, Tucson AZ; Janice E. Bowers; U.S. Geological Survey (Ret) Tucson AZ 85745  
Project: Compile a flora –a complete list of all flowering plants, ferns, and conifers on the Research Ranch.  
Application: Baseline for ongoing and future research  
*Status: Pub and checklist requested often Note to AZ Nev Aca of Science of additions to flora since publication in preparation w/Kennedy. Approx 60 additions. McLaughlin & Bowers retired and moved to CA. Geiger is in Brazil.*

**Water use and the future of the Sonoita Valley**

Naeser Robert and Anne St. John, Yale School of Forestry and Environmental Studies, New Haven, CT.; Wm. V. Branran, Ph.D., then Director, Audubon Research Ranch  
Project: Review existing information to determine how much water is currently being used in the Sonoita valley  
Application: Establish safe yield development density that will keep the area from growing beyond the capacity of the water supply.  
*Status: Request for reprints: Romagni & Colman (Aug 2005), Branran for AMA, Notestein for AMA.SCCF (2009).*

**Natural Resources Inventory – Primary Site Unit**

Natural Resources Conservation Service – USDA. Tucson, AZ. Emilio Carrillo (2004), Christine Egen (1992), Steve Barker (1982)  
Project: Repeated measures: vegetation and soil. Established in 1982, to be resampled approximately decade basis  
Application: Identification of trends – reference area for MLRa-41  
*Status: Two points resampled in September, 2004. GPS/map prepared. Description received.*

**\*Long-term meteorological, evaporation and carbon flux measurements**

National Oceanic & Atmospheric Administration (NOAA); Tilden P. Meyers, Ph.D. Meteorologist; NOAA, Oceanic and Atmospheric Research, Air resources Laboratory, Atmospheric Turbulence and Diffusion Division, 456 S. Illinois Ave., P. O. Box 2456; Oak Ridge, Tn 37831-2456 meyers@atdd.noaa.gov, 865 576 1245, F 1327; John Hughes, NOAA, National Data Climatic Center, U.S. Climate Reference Network, 151 Patton Avenue Federal Building Room 420-F, Asheville, NC 28801-5001; Ph 828 271 4020; John.P.Hughes@noaa.gov  
Subject: “Establish a Climate Reference Network site – to characterize the water and carbon balance for typical ecosystem for arid southwest grasslands.  
Application: These data will be used to improve the current land use models for climate change.”  
*Status: Site commissioned in 2004. Data available at: <http://gewex.atdd.noaa.gov/> and <http://www.ncdc.noaa.gov/oa/climate/uscrn> (data/observation). Periodic visits (1-2X) yr for maintenance.*

**\*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 88130. [Clay.nichols@enmu.edu](mailto:Clay.nichols@enmu.edu)  
Project: Re-survey bird diversity on oak transects established by Bock & Bishop after Ryan fire.  
Application: Provide information, long-term, on effect of wildfire on avian diversity and abundance  
*Status: Began fieldwork in Summer, 2008. Awarded Apacheria Fellowship 2008, 2009. Zach Jones is advisor. Presentations at several professional conferences, 2008, 2009.*

**Pre-monsoon post-fire sediment survey**

Nichols Mary, Hydraulic Engineer, USDA-ARS; 2000 E. Allen Rd. Tucson, AZ; [mnichols@tucson.ars.ag.gov](mailto:mnichols@tucson.ars.ag.gov)  
Subject: Survey several stock tanks on ARR to determine level of sediment movement after monsoon. Ground cover lost due to Ryan Wildfire.  
Application: Predict one factor in rangeland health post fires.  
*Status: Sampled in summer 2005, 06, 07,08; results will be incorporated into Stone, Paige papers.*

**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, College Park, MD 20742.  
[kelleyo@umd.edu](mailto:kelleyo@umd.edu)  
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  
*Status: Began fieldwork in summer, 2008. Received Apacheria Fellowship. Gave presentation at ESM in 2009.*

**Spatial variability of infiltration on rangelands**

Paige Ginger, Research Hydrologist, USDA-ARS; 2000 E. Allen Rd. Tucson, AZ 85719; 520 670 6381 x 143; [gpaige@tucson.ars.ag.gov](mailto:gpaige@tucson.ars.ag.gov)  
Subject: Determine the hydraulic properties of the soils on ARR as part of a larger project to characterize the hydrologic responses of different ecological sites within MLRA 41-3 that are in different states of “health”.  
Application: Quantify the relationship between the “health” of an ecological site and the risk of an “at risk” site transitioning to another state.

