

A Proposal to Establish a Research Field Station in
Cuatro Ciénegas

by

Dean A. Hendrickson, Texas Memorial Museum and
Section of Integrative Biology, University of Texas,
Austin

16 March, 2005

Cuatro Ciénegas, Coahuila, México

INTRODUCTION

Cuatro Ciénegas has a long history of scientific research that uncovered its extraordinarily high biodiversity and endemism. Consequently, this small desert valley in the center of the Chihuahuan Desert is now globally recognized as an important center of extraordinary biodiversity and endemism. Scientific research is what brought the importance of this valley to the attention of the world, and now, with a great diversity of complex ecological and societal issues threatening the sustainability of this incredibly important ecosystem, a new epoch of research is required to help rescue it.

History of Research in Cuatro Ciénegas

The earliest written reports of research in Cuatro Ciénegas date to 1920 when the well-known geologist, Walter Scott Adkins, of the University of Texas at Austin, was contracted by the then owner of water rights in the southeast part of the valley to inform him regarding how to value, extent and best ways to exploit the area's water resources. Adkins produced an unpublished report that is archived (together with some photographs from his explorations) at the University of Texas' Center for American History (Adkins 1920). Biological research began some years later with initial explorations and collections of E. G. Marsh in the 1930's, but no publications came of these, except indirectly and much later. A few papers were published on regional archaeology, botany and herpetology in the 1940's and 50's, along with a thesis on fishes of the Río Salado (into which Cuatro Ciénegas now drains via canals) (Taylor 1956, Guerra 1952, Smith & Taylor 1950, Smith & Taylor 1948, Muller 1947, Gilmore 1947, Taylor et al. 1945, Shreve 1944, Schmidt & Owens 1944, Shreve 1942, Muller 1942). It wasn't until the 1960's and 1970's that intensive biological surveys got underway and started documenting the surprising biodiversity and the evolutionary history that produced it. These efforts were largely carried out under the initiative of Dr. W. L. Minckley, who obtained significant monetary support from the National Science Foundation of the U.S., and brought many colleagues to the basin to collaborate with him. Minckley thus contributed personally to, and actively promoted through others, the production of a substantial body of valuable descriptive literature on the natural history of the valley.

The 1980's and 1990's saw relatively little research activity, but renewed efforts began in the late 1990's and continued at a high level to present. Again, these efforts were driven by independent initiatives and external, independently obtained funding. Hendrickson and Marks obtained funding from The Nature Conservancy for ecological studies and renewed inventory of aquatic systems. Shortly afterward, an independent group led by Elser and Souza obtained funding from the National Aeronautics and Space Administration of the U.S. to conduct studies related to the origin of life (stromatolite ecology and evolution) and life in extreme environments (spring and deep aquifer microbiology). An Italian group, La Venta Explorazioni Geografiche, and many other researchers, far too numerous to name individually, have also made significant contributions. The currently high level of research activity was made obvious to all at the first meeting Cuatro Ciénegas researchers in August 2004 (see <http://www.desertfishes.org/cuatroc/junta/2004> for more information). Organized by Dean Hendrickson and the APFFCC with support from diverse conservation organizations, this meeting consisted of 32 oral papers and 10 posters that were presented

by a broad spectrum of researchers currently working in the basin. Throughout the 3 day event it was estimated that local residents comprised > 50% of the audience of 150 – 200 persons. Community involvement was especially notable in the discussion that preceded closure of the meeting, with many individuals expressing considerable interest in learning more, suggesting areas for additional research, and especially seeking ways to both become more involved in research, and hoping to see more events like the researchers meetings, at which current research results are presented and interpreted for the local residents.

Justification for establishment of a Research Center

The earlier periods of intensive research clearly illustrates the basic value of research. Without that early research, obviously the importance of the valley as a biodiversity and endemism hot spot would not have been recognized, and perhaps the Protected Area would not have been declared and the valley's resources would have been much more heavily impacted by now. The earlier work, and to some extent the recent research, also illustrate factors that have limited the value of research and affected its application in management. Much of the research has been done by U.S. researchers who conduct their fieldwork largely in isolation from the local community, and who publish their results in English language journals inaccessible to the local populace. Certainly with regards to the early research, local residents were generally left ignorant of both the process of scientific research and of the results of the work of many researchers, and almost always ignorant of the relevance of such research to them. Suddenly, however, they discovered how relevant the research really was to them when it formed the basis for the government's declaration of the valley as a Protected Area, a move that carried direct, tangible, and often negative effects on residents' daily lives. Not only were some activities now directly restricted, but indirect impacts also became more apparent. As the world learned of this amazing place, tourism increased, and new economic opportunities presented themselves, along with related new problems. At the same time, independent new social reforms created totally new potential threats to the valley's biodiversity and traditional regional human lifestyles, and a whole new level of complexities confronted local residents and managers of the Protected Area.

In summary, intense controversy surrounded the declaration of the Protected Area from the start, and continues to present. Opinions regarding solutions to these problems always abound, but it is clear that today's highly complex and pressing questions require sound scientific information that can only be provided by strong, independent research programs and effective dissemination of their results. While local residents are certainly now better informed regarding the reasons why the Protected Area was declared and now know more about the area's endemic biodiversity, current research is complex and remains little understood by local residents. The majority of researchers are little more involved in the local community than has been the case for decades, and the local community little more involved in research than before. Consequently, researchers still lack a thorough understanding of local needs and concerns and locals largely fail to fully appreciate what the researchers are doing or how the research they do might be applied in ways that would benefit the local community. It is not only the local community that fails to understand the value of much of the research, but the local management community is also not fully apprised of the outcome of research. Currently, coordination between researchers and the

local and management communities falls far short of what would be most beneficial to all. Researchers strive to publish their results in the peer-reviewed literature, and often then consider their jobs done, but in actuality, much work remains to be done to interpret and convey the results of the research to the public and management institutions.

Recently high levels of research have clearly demonstrated other reasons to establish a Research Center. Several relatively large, but independent projects began in the late 1990's, and operated initially almost totally independently, with nearly non-existent coordination. Researchers would sometimes cross paths in the field or at the Reserve office, but there were very limited exchanges. These independent researchers and their students were finally brought into contact via an invitation to share in the rental and utilization of a house that was initially rented by Hendrickson. By sharing living facilities during two summers of intensive field work, new productive exchanges were initiated and new collaborative ventures born. This new community of researchers, many of them graduate and undergraduate students, began to expand as each team started bringing more and more participants. Volunteers began to proliferate and provide valuable help as each team promoted their work at their home institutions and at professional meetings. With a now large core group of researchers living and working together at the rented house, new volunteers were comfortable arriving and being guided by those already working in the basin, and the team began to grow rapidly. Many of those who presented their own original research at the recent Researchers meeting began their independent projects following initial visits as volunteers working for others.

The data in Table 1 are known to be incomplete, but here one can see the list of those who have used the rental house since summer of 1998. At least 302 persons have occupied the house a total of 4,520 person days while doing field research in the basin. Over the 6 year period, this averages about 753 person days/per year. It is important to point out that this list reflects only those who have arrived at the house via collaborations of some sort with one or the other of 3 or 4 principal investigators. Until recently, the house has not been made widely available to other researchers, who, of course, are many, as illustrated at the Researchers' Meeting. We are fully convinced that upon publicizing availability of low-cost field station accommodations to the entire research community we will see a rapid increase in utilization of the facility.

The Researchers' meeting was an undisputed success by all measures. All researchers, many for the first time, became aware of what other researchers were doing, and many new friendships and potentially collaborations, were established. Perhaps most importantly, though, many researchers made new contacts with members of the local community interested in becoming more involved in research and in working with the researchers to help them interpret their work for the local community. We are firmly convinced that further institutionalization of interactions among researchers, managers and the local populace is the most effective way to increase the research done in the area and maximize its value for sustaining the valley's biocomplexity. Our long histories of experience conducting research in Cuatro Ciénegas and attempting to help manage its natural resources, clearly indicate that establishment of a permanent Research Center, with a two-pronged mission to (1) facilitate research and (2) to work with local communities to improve transfer of knowledge between researchers and the local community, is critical for

the long-term sustainability of a healthy Cuatro Ciénegas ecosystem. By better integrating the various communities - researchers, managers, and local residents - we seek to not only promote increased research activity in the region, but to also facilitate the bridging of the communications gap between researchers and the local community. We aspire to educate the local public as to the value of research, make the products of research more readily available to all, and to help the researchers better understand local needs so they might better help find solutions. We hope to facilitate such improved and expanded interactions between the local populace and the research community in large part by obtaining support to hire a field station coordinator, who can serve as liaison between the researchers and local educators,

IMMEDIATE GOALS / OBJECTIVES

Promote and facilitate scientific research

Facilitate links among researchers and between the researchers and local community