Status: Abstract, Madrean Conference 2004. Field work conduct September 2004 P.I. moved from state. See also J. Stone

**\*TogetherGreen Apacheria Renewable Energy Analysis**

Porter, Wayne. (Apacheria Fellow) Arizona State University School of Sustainability, Tempe, AZ

Project: Develop a replicable methodology for characterizing, and also disseminating information about the available renewable energy resources.

Applicability: Analyze methodologies by which to reduce carbon emissions

Status: Started in 2009, will be complete (case study/thesis) by Aug 2010

**\*Identification of bobcats using photos from trail cameras**

Reifel, Lindsey (Intern) and C.C. Hass (Assistant Director)

Project: Determine identifiable characteristics on peltage of bobcats (*Lynx rufous*)

Application: Monitor number and movement of bobcats on Research Ranch

Status: Entered more than 3000 photos into spreadsheet/database. Currently analyzing spot patterns.

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

Robinett Dan (Daniel.robinett@az.usda.gov), Don Breckenfeld, U.S.D.A. –N.R.C.S. 2000 E. Allen, 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.

Status: Copy of report requested by TNC for Las Cienegas. Specific information requested by several researchers (i.e. lattanizio 09, mathias 09). Formed basis for Ecological Site Monitoring (Audubon Staff). Now available on website: <http://researchranch.audubon.org/Library.html>

**\*Babocomari River Protection**

Robinett, Daniel G., Robinett Rangeland Resources, Catalina, AZ; Donna Mathews, Coronado RD & D., Inc. Willcox,

Project: Establish transects and 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. Will have application to other desert rivers.

Status: Application to Arizona Water Protection Fund submitted 2008. Awarded in fall of 2008, but state funding issues and contractual snafus delayed implementation of field work until fall, 2009.

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

Ruth, Janet M. Ph.D., USGS Arid Lands Field Station, Fort Collins Science Center, Department of Biology, University of New Mexico, Albuquerque, NM 87131, , email: janet\_ruth@usgs.gov

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.

Status: Publications received 2009.. See also Wintering habitat use by priority grassland birds.

**Wintering habitat use by priority grassland birds**

Ruth, Janet M. Ph.D., Research Ecologist, USGS Fort Collins Science Center, Arid Lands Field Station, Department of Biology, University of New Mexico, Albuquerque, NM 87131; janet\_ruth@usgs.gov

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?

Application: Aid in land management decisions to provide habitat.

Status: Report used to develop AWCBC circle and IBA monitoring Publications received 2009.

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

Ruth, Janet M. Ph.D., Research Ecologist, USGS Fort Collins Science Center, Arid Lands Field Station, Department of Biology, University of New Mexico, Albuquerque, NM 87131; [janet\\_ruth@usgs.gov](mailto:janet_ruth@usgs.gov)

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.

Status: 2009: Study re-implemented and will continue at least through 2010.

**Preliminary mapping of archaeological sites revealed after Ryan Wildfire**

Schupp Leslie, P.O. Box 921, Patagonia Az ; phone & Fax 520 394 2003; e-mail: pathless@dakotacom.net

Project: Map archaeological sites between headquarters and research housing post Ryan fire. Record with state.

Application: Establish permanent record.

Status: 2009, contacted by Schupp, plan to re-examine in spring 2010.

**Mapping of Boer lovegrass, Lehmann lovegrass, and coastal Bermuda on the Research Ranch**

Seltzer Stephanie, (Intern); John Briggs, Ph.D., Department of Plant Biology, Arizona State University, [john.briggs@asu.edu](mailto:john.briggs@asu.edu); Linda Kennedy

Project: Quantify the extent to which non-native grass species have established on the Research Ranch



Application: Land management decisions and baseline for future research.

Status: *Map(s), GIS files requested by several researchers (i.e. Baker 2005, Hershendorfer 2006, Crawford 2008).*

**Assessing Condition of O'Donnell Creek**

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

Status: *2008 Found the stretch examined to be in proper functioning condition that would not be altered if one or both dams were breached. Have asked for copy of report.*

**The herpetofauna of the Research Ranch**

Smith Hobart, Ph.D., University of Colorado, Department of Biology, Boulder, CO 80309; [hsmith@spot.colorado.edu](mailto:hsmith@spot.colorado.edu);

David Chiszar, Ph.D., University of Colorado, Department of Psychology, Boulder, CO 80309;

Project: Develop a checklist of reptiles and amphibians known or thought to occur on the Research Ranch.