Compile scientific information (library of books, reprints, maps and photos)

Create opportunities for scientific interchange (workshops, conferences, social events, participation in research programs, other activities)

Generate data bases for species, groups and basic information (GIS)

Involve researchers and local people in local education programs

Assist field work for researchers

PLANS

At this point in time, we seek only adequate support to continue renting an adequate facility in order to continue and expand the functions of the houses we have been renting in Cuatro Ciénegas since 1998. We do, however, envision establishing as soon as possible a long-term agreement among interested participants that will allow us to accomplish that immediate goal and to plan for expansion and improvement of the facility over a longer period. Eventually we aspire to obtain support to build a complete research station with laboratory, kitchen, dormitory and meeting facilities designed by the researchers and local participants for their particular needs. We feel that infrastructure not unlike that of the very successful Field Station run for over 50 years by the American Museum of Natural History near Portal, Arizona is attainable in Cuatro Ciénegas. In fact, the research activity at the rented field station house in Cuatro Ciénegas (Table 1) already approaches the activity levels of that major research station as described in recent publications (Sherbrooke & Sherbrooke 2003) (included in Appendix 1). We propose that the SWRS is an appropriate model for management of a Cuatro Ciénegas research station. The SWRS website (<http://www.research.amnh.org/swrs/>) provides complete additional information about that facility and how it functions. We anticipate inviting the recently retired Director of the SWRS, Dr. Wade Sherbrooke, to become a member of the Cuatro Ciénegas Research Station's advisory board.

OVERSIGHT AND PROFESSIONAL GUIDANCE

Views and perspectives of active research scientists will be incorporated into the programs and development of future planning of Station Activities via establishment of a Scientific and Local Community Advisory Committee comprised of international research scientists

and selected representatives of diverse segments of the local community serving rotating volunteer terms. Initially, this Committee will provide input regarding development of the Research Station’s mission and management plan, and later will focus on helping to refine management to maximize goal attainment and research and outreach productivity. The Committee will also be asked to help seek funding for the maintenance and activities of the Station. The Administration of the Station will provide annual reports to the Advisory Board.

ADMINISTRATION

Coordinator / Manager – salary of a person who will be charged with

1. maintain the physical facility
2. coordinate with all members of the Research Center Consortium (Sponsors / donors)
3. report to the Research Consortium
4. Coordinate and facilitate visits and work of researchers
5. Facilitate liaisons and interactions between researchers and local community
 - a. Workshops with local teachers
 - b. Participation of local students and interested residents in research
 - c. Development and implementation of education projects and exhibits in coordination with interested local collaborators and researchers
6. Maintain data on facility utilization and production (visits, activities, participants, contact information, researchers database)
7. Maintain data useful to researchers and locals (library, bibliography, reports, maps, photos, GPS / GIS database, etc.)
8. Maintain institutionally owned equipment.
9. Publish regular communications with researchers and interested others (newsletter)

(skills sought in the person hired into this position include – bilingual, science background (minimo licenciatura), good computer and internet skills, good interpersonal skills (for coordination with locals, researchers, etc.), some knowledge of the basin and its conservation issues and major players.

MONTHLY BUDGET

The following figures are based on the current rental of the house that has been serving for 3 years as a field station. A vehicle (1979 Chevy 4x4 double cab truck) donated by University of Texas to DeSuValle that can continue to serve as the station’s field vehicle, but it requires considerable maintenance. It is not highway-worthy, but adequate for travel from town to field sites. The house is equipped with basic field sampling gear for fishes and aquatic invertebrates for UT-based research projects, and that equipment can remain. Some limited additional equipment and supplies will be required in the near future, but are not included in the following budget, which consists only of recurring monthly expenses based on recent experience.

Rent	\$4,500
------	---------

Utilities (includes elec., water, gas, phone, Internet)	\$2,200
Salary of caretaker*	\$4,400
Maintenance (house / truck)	\$1,650
Insurance	\$330
Cleaning	\$660
Travel	\$330
Total	\$14,070

New equipment and supplies that will be required in the future include a refrigerator and freezer, new kitchen equipment including microwave oven, computer, maps, GPS receivers, and transformers. Eventually a new vehicle will be required.

Currently, the Area Protegida has been providing administrative (but not financial) support and encouragement. Desuvalle A.C. has committed part of one person’s salary so that person can serve as the primary contact for the research station, pay all of the bills, coordinate with house users, and be sure the house is properly maintained and kept ready for use by arriving field crews. While this generous contribution from Desuvalle does not equate to the full-time Research Station manager that we feel will be eventually required, the current arrangement is adequate to allow the house to continue to function as it currently does. Expenses are currently being paid from grants to Dean Hendrickson that end in June of 2005, and from a grant from Desert Fishes Council. At the time of drafting of this proposal, basic expenses are covered through at least July of this year, and we are seeking continued funding from other interested sponsors. Desuvalle is committed to continue serving as administrator of the Research Station. It is anticipated that the Desert Fishes Council members will continue funding a research station at some level in the future, but there has been no commitment as yet, and any significant decision by that group cannot be taken until the annual meeting (in Cuatro Ciénegas) in November of 2005. A number of local educators have promised to help develop liaisons between researchers and local students, but until a more permanent station is established and formal management plan is in place, such liaisons remain difficult to manage.

If funding can be secured to keep the rental house functioning as a field station for at least one more year, and a formal agreement among sponsors can be signed by all contributors to formally establish a nascent field station, Hendrickson and other researchers will work with Desuvalle and an advisory board to manage the facility and produce proposals for additional external funding. Prior to formal establishment of a field station and demonstration by local interests of sincere interest in supporting such a venture, it will be difficult to secure significant external funding, however, we feel that external funding can be obtained to move the facility toward greater permanence.

References

- Adkins, W.S. (1920) *Cuatro Ciénegas, Coahuila - Water Resources*, The Center for American History, The University of Texas at Austin, Austin, Texas, 19 pp.
- Gilmore, R.M. (1947) Report on a collection of mammal bones from archeologic cave sites in Coahuila, Mexico. *Journal of Mammalogy*, 28, 147-165.
- Guerra, L.V. (1952) *Ichthyological survey of the Rio Salado, Mexico*, Masters of Science thesis University of Texas at Austin, 30 pp.
- Muller, C.H. (1942) Notes on the American Flora, Chiefly Mexican. *American Midland Naturalist*, 27, 470-490.
- Muller, C.H. (1947) Vegetation and climate of Coahuila, Mexico. *Madrono*, 9, 33-57.
- Schmidt, K.P. & Owens, D.W. (1944) Amphibians and reptiles of northern Coahuila, Mexico. *Field Columbian Museum Publication, Zoological Series*, 29, 97-115.
- Sherbrooke, W.C. & Sherbrooke, E.E.W. (2003) Managing a resident volunteer program at a remote research station. *Curator*, 46, 385-400.
- Shreve, F. (1942) Grassland and related vegetation in northern Mexico. *Madrono*, 6, 190-198.
- Shreve, F. (1944) Rainfall of Northern Mexico. *Ecology*, 25, 105-111.
- Smith, H.M. & Taylor, E.H. (1948) An annotated checklist and key to the Amphibia of Mexico. *Bulletin of the United States National Museum*, 194, 1-118.
- Smith, H.M. & Taylor, E.H. (1950) An annotated checklist and key to the reptiles of Mexico exclusive of the snakes. *Bulletin of the United States National Museum*, 199, 1-253.
- Taylor, W.W. (1956) Some implications of the Carbon-14 dates from a cave in Coahuila, Mexico. *Bulletin of the Texas Archeological Society*, 27, 215-234.
- Taylor, W.P., McDougall, W.B., Presnall, C.C. & Schmidt, K.P. (1945) *Preliminary biological survey of the northern Sierra del Carmen, Coahuila, Mexico, 1945 Apr 1-10*. U.S. Fish and Wildlife Service,

Table 1 – Utilization history of house rented and managed as a field station for students and colleagues of Dean Hendrickson (UT), Jane Marks (NAU), and James Elser (ASU)

e-mail	full name	student / prof.	visit status	research topic	affiliation	number of people	number of days	person days
	Laura Nancy Barrow	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Matthew Todde Bays	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Rodney Andrew Bradshaw	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Angelica Delgado	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Beatrijs Valerie Dewaard	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Christopher R. Elmore	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Amy Elizabeth George	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	April I. Harris	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
creature@mail.utexas.edu	Jean Krejca	graduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Colette Nadene Mellors	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Patina Kimberly Mendez	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Timica Rochell Patton	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Michelle Lynn Reeve	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Darin R. Rokyta	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Jessica Marie Rosales	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Dan Sabath	graduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Murphy Gano Scurry	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Jason Timothy Seals	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	David Lorenz	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3

	Sudradjad				Austin			
	Stephanie ?	graduate	volunteer	Fish	Arizona State University	1	8	8
	Jennifer Lee Alana	undergrad	class, ichthyology	Fish	University of Texas at Austin	1	3	3
aaa@mail.utexas.edu	Allison Anderson	M.S.	employee	Fish	University of Texas at Austin	1	4	4
	Elisa Beth Atarod	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
jcaxt@aol.com	Julianne Axt	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
bocklo@mail.utexas.edu	Lori Bockstanz	Webmaster	employee	Fish	University of Texas at Austin	1	10	10
	Damon Keith Broglie	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
Evan.Carson@asu.edu	Evan Carson	graduate	researcher	Fish	Arizona State University	1	80	80
strandbc@aol.com	Strand Conover	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Natalie M. Cummings	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Maria Elizabeth Dahmus	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
jess_d@mail.utexas.edu	Jessica Dalby	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
Kris43@mail.utexas.edu	Kristin Dean	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
tdudley@socrates.berkeley.edu	Tom Dudley	Ph.D.	researcher	Fish	University of California, Berkeley	1	5	5
hayduke7@hotmail.com	Scott Egan	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
	James Estrada	undergraduate	volunteer	Fish	Northern Arizona Univ	1	10	10
	Addie Lynn Frets	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
marcusgary@mail.utexas.edu	Marcus Gary	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
a.g.gluesenkamp@mail.utexas.edu	Andy Gluesenkamp	graduate	volunteer	Fish	University of Texas at Austin	1	20	20
ryh007@aol.com	Darcy Harris	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
aholloway@mail.utexas.edu	Alisha Holloway	graduate	volunteer	Fish	University of Texas at Austin	1	8	8
mayleehsu@mail.utexas.edu	Maylee Hsu	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
Bruce.Hungate@nau.edu	Bruce Hungate	Ph.D.	researcher	Fish	Northern Arizona Univ	1	20	20
sgjohnso@uno.edu	Steve Johnson	Ph.D.	researcher	Fish	University of New Orleans	1	10	10
tmk21@hotmail.com	Tonia Kittelson	graduate	volunteer	Fish	Earthwatch	1	10	10
creature@mail.utexas.edu	Jean Krejca	graduate	researcher	Fish	University of Texas at Austin	1	30	30

	Sarah Adrienne Lang	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Karla Lara	undergraduate	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	4	4
	Christoper Jason Lowe	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
bmadsen@utah.uswest.net	Jed Madsen	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
keelin_mcdonnell@hotmail.com	Keelin Mcdonnell	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
W.MINCKLEY@ASU.EDU	W.L. Minckley	Ph.D.	researcher	Fish	Arizona State University	1	8	8
allecto@mail.utexas.edu	Sheila Modi	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
Lyoness929@aol.com	Anna Nellis	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
	John Matthew Pardue	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Amy Catherine Patterson	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Garner John Peterson	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Landon Joseph Peterson	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
mpoteet@socrates.berkeley.edu	Mary Poteet	Ph.D.	researcher	Fish	University of Texas at Austin	1	15	15
	Gregory Wade Putman	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
lizzard_at_home@yahoo.com	Stacia Rodenbusch	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
fishman@biomail.ucsd.edu	Gil Rosenthal	graduate	volunteer	Fish	University of Texas at Austin	1	14	14
samiam-ru@mail.utexas.edu	Sam Sadin	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
yarindou@hotmail.com	Yara Sanchez	undergraduate	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	15	15
noam@mail.utexas.edu	Noam Schroit	undergraduate	volunteer	Fish	University of Texas at Austin	1	4	4
	Gary Phillip Scott	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Jennifer Paige Stahl	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
MS1064@swt.edu	Matt Stephens	graduate	volunteer	Fish	Texas State University	1	40	40
vvirta@mail.utexas.edu	Valerie Virta	undergraduate	volunteer	Fish	University of Texas at Austin	1	10	10
aster280@uts.cc.utexas.edu	Tom Wendt	Ph.D.	researcher	Fish	University of Texas at Austin	1	4	4
sfxwilliams@mindspring.com	Claire Williams	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10

yost@mhonline.net	Christine Yost	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Zachary Aric Zamora	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	35 other undergrads from Inst. Tec. de Cd. Victoria	undergraduate	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps. University of New Orleans	35	3	105
	Aaron	undergraduate	volunteer	Fish	Earthwatch volunteer	1	12	12
	Garrett Hendrickson	High School	volunteer	Fish		1	40	40
	Jacob Hendrickson	High School	volunteer	Fish		1	60	60
	Sherry Hendrickson		volunteer	Fish		1	30	30
sarahstaller@yahoo.com	Sarah Staller	High School	Earthwatch	Fish	Earthwatch volunteer, then staff (2002) University of Texas at Austin	1	20	20
deanhend@mail.utexas.edu	Dean Hendrickson	Ph.D.	researcher	Fish	University of Texas at Austin	1	250	250
jennybirnbaum@hotmail.com	Jenny Birnbaum	undergraduate	volunteer	Fish	University of Texas at Austin	1	20	20
ecd2@dana.ucc.nau.edu	Eric Dinger	graduate	employee	Fish	Northern Arizona Univ	1	60	60
r.caesar@mail.utexas.edu	Ryan Caesar	undergraduate	volunteer	Fish	University of Texas at Austin	1	30	30
acohen@mail.utexas.edu	Adam Cohen	graduate	employee	Fish	University of Texas at Austin	1	60	60
garciadl@prodigy.net.mx	Francisco Garcia De León	Ph.D.	researcher	Fish	Instituto Tecnológico de Cd. Victoria, Tamps. University of Texas at Austin	1	20	20
anabas@mail.utexas.edu	Dawn Johnson	graduate	Earthwatch	Fish	Austin	1	10	10
Jane.Marks@nau.edu	Jane Marks	Ph.D.	researcher	Fish	Northern Arizona Univ	1	40	40
bigtoe@mail.utexas.edu	Francisco Martinez	undergraduate	volunteer	Fish	University of Texas at Austin	1	14	14
imorales@mail.utexas.edu	Ivonne Morales	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
	Chris Williamson	undergraduate	volunteer	Fish	Northern Arizona Univ	1	50	50
aaguev@latinmail.com	Aldo Guevara	employee	field assistant	Fish/Turtles	Instituto Tecnológico de Cd. Victoria, Tamps. University of California, Davis	1	80	80
cdhulsey@ucdavis.edu	Darrin Hulsey	graduate	researcher	Fish		1	40	40
abm8@dana.ucc.nau.edu	Angie Moline	graduate	volunteer	Fish	Northern Arizona Univ	1	40	40
iza@mail.utexas.edu	Jarrold Scott	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
	Lucas Mceachron	High School	Earthwatch	Fish/Vegetation	Earthwatch volunteer	1	20	20
creature@mail.utexas.edu	Jean Krejca	graduate	Earthwatch	Fish	University of Texas at Austin	1	30	30
char74@mail.utexas.edu	Charlene Zvolanek	employee	employee	Fish	University of Texas at Austin	1	30	30

	Rocio Inés Rodríguez Martínez	graduate	researcher	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	4	8	32
	John Schampel	Ph.D.	researcher	Invertebrates	Arizona State University	1	60	60
	James Watts	graduate	researcher	Invertebrates	Arizona State University	1	80	80
smcgaugh@iastate.edu	Suzanne Mcgaugh	undergraduate	researcher	Turtles	University of Texas at Austin	1	156	156
	Hamad Al-Khateeb	undergrad	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Kate Behn	undergraduate	volunteer	Fish	Northern Arizona Univ	1	8	8
	Jenny Birnbaum	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Melisa Delgadillo	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
metroutguy@aol.com	Mike Edgar	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Ginger Hsieh	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Mike Kerkman	undergraduate	volunteer	Fish	Northern Arizona Univ	1	8	8
mickl@frontier.net	Mick Lorusso	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Francisco Martinez	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Luis Martinez	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
kmcilvoy@zianet.com	Kiernan Mcilvoy	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
vinitmodi@netscape.net	Vinit Modi	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
					Texas Natural Resources Conservation Commission	1	3	3
dmosier@tnrcc.state.tx.us	Doyle Mosier	M.S.	volunteer	Fish	Commission	1	3	3
sosipova@sirius.com	Alessandra Osipova	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Allison Pease	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Peter Polsgrove	undergraduate	volunteer	Fish	Northern Arizona Univ	1	4	4
sharifa1982@aol.com	Sharifa Ramaileh	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Stephanie Shively	graduate	volunteer	Fish	Northern Arizona Univ	1	8	8
pacesetters@tcon.net	Virginia Sorrell	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
erintofte@hotmail.com	Erin Tofte	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Benjamin Walther	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Nathan Zorich	undergraduate	volunteer	Fish	Northern Arizona Univ	1	8	8
	Pedro Castillo Castillo	undergraduate	employee	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	10	10
jessford@mail.utexas.edu	Jessica Ford	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8