Application: Baseline information

Status: *Smith. Checklist requested (i.e. Lattanzio 2009) and is available on website.*

<http://researchranch.audubon.org/Library.html>

**Quantifying runoff and erosion after the Ryan Fire at The Research Ranch, southeastern Arizona**

Stone Jeffrey, ([jstone@tucson.ars.ag.gov](mailto:jstone@tucson.ars.ag.gov)) and Ginger Paige, Research Hydrologist (520 670 6381 x 143;

[gpaige@tucson.ars.ag.gov](mailto:gpaige@tucson.ars.ag.gov)), USDA-ARS; 2000 E. Allen Rd. Tucson, AZ 85719; 520 670 6381

Subject: To develop a methodology which will provide framework for future experiments

Application: predict the effects of management on runoff and erosion from ecological sites within MLRA 41-3.

Status: *See also Paige. Project completed, 2006. Publications pending.*

**Habitat, movements and roost characteristics of Montezuma quail in southeastern Arizona**

Stromberg Mark R., Ph.D., Director, Hastings Reserve, UC Berkeley, 38601 E. Carmel Valley Road, Carmel Valley, CA 93924; [Stromber@socrates.berkeley.edu](mailto:Stromber@socrates.berkeley.edu); 831 659 2664

Project: Understanding the status of populations and habitats of this species

Application: to facilitate management decisions.

Status: *No additional field work anticipated for several years. Request for copies Chavarria 2008*

**\*Ecology of *Sporobolus wrightii* (Big sacaton): Implications for restoration and management of riparian grasslands in southwestern North America**

Tiller Ronald L. (currently TNC) , Brantlee Spakes (UNC) , Juliet C. Stromberg, Jean C. Stutz, Duncan T. Patton; , Arizona State University, Box 871601, Tempe, AZ 85287-1601; Linda Kennedy.

Project: Understand the ecological processes, variables and relationships influencing regeneration and maintenance of sacaton grasslands.

Application: Enhance restoration/revegetation/protection of sacaton grasslands

Status: *Report to AZGF received 2009. Sacaton cross-sections reexamined 2009 – see Robinett Babacomari project. MS in prep- seed germination (July 2008).*

**\*Research and reintroduction effort for Huachuca Water Umbel**

Titus Jonathan H., Ph.D., Dept. of Biology, Jewett Hall, SUNY-Fredonia, Fredonia, NY 14063 716-673-3818

[titus@fredonia.edu](mailto:titus@fredonia.edu); Priscilla Titus, Fredonia NY 14063

Project: Transplant plugs and monitor success

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

Status: *Monitored in 2008, site visit in 2009 HWU are thriving. Publications received.*

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

Volentine, Sandy. (Intern) Prescott College, Prescott AZ

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

Application: Protect endangered species

Status: *Associated with thesis topic. Summer fieldwork with other researchers, extensive communications with AZGF and scientists. Report in file.*

**\*Inventory of Native Plant-Feeding Insects Arizona**

Wheeler, Alfred G., Department of Entomology, Clemson University, Clemson, SC 29634-0365; 864-656-5061; [awhler@clemson.edu](mailto:awhler@clemson.edu)

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

Status: *Several publications and reports received, others in prep.; 3-4 species new to science. Came 2x in 2009..*

**Floral biology of *Penstemon dasyphyllus* and other *Penstemon* species on ARR.**

Wilson, Paul. Department of Biology, California State University, Northridge, CA 91330-8303. 818 677 2937

Project: Study the diversity of *Penstemon* flowers in terms of morphology, pollinators, nectar secretion characters, and pollen presentation characters.

Application: Conservation of *Penstemon* species that are of conservation concern

Status: *Re-examined sites in April 2008. Publications received 2008*

### Appleton-Whittell Research Ranch Budget

<b>Revenue</b>	<b>Fy 08/09</b>
Contributions	6190
Grants	2982
Sales	166
Rentals	2040
Misc Income	2000
Pooled Investment Income	244044
Assets Released from Restriction	9078
<b>Total revenue</b>	<b>266500</b>
<b>Expenses</b>	
Salaries/Benefits	184368
Travel	2160
Vehicle oper	1389
Staff Training	771
Postage-General	382
Bank Fees	554
Accountant/Audit	3700
Consultant	950
Gas & Electricity	5221
Buildings, Maintenance	3202
Telephone	4534
Insurance	6983
Maintenance	4502
Equip. Maintenance Contracts	345
Office and Household Supplies	2859
Educational Materials	630
Photographic Supplies	43
Farm Supplies	3700
License, permit, registration	200
Dues & Subscriptions	466
Depreciation	3552
Subtotal Expenses	230511
Support Service Allocation	35989
<b>Total Expenses</b>	<b>266500</b>
<b>Net surplus/deficit (-)</b>	<b>0</b>