	Margarito Herrera	undergraduate	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	4	4
	Matthias Hess	undergraduate	volunteer	Fish	Northern Arizona Univ	1	40	40
	Ted Hufstader	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Leean Johns	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Jaina Lundburg	undergraduate	volunteer	Fish	Northern Arizona Univ	1	10	10
	Carol Marquardsen	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Claudia Morales	undergraduate	volunteer	Fish	University of Texas at Austin	1	8	8
	Jeff Nelson	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Elissa Olimpi	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Adam Oswald	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
	Savannah Williams	High School	Earthwatch	Fish	Earthwatch volunteer	1	10	10
Sara.B.Albornoz@directory.reed.edu	Sarah "Sari" Albornoz	undergrad	volunteer	Turtles	Reed University, Oregon	1	8	8
luv_a_turtle@yahoo.com	Ari Breish	Research Assoc.	volunteer	Turtles	Marshall University, Dept. Biology	1	5	5
arbreisc@gw.dec.state.ny.us	Al Breish	Ph.D.	volunteer	Turtles	NY State Dept. Environmental Conservation	1	5	5
wbrown@skidmore.edu	William Brown	Ph.D.	researcher	Turtles	Skidmore College, Dept. Biology	1	5	5
jazzsshuz3@hotmail.com	Kelsey Brown	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
	Susan Elizabeth Cameron	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Sandra L. Cook-Hildreth	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
tiliqua2@earthlink.net	Margie Crisp		volunteer	Turtles	Austin, Texas	1	20	20
	Jasmine Quynh Dao	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
mderemoise2211	Peter Demoise	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
gcdenny@hotmail.com	Geoff Denny	graduate	volunteer	Turtles	University of Texas at Austin	1	14	14
	Jim Elser	Ph.D.	researcher	Invertebrates	Arizona State University	1	10	10
	Ray Engeszer	graduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
sarah_51385	Sarah Falck	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
	Yarly Fassih-Nia	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Ben Michael	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
alice.gibb@nau.edu	Alice Gibb	Ph.D.	researcher	Fish	Northern Arizona Univ	1	8	8

	Orlando Guevara	undergraduate	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	4	4
	Hansita Hansen	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Ana María Hernández	undergraduate	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	4	4
bivey37@hotmail.com	Berry Ivey	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
hmk2@dana.ucc.nau.edu	Heidi Kloeppe	graduate	volunteer	Fish	Northern Arizona Univ	1	50	50
	Kelli Ann Kutach	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Carmen Lesso	undergraduate	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	4	4
	Rick Mayden	Ph.D.	researcher	Fish	Saint Luis University	1	2	2
joeym4569@hotmail.com	Josephine Mwaura	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
	Alexandra Galt Myers	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Amy Persons	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Linda X. Phan	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
jbaritone@yahoo.com	Joshua Rodriguez	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
	Jack Siegrist	undergraduate	volunteer	Turtles	University of Texas at Austin	1	80	80
	Peter Sprouse		volunteer	Fish	Austin, Texas	1	4	4
	John Renway				University of Texas at Austin	1	3	3
brookswanson@hotmail.com	Strohmeier	undergraduate	class, ichthyology	Fish		1	3	3
	Brook Swanson	graduate	researcher	Fish	Northern Arizona Univ	1	60	60
	Joseph Tomelleri	M.S.	artist (fish illustrator)	Fish		1	2	2
	Josh Trapani	Ph.D.	researcher	Fish	University of Michigan	1	10	10
stuttle@skidmore.edu	Sheila Tuttle	graduate	volunteer	Turtles	Marshall University, Dept. Biology	1	5	5
	Jennifer Lyn Wesolowski	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Heather Elaine Wright	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
jyan1884@yahoo.com	Jason Yan	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
supastar_me@hotmail.com	Kim Zubris	High School	Earthwatch	Fish/Turtles	Earthwatch volunteer	1	10	10
	XX La Venta group		researcher	Hydrology	Italy	10	14	140
	Eddie Bonnell	undergraduate	volunteer	Turtles	University of Texas at Austin	1	36	36
	Nancy Hernandez	undergraduate	volunteer	Turtles	University of Texas at Austin	1	36	36
	Suzanne Mcgaugh	undergraduate	researcher	Turtles	University of Texas at Austin	1	34	34

						Austin			
	Eric Dinger	graduate	researcher	Fish	Northern Arizona Univ	1	3	3	
	Chris Jaquette			Turtles	Colorado State University	1	22	22	
	Shawn White	graduate		Turtles	Colorado State University	1	22	22	
	Hamilton Carmean	graduate		Fish	Texas State University	1	1	1	
	Wayne Dalchou?	alumni		Fish	University of Texas at Austin	1	2	2	
	Robin Havens			Fish	Individual Contract Research Assistants	1	2	2	
	Jenn Thuss			Fish	Individual Contract Research Assistants	1	2	2	
	Scottia Williams	alumni		Fish	University of Texas at Austin	1	2	2	
	Pedro A. Castillo Castillo	under	volunteer	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	10	10	
andres_sandoval3@yahoo.com	Andres Ismael Hernández Sandoval			Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	4	4	
	Rocio Inés Rodríguez Martinez	undergraduate	researcher	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	4	4	
	Francisco Garcia De León	Ph.D.	researcher	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	3	3	
	Tania Yissel Flores Martinez	undergraduate	researcher	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	2	2	
	Jen Harden				Arizona State University	1	49	49	
	James Watts	graduate	researcher	Invertebrates	Arizona State University	1	53	53	
	Zita Maliga	graduate	researcher	Stromatolites	San Francisco State University	1	31	31	
	Evan Saint-Pierre				University of California, Santa Cruz	1	21	21	
jacobh33@hotmail.com	Jacob Hendrickson	high school	Student	Fish	LBJ High School, Austin, Texas	1	4	4	
	Luis Lipchak	high school	Student	Fish	LBJ High School, Austin, Texas	1	4	4	
	Eric Dinger	graduate	researcher	Fish	Northern Arizona Univ	1	7	7	
	Gricelda Meraz			Fish	Northern Arizona Univ	1	7	7	
	Aldo D Guevara Carrizales	undergraduate	Earthwatch		Instituto Tecnológico de Cd. Victoria, Tamps.	1	16	16	
	Orlando Guevara Carrizales	undergraduate	Earthwatch		Instituto Tecnológico de Cd. Victoria, Tamps.	1	6	6	

	Evan J. Campbell	High School	Earthwatch		Earthwatch volunteer	1	12	12
	Kendra Davis	High School	Earthwatch		Earthwatch volunteer	1	12	12
	Tyler Johnson	High School	Earthwatch	Fish	Earthwatch volunteer	1	12	12
	Rhoda E. Lugo	High School	Earthwatch	Fish	Earthwatch volunteer	1	12	12
	Taylor Morris	High School	Earthwatch		Earthwatch volunteer	1	12	12
	Yhoko Ogawa	High School	Earthwatch	Fish	Earthwatch volunteer	1	12	12
	Yi Zhang	High School	Earthwatch		Earthwatch volunteer	1	12	12
	Evan Carson	graduate	researcher	Fish	Arizona State University	1	24	24
	Rene Cerritos Flores			Fish	Universidad Nacional Autónoma de México	1	8	8
	Antonio Cruz Peralta				Universidad Nacional Autónoma de México	1	8	8
	Luis E. Eguiarte	Ph.D.	researcher		Universidad Nacional Autónoma de México	1	8	8
	Luis Felipe Eguiarte Souza				Universidad Nacional Autónoma de México	1	8	8
	Ana Elena Escalante Hernández				Universidad Nacional Autónoma de México	1	8	8
	Rodrigo González Chauvet				Universidad Nacional Autónoma de México	1	8	8
	Osiris Yuriko Rios Vargas				Universidad Nacional Autónoma de México	1	8	8
	Aldo Vabia Vázquez				Universidad Nacional Autónoma de México	1	8	8
	Marco Araujo				Soluciones ambiental	1	5	5
	Claudia Silva				Universidad Nacional Autónoma de México	1	5	5
souza@servidor.unam.mx	Valeria Souza	Ph.D.	researcher		Universidad Nacional Autónoma de México	1	5	5
	Mike Travisano	Ph.D.	researcher		University of Houston	1	5	5
	Pablo Vinuesa		researcher		Universidad Nacional Autónoma de México	1	5	5
	Geoff Denny	graduate	researcher	Botany	Texas A&M University	1	2	2
	Sarah Jackson		researcher	Fish	University of Texas at Austin	1	2	2
	Mike Moore	graduate	researcher	Botany	University of Texas at Austin	1	2	2
	Shirley Bartz	undergraduate	volunteer		Northern Arizona Univ	1	4	4
	Eric Dinger	graduate	researcher	Fish	Northern Arizona Univ	1	4	4

brookswanson@hotmail.com	Brook Swanson	graduate	researcher	Fish	Northern Arizona Univ	1	4	4
	Jennifer Howeth	graduate	researcher	Turtles	University of Texas at Austin	1	2	2
jacobh33@hotmail.com	Jacob Hendrickson	High School	volunteer		LBJ High School, Austin, Texas	1	3	3
jacksiegrist@yahoo.com	Jack Siegrist	undergraduate	researcher	Turtles	University of Texas at Austin	1	118	118
	Andrés Almitán	professional photographer	volunteer			1	60	60
	Lydia Breunig	graduate	researcher	Sociology	University of Arizona	2	90	180
	Robin Havens	undergraduate	volunteer	Turtles	ICRA	1	10	10
hellofromnancy@hotmail.com	Nancy Hernandez	graduate	volunteer	Turtles	University of Texas at Austin	1	56	56
jhoweth@mail.utexas.edu	Jennifer Howeth	graduate	researcher	Turtles	University of Texas at Austin	1	60	60
	Darrin Hulsey	Ph.D.	researcher	Fish	University of California, Davis	1	45	45
	Steve Johnson	Ph.D.	researcher	Fish	University of New Orleans	1	30	30
	Nick Lang	graduate	researcher	Fish	Saint Luis University	1	5	5
	Sidhartha Nag	undergraduate	researcher	Sociology	University of California, Berkeley	1	60	60
	Suzanne Pierce	graduate	researcher	Hydrology	University of Texas at Austin	1	20	20
	Juan Manuel Rodriguez-Martinez	Ph.D.	researcher	Hydrology	Universidad Autónoma de Nuevo León	1	18	18
	Jack Sharp	Ph.D.	researcher	Hydrology	University of Texas at Austin	1	4	4
	Jenn Thuss	undergraduate	volunteer	Turtles	ICRA	1	10	10
	Shawn White	graduate		Fish	Colorado State University	1	15	15
	15 hydrogeology students	undergrad and graduate	class, hydrogeology	Hydrology	University of Texas at Austin	15	4	60
tracykgreene@yahoo.com	Tracy Greene	High School	volunteer		L.C. Anderson high School, Austin, Texas	1	3	3
jacobh33@hotmail.com	Jacob Hendrickson	High School	volunteer		LBJ High School, Austin, Texas	1	3	3
	Mohammed Akbani	undergrad	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Katrina Cohen	undergraduate	volunteer	Fish	University of Texas at Austin	1	3	3
	Miguel Correa	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Ray Engeszser	graduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3

	Shanna Evans	graduate	researcher	Hydrology	University of Texas at Austin	1	3	3
deanhend@mail.utexas.edu	Dean Hendrickson	Ph.D.	researcher		University of Texas at Austin	1	3	3
	Ray Huang	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Michael Marshall	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Mike Marshall	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Tisha Miller	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Ziba Rezaee	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Sina Safar	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Adam Witt	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Travis Wycoff	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Mónica González					1	14	14
	Steve Danner				Northern Arizona Univ	1	3	3
	Misty Dayzie				Northern Arizona Univ	1	3	3
	Eric Dinger	graduate	researcher	Fish	Northern Arizona Univ	1	3	3
	Ian Mckenna				Northern Arizona Univ	1	3	3
	Scott Mckenna				Northern Arizona Univ	1	3	3
	Lucas Mceachron	undergraduate	researcher	Arundo	Colorado State University	1	10	10
	Suzanne Mcgaugh	undergraduate	researcher	Turtles	University of Texas at Austin	1	10	10
jeppesen_becky@hotmail.com	Rebecca Jeppesen	graduate	field assistant	Turtles		1	39	39
	Chrissie Mckenney			Turtles	University of Southern Mississippi	1	22	22
	Shanna Evans	graduate	researcher	Hydrology	University of Texas at Austin	3	7	21
	Chris Irle					1	7	7
deanhend@mail.utexas.edu	Dean Hendrickson	Ph.D.	researcher		University of Texas at Austin	1	6	6
	James Watts	graduate	researcher	Invertebrates	Arizona State University	1	33	33
tracykgreene@yahoo.com	Tracy Greene	high school			L.C. Anderson high School, Austin, Texas	1	7	7
jacobh33@hotmail.com	Jacob Hendrickson	high school			LBJ High School, Austin, Texas	1	7	7
	Luis Lipchak	high school		Fish	Austin High School, Austin, Texas	1	7	7

	Afshan Miri	high school		Fish	LBJ High School, Austin, Texas	1	7	7
	Rus Block		volunteer		Austin, Texas	1	3	3
	Shanna Evans	graduate	researcher	Hydrology	University of Texas at Austin	1	3	3
	Andres Ismael Hernandez Sandoval			Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	3	3
	Rocio Inés Rodríguez Martinez	undergraduate	researcher	Fish	Instituto Tecnológico de Cd. Victoria, Tamps.	1	3	3
	Charlene Zvolanek	employee	employee	Fish	University of Texas at Austin	1	3	3
curteck@iastate.edu	Curtis Eckerman	Ph.D.	volunteer	Vegetation/Herps	Iowa State University	1	5	5
	Sesana Ramirez				Universidad Autónoma Chapingo	1	5	5
	Nicole Harris				Austin Community College	1	4	4
	Jennifer Howeth	graduate	researcher	Turtles	University of Texas at Austin	1	4	4
	Martin Schlaepfe			Turtles	University of Texas at Austin	1	4	4
jacksiegrist@yahoo.com	Jack Siegrist	undergraduate	researcher	Turtles	Southeastern Louisiana University	1	4	4
	Brian Carlile	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Katrina Cohen	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
flagel@iastate.edu	Shanna Evans	graduate	researcher	Hydrology	Earthwatch volunteer		20	0
	Lex Flagel	graduate	volunteer	Vegetation	Iowa State University	1	5	5
	John Hooge	undergraduate	class, ichthyology	Fish	University of Texas at Austin	1	3	3
	Brian Greene	undergraduate	researcher	Sociology	Wofford College	1	16	16
	Krista Capps	graduate	prospective student	Fish	University of Texas at Austin	1	3	3
deanhend@mail.utexas.edu	Dean Hendrickson	Ph.D.	researcher		University of Texas at Austin	1	3	3
					TOTALS			4520

Managing a Resident Volunteer Program at a Remote Research Station

• • • • •

WADE C. SHERBROOKE AND EMILY E. W. SHERBROOKE

ABSTRACT Museums are ideal institutions for the development of volunteer programs. A museum's commitments to education and research and to expansion of learning, as well as its physical resources, offer potentially attractive forms of involvement for various segments of the population. We discuss aspects of a long-established, self-funded resident volunteer program that integrates the resources of a museum's field station with seasonal staffing needs, resulting in economic benefits to the museum and educational and career-advancement benefits to volunteers. The practices used to bring together these objectives are discussed, with the goal of providing an example for museum administrators so they might better appreciate the potential diversity of volunteer programs as methods of broadening museums' roles in society.

INTRODUCTION

For over 40 years the Southwestern Research Station (SWRS) of the American Museum of Natural History (AMNH) has been the site of a unique volunteer program. The benefits offered by the program have been highly successful in bringing an annual influx of 30–40 volunteers—mainly undergraduates in the biological sciences—to the station, which is located in the mountains near Tombstone and Bisbee, north of Douglas, Arizona, at the extreme southeastern corner of the state adjacent to New Mexico and the Mexican border. Volunteers assist the staff with a wide diversity of crucial seasonal tasks, gain field experience and receive mentoring from established researchers and graduate students while assisting them with data collection and experimental design. In recent decades, as university undergraduate programs have scaled back on field experiences for their students, this program has come to play a significant role in the professional development of volunteers.

Wade C. Sherbrooke (wcs@amnh.org) is director emeritus and Emily E. W. Sherbrooke is the former assistant director of the Southwestern Research Station, American Museum of Natural History, P.O. Box 16553, Portal, AZ 85632.



A volunteer uses radiotelemetry in following the movements of a green ratsnake throughout the canyons of the Chiricahua Mountains, southeastern Arizona. *Photo courtesy of Wade C. Sherbrooke.*

The remote location in the Chiricahua Mountains of southeastern Arizona offers some unique volunteer opportunities, given that scientists, volunteers, and staff live and dine together in close proximity. This paper reports on management issues that arise in maintaining this resident program, stressing the advantages both to the institution and to the volunteer participants. We feel this program can serve individuals at other museums as a model for conceiving and developing specialized volunteer programs that take advantage of un- or under-utilized resources to meet special staffing needs, with positive budgetary consequences.

Setting of the Southwestern Research Station—The SWRS is located in Cave Creek drainage, at 5,400 feet elevation, on the east side of the 9,796-foot Chiricahua Mountains, a major “sky island” mountain (Heald 1967) in a series of mountain ranges ecologically isolated by surrounding arid conditions. The ranges to which the Chiricahuas belong extend south-to-north between the Sierra Madre Occidental of western Mexico and the Rocky Mountains of the western United States, Canada, and Alaska. The elevation changes within each mountain range combine with biogeographic influences from the biota to the north—with its history of glaciations and freezing winters—and the biota to the south—with its tropical affinities—to bring together a wide range of animals and plants. In the arid valleys there is a west-to-east mixing at the edges of two great North American deserts, the warmer Sonoran Desert to the west and the cooler inner-conti-

mental Chihuahuan Desert to the east. The resulting diversity of species interacting in complex communities is outstanding in North America (DeBano et al. 1995), something recognized by the scientists who use the SWRS as a natural laboratory, as well as by bird watchers who seem to visit the region as a rite of passage and a vital contribution to life-lists (see Sherbrooke 2002 for a discussion of a SWRS student-grant program supported in part by ecotourism-research interactions).

Annually the SWRS attracts upwards of 200 scientists, graduate students, and research assistants who conduct a wide variety of field studies with vertebrate and invertebrate animals, plants and geology. Scientists come from universities and other institutions across the United States and from many other countries. The scientific studies are aimed at increasing our understanding of the ways that nature works. Volunteers most often share living accommodations with researchers (the SWRS can house up to 72 people), and everyone at the SWRS shares a common dining room at fixed meal times, as well as social areas and laboratories. Living conditions facilitate maximum interactions between scientists and volunteers. This atmosphere of tight bonding among residents is enhanced by the isolation of the SWRS from towns, news outlets (such as TV), shopping opportunities, or other distractions of modern society, and by one's distance from home and thus one's ability to address personal, work and family concerns.

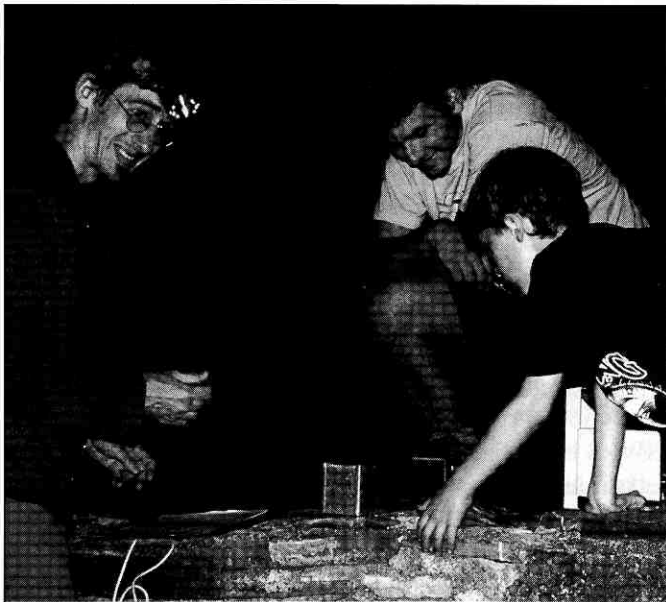
SEASONALITY OF OPERATIONS AT SWRS

Changes in SWRS use, types and numbers of guests (scientific researchers, naturalists and ecotourists) during the year, and seasonal availability of volunteers greatly influence the operations of the volunteer program at SWRS. During winter months—November through February—most of the living units are closed for winter, as is the dining area. A few scientists may use the facilities. Only infrequently are volunteers in residence to assist with cleaning and maintenance chores. In March, with the arrival of scientists, student groups, and naturalist guests, the SWRS becomes fully active, and meals are served daily. There is a need for volunteer staff, but typically this is a difficult time to enlist students who are committed to university schedules. The sociological configuration of spring volunteers consists of recent university graduates, students in a career development program at their university or college, people considering going back to school in field biology, retired people, and others who want to spend time in the area because of its biological and scenic attractions. The SWRS is used most heavily by scientists from June through August; this is also the period during which the largest numbers of university students apply for, and are accepted into, the volunteer program. During the summer there are 8–15 volunteers at the SWRS at any one time. By the end of August, these volunteers have begun departing; those still in residence in fall are frequently international students, or students who are not currently matriculated. During the fall there are few field-active researchers at the SWRS; facility use is instead focused on weekend retreats, workshops and scientific conferences. Scientific activities of volunteers in the fall are left open to independent projects.

CONTACTING AND ESTABLISHING WORKING RELATIONSHIPS WITH VOLUNTEERS

Many prospective volunteers learn about the program from people who have spent time at the SWRS as researchers or volunteers. Brief advertisements are also placed at no cost in the newsletters of scientific societies; an annual winter mailing is sent (formerly by post, now electronically) to pertinent department heads at colleges and universities; the program and application form are made available on the SWRS website of the AMNH (<http://research.amnh.org/swrs/>); and a listing is published on the annual summer classes poster (formerly sent around the country to biology departments, now available on-line) of the Organization of Biological Field Stations. Additionally, professors using the SWRS mention the volunteer program to students who are seeking career opportunities (very effective in attracting international students); and prospective volunteers who independently arrive at the SWRS are made aware of the program. In recent years there has been a greater emphasis on electronic communication with the community of potential volunteers via listserv lists for environmental job listings (a task formerly performed by newsletters).

The volunteer application outlines the program and clearly establishes the volunteer's work relationship with the SWRS. Each volunteer works 24 hours per week, usually spread over six days, in exchange for room and board (three meals per day) in bachelor quarters (single-sex, shared rooms with between five and eight single beds and a bathroom). The current value is \$270 per week; thus a volunteer's wage equivalent is \$11.25



Researcher and volunteers remove a yellow-nosed cotton rat from a live trap and apply UV-fluorescent powder to its fur in order to follow its nocturnal movements and trail complex after release. *Photo courtesy of Wade C. Sherbrooke.*

per hour. Volunteers are encouraged to commit to a minimum stay of six weeks. Because the SWRS's operations depend on a clear understanding that volunteers' primary responsibility consists of SWRS chores, volunteers are not termed "research interns," which might imply a SWRS responsibility to operate a career-training program. Volunteers record their chore hours daily and tally them weekly and monthly. These records are separate from their accounting of research



Several buildings of the Southwestern Research Station (5,400 feet elevation) are visible near the leafless deciduous trees along the stream drainage flowing out of the Chiricahua Mountains. Due to dramatic elevational changes, the station is in close proximity to five of the life-zones of the western United States. *Photo courtesy of Wade C. Sherbrooke.*

activities, which are also expected to be part of the program. No specific number of research hours is required. Rather, volunteers are encouraged to seek as much involvement with scientists as possible to maximize their career growth during their time at the SWRS. Although records are sent to the AMNH in New York, all advertising, selection, orientation and management of the program are handled at SWRS in Portal, Arizona.

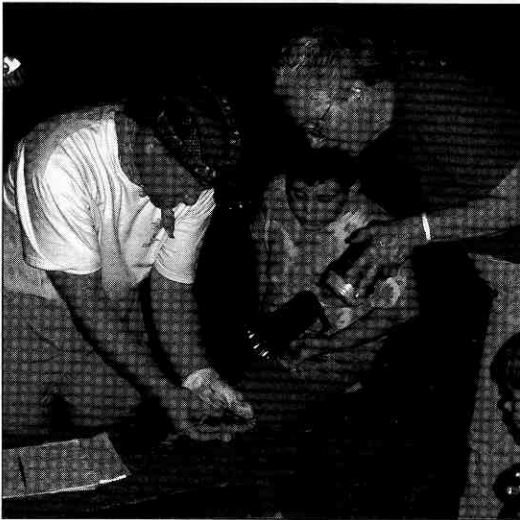
With few exceptions, potential volunteers under 18 years of age are not considered. Applications for summer positions are reviewed carefully, noting the applicant's maturity and suitability for life at the SWRS and their willingness to perform volunteer tasks. These issues are judged from the materials requested in their application, including letters of recommendation from professors, and the applicant's statement of goals while at the SWRS. As the application says, "Volunteers are expected to be mature and responsible individuals with a keen interest in field biology and a willingness to pitch in and help with whatever needs doing. Enthusiasm, dependability, and appreciation for hard work are foremost needs." Selection is influenced by dates of availability and housing at the SWRS. Summer positions can be very competitive, with two, three, or more applicants for each position. Many qualified people are not accepted. They may be offered fall positions, or encouraged to reapply the following year. During the summer months volunteer terms of stay may be restricted to a six-week maximum, with the objective of opening the experience to a larger number of participants. With few exceptions, usually international students, the SWRS director does not take on the responsibility of reporting an evaluation for a grade to a home institution. Thus, volunteers enter the program with goals

directly related to their primary experiences; credits for graduation from some institutional program are not the primary aim.

Upon acceptance, potential volunteers receive a letter requesting their confirmation of intent to participate. Additionally, they are sent materials about living at the SWRS, such as rules and etiquette and information about travel. International students are advised to obtain a tourist-class visa for visiting the United States. Prospective volunteers receive a letter of acceptance that clearly states they will not be employed (salaried) by the SWRS, but that the SWRS will be responsible for their housing and meals for the duration of their stay.

The chores assigned to volunteers vary somewhat seasonally, but the core tasks are centered in the dining area and the residential units. Preparing, serving, and cleaning up after three meals a day for large groups of people are labor-intensive activities. Meals are at fixed times and are expedited to minimize staff-volunteer hours. Rotating schedules are made weekly to assure assistance in food preparation, dishwashing, and evening dining-area clean-up. Similar schedules, with follow-up by staff, ensure that living units receive proper cleaning following guests' departure and prior to arrival. Other assigned tasks, which use up a greater number of volunteer hours in the summer months, include maintenance (often outdoors on the grounds or buildings) and janitorial duties in the offices and laboratories.

Typically, new volunteers arrive by personal vehicle, or via public transport to Douglas, Arizona (one hour from SWRS), on Thursdays, when a SWRS vehicle makes a scheduled trip for numerous operations issues. Upon arrival volunteers are greeted and



A volunteer and researchers examine a bat netted over the station pool, a location where the highest diversity of bats in North America has been documented. *Photo courtesy of Wade C. Sherbrooke.*

shown to their assigned living area. They are then given a brief tour of the SWRS, a volunteer handbook, and registration materials. The following day volunteers begin scheduled chores. Within a few days the SWRS director meets with them individually or in a small group to review the nature of the relationship between the volunteers and the SWRS, and to ensure they understand how the chore schedule functions. The director also explains how they might become involved in the researchers' activities. During their stay, volunteers attend brief weekly meetings with the staff coordinator and the director to work out issues in scheduling and to make volunteers aware of upcoming scientific opportunities at the SWRS.

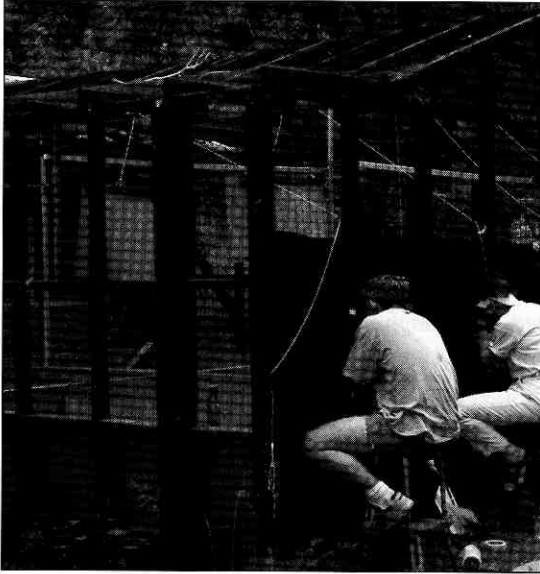
Sometimes conflicts arise between the chore schedule and opportunities volunteers identify for involvement with research projects. To minimize these conflicts, and achieve as many goals as possible, aspects of the schedule have been made flexible. Meal and room cleaning assignments require timely attention for the efficient functioning of the SWRS. But volunteers are allowed and encouraged to swap scheduled time-slots to achieve their research goals and still ensure attention to SWRS business. The timing of maintenance or cleaning tasks can frequently be adapted around the desired research activity. This flexibility is made possible by encouraging close communication between the individual volunteer and the staff member in charge of the chore activity, and by designing activities that may be attended to throughout the day or evening. By leaving responsibility of the reassignment of tasks in the hands of the volunteers (changing names on work schedules), staff are freed from negotiating such arrangements, without interruption of timely task performance.

ESTABLISHING WORKING RELATIONSHIPS BETWEEN VOLUNTEERS AND SCIENTISTS AT SWRS

Volunteers are not assigned to research activities with a particular scientist. Relationships are allowed to develop in a free-market atmosphere. Volunteers and researchers select one another and define the depth and nature of the relationship themselves. Either may terminate the relationship at any time, mainly by lack of interest in its continuance. This arrangement encourages volunteers to bring their strongest attributes to the relationship, to be punctual and careful with assignments, to pay attention, and if a long-term relationship and in-depth involvement with a project is desired, to commit sufficient time to assisting with the project to compensate the researcher for his/her investment of time and effort at instruction.

Some volunteers take a "shotgun" approach of briefly helping with several projects; others select one or two projects for their focus and become deeply involved. In return for a volunteer's increasing dedication to a project, researchers provide greater mentoring by explaining the theoretical issues being addressed by their research, teaching the problems and limitations of data collection, collaborating with volunteers to pursue a side project that the researcher conceived but does not have the time to execute without dedicated volunteer assistance, and generally making the volunteer feel like a valued participant. Occasionally volunteers have backgrounds that allow them to initiate their own research projects.

Volunteers are assisted in establishing contacts with the researchers through a number of mechanisms: 1) posted photographs of researchers, volunteers, and staff, 2) personal introductions by staff, 3) shared dining and housing, 4) annually compiled descriptions of researchers' projects, 5) availability of a SWRS bibliography of researcher publications (with access to articles), 6) annual photographic albums depicting people and activities in past years (many people return), 7) a dry-erase board where researchers indicate that they are seeking assistance with projects, and 8) frequent evening seminars about research



Volunteers assist researchers by making clandestine observations on the success of mating displays of caged lizards. *Photo courtesy of Wade C. Sherbrooke.*

projects. Since the SWRS is a close community, much is accomplished via casual conversations.

Volunteers play a significant role in social life at the SWRS, being somewhat more free of time constraints than graduate students who are usually more intent on experiments and data collection for their degree projects. Living conditions are largely uniform, as are meals. Social activities—volleyball and Ultimate Frisbee, swimming, and excursions to regional scenic areas—help eliminate barriers that might isolate volunteers from other segments of the population. In this way volunteers have an opportunity to feel what it might be like to be in graduate school preparing to be a professional scientist—the other side of being in the field collecting data or in the laboratory.

COSTS TO SWRS

Volunteers are responsible for all transportation costs to and from the SWRS, except for the portion from Douglas, Arizona. Scheduling of living units ensures that volunteers are occupying beds that would most likely otherwise be unoccupied. This means that volunteer residency results in no loss of revenue to the SWRS. There is a small cost for weekly laundering of bed linens and towels, use of the SWRS laundry, and other services. For about eight months of the year, cooks are employed in food preparation for the entire community. The additional numbers of volunteers at meals make only a minimal difference in meal preparation costs, and only a modest difference in food costs.

Staff time is needed to advertise for volunteers and to schedule their chore-oriented activities while at the SWRS. If paid personnel were employed to accomplish the same tasks, they would require supervision. Due to the remote location and the sparse population, it would be difficult to engage local people for such positions, and they would undoubtedly not be as flexible as are resident volunteers in meeting the meal and cleaning schedules.

In summary, the three areas of program costs to the SWRS are: administration, housing, and meals. Due to circumstances of operations, all are met with minimal budgetary expenditures. Although having volunteers in residence may make additional

demands on staff—in terms of mail, laundry, social events, scientific lectures, and so on—this is a built-in part of SWRS operations for all residents and therefore does not significantly increase the overall operations costs.

BENEFITS TO SWRS

The SWRS benefits directly by having access to an intelligent work force with personal goals that are highly compatible with the mission of the SWRS. These workers become available seasonally in a remote area, where identification of people for short-term employment at menial tasks would otherwise be difficult. Engaging volunteers does not involve the human resources or payroll departments of the AMNH. Budgeting for payment of services is not required, saving significant expenditures annually. Examination of volunteer work hours on an annual basis illustrates these savings (table 1).

Training for varied and detailed tasks, with a constantly changing volunteer population, introduces challenges for the permanent staff, especially in relation to cooking and housekeeping. These issues are addressed by having staff willing to instruct volunteers, by use of longer-established volunteers as side-by-side training instructors, and by providing detailed lists of specific tasks for each work assignment. Outdoor and maintenance work assignments often take advantage of special skills volunteers have to offer—carpentry, electrical, climbing, and so on. In the kitchen, volunteers may share their cooking skills, individually or in groups, to prepare a special food dish or ethnic meal. Often delicious international cuisine is a result of these efforts.

Volunteers make significant contributions to the productivity of scientists and graduate students engaged in research at the SWRS. This assistance may be particularly helpful to graduate students who do not have the financial resources to hire field assistants. In addition, scientists have come to rely on the presence of a labor pool at the SWRS, sometimes “hiring” volunteers away from the program, with staff consent, to achieve research objectives that require the full-time participation of the volunteer. Thus volunteers become research assistants, with researchers paying normal residency costs, which generates revenue for SWRS. The volunteer program is viewed favorably by scientists and is an additional attraction for carrying on their studies at SWRS.

During their stay at the SWRS, volunteers bring all of their personal attributes. These are wide-ranging: expertise in identification of special groups of animals; musical abilities; travel adventure tales; international backgrounds, and so on. All exhibit a deep curiosity and interest in the natural world. Sharing of their enthusiasms with other residents helps to create a vibrant atmosphere.

As former volunteers mature in their careers after departing from SWRS, many become members of the scientific community with fond recollections of their youthful formative days spent in the Chiricahua Mountains. Some return to do their own graduate studies at the SWRS. Others come for visits, sometimes bringing family or friends. They tend, by design or inadvertently, to serve as goodwill ambassadors for the SWRS throughout their travels and careers.

Table 1. Southwestern Research Station, summary of volunteer participation and contributions, 1963-2003. (ND = No data.)

	# of Volunteers	# of Nights	Average Stay	Male	Female	Total Work Hours	Total Research Hours	*Inter- national
1963	6	394	66	4 (67%)	2 (33%)	ND	ND	ND
1964	6	403	67	2 (33%)	4 (67%)	ND	ND	ND
1965	2	ND	ND	1 (50%)	1 (50%)	ND	ND	ND
1966	4	ND	ND	2 (50%)	2 (50%)	ND	ND	ND
1967	ND	ND	ND	ND	ND	ND	ND	ND
1968	ND	ND	ND	ND	ND	ND	ND	ND
1969	8	ND	ND	ND	ND	ND	ND	ND
1970	8	52	ND	5 (62%)	3 (38%)	ND	ND	ND
1971	3	ND	ND	ND	ND	ND	ND	ND
1972	13	405	31	9 (69%)	4 (31%)	ND	ND	ND
1973	8	392	49	4 (50%)	4 (50%)	ND	ND	ND
1974	10	448	45	4 (40%)	6 (60%)	ND	ND	ND
1975	17	489	29	9 (53%)	8 (47%)	ND	ND	ND
1976	13	542	42	7 (54%)	6 (46%)	ND	ND	1 (8%)
1977	11	504	46	7 (64%)	4 (36%)	ND	ND	ND
1978	15	585	39	6 (40%)	9 (60%)	ND	ND	ND
1979	12	674	56	6 (50%)	6 (50%)	ND	ND	ND
1980	12	482	40	5 (42%)	7 (58%)	ND	ND	ND
1981	12	659	55	5 (42%)	7 (58%)	ND	ND	ND
1982	13	585	45	5 (38%)	8 (62%)	ND	ND	ND
1983	17	559	33	9 (53%)	8 (47%)	ND	ND	ND
1984	18	822	46	11 (61%)	7 (39%)	ND	ND	1 (11%)
1985	17	597	35	6 (35%)	11 (65%)	ND	ND	3 (18%)
1986	16	1185	74	7 (44%)	9 (56%)	3701	ND	1 (6%)
1987	19	1146	60	10 (53%)	9 (47%)	4007	363	6 (32%)
1988	17	1043	61	8 (47%)	9 (53%)	3704	1448	2 (12%)
1989	19	1024	54	7 (37%)	12 (63%)	3102	2250	3 (16%)
1990	23	1071	47	11 (48%)	12 (52%)	3582	2353	6 (26%)
1991	23	1278	56	10 (43%)	13 (57%)	4322	1890	4 (17%)
1992	33	1463	44	12 (36%)	21 (64%)	5100	2654	4 (12%)
1993	40	1721	43	22 (55%)	18 (45%)	5757	2171	6 (15%)
1994	35	1567	45	18 (51%)	17 (49%)	5158	2350	7 (20%)
1995	33	1773	51	22 (66%)	11 (34%)	5899	3384	9 (26%)
1996	36	1565	43	17 (47%)	19 (53%)	5383	3808	16 (44%)
1997	40	1750	44	20 (50%)	20 (50%)	5741	4273	13 (33%)
1998	39	1778	46	16 (41%)	23 (59%)	6150	5025	20 (51%)
1999	47	1678	36	21 (45%)	26 (55%)	6057	2792	20 (43%)
2000	30	1267	42	11 (37%)	19 (63%)	3943	2411	13 (43%)
2001	30	1069	36	13 (43%)	17 (57%)	3874	1036	12 (40%)
2002	34	1681	49	20 (50%)	14 (41%)	4,684	2269	8 (24%)
2003	36	1710	48	21 (58%)	15 (42%)	5043	2283	13 (36%)
Totals	775	34361	1603			85207	42760	

*Countries of international SWRS volunteers: Argentina, Australia, Bahamas, Belgium, Brazil, Canada, Chile, Costa Rica, Czech Republic, Denmark, Ecuador, Finland, England (United Kingdom), France, Germany, Ireland, Israel, Italy, Japan, Mexico, Namibia, Poland, Scotland (United Kingdom), South Africa, Switzerland, Turkey, Trinidad.



Volunteers assist with the selection and release of various winged ants (reproductives), from different colonies into temporary “honeymoon suites” where they may mate, allowing subsequent analysis of their genetic relationships. *Photo courtesy of Wade C. Sherbrooke.*

BENEFITS TO VOLUNTEERS

Every volunteer arrives with his/her own experiences, intentions at the SWRS, and future goals, and each individual leaves having grown in different areas. Some expectations are met, others are exceeded, some experiences are new revelations, and some desires are never realized for lack of time. During the execution of various volunteer chores and research activities, volunteers are exposed to new skills. These vary from running an institutional dishwasher to mixing and pouring cement, or painting and roofing a building. Or, with scientists, they learn how to use radiotelemetry to follow lizards, take notes on ant work-behaviors, or videotape frequency of bird-feeding bouts at nests.

At one time in the late 1980s an attempt was made to ensure that each volunteer mastered a set of intellectual skills while at the SWRS. This took the form of joint weekly study on groups of organisms from the area: lizards one week, oaks another week. Another tactic was to have volunteers read research papers and discuss them at the weekly volunteer meeting, or to have scientists come to special meetings. Over these summers it became apparent that there was little enthusiasm for these activities, and the practice was dropped. With hindsight, it appears that what was wrong with these efforts was that they were, in effect, an intrusion into the freedom volunteers enjoyed for individual exploration—something they were already carrying on full-time. Adopting a *laissez faire*

attitude toward educational goals has proven successful.

Every year there are a number of graduate student researchers who take advantage of the volunteer program to help fund their stay and activities at the SWRS. This practice has been encouraged. Most frequently these students volunteer half-time, paying the normal researcher charges for half of their stay. This enables them to work only 12 hours per week, but reduces their SWRS bill by half, or doubles their affordable length of stay. The fluidity with which volunteers and researchers can change daily roles is facilitated by an atmosphere of equality that permeates SWRS life.

Following departure from the SWRS, volunteers are sent an evaluation form to comment on their experiences, both with staff and with scientists. Comments have led to more flexible scheduling as well as to the half-time volunteer positions mentioned. They also have provided insights into the nature of the volunteer experience. Here are some of these sentiments:

I feel that I am now ready to start my Ph.D. and am really looking forward to starting in October. The whole trip was a huge confidence booster as I had never traveled so far from home on my own for so long.

Not only was I taught how to take food samples through the use of ligatures, I was given the opportunity to do so on my own. It was also emphasized that the field observations I made in foraging behaviors of target bird species were very valuable to the success of the project.

The schedule flexibility was the most important point in facilitating my goals.

It is thanks to SWRS and the volunteer program that I discovered entomology and was able to make plans for grad school.

Volunteering at SWRS was unlike any job I have ever held before, and I have never before been surrounded by such amazing people. Everyone was willing to explain what they were doing and why they were doing it without being condescending or impatient, as has been some of my experience with “intellectuals” in the past. The people at the SWRS were amazingly real and down-to-earth. . . .

By living in close proximity to the researchers I got to know them on a personal level—this in turn broke down a lot of my own insecurities concerning my science background and allowed me to see that the most important thing was the commitment to the research—not your past experience.

I think responsibility is the big thing. When you are made responsible for part of a project . . . you feel useful. You feel that you are contributing something valuable. The researchers at SWRS were very good at conveying such feelings to volunteers. . . .

It [volunteering] has renewed my enthusiasm and drive to conduct biological research.

I found this experience incredibly exciting, motivating, and rewarding, and as a result I would like to become involved professionally in these types of studies in the future.

I left the SWRS renewed and ready to have an impact somewhere in the world.

Volunteers are able to request letters of recommendation from researchers they have worked with in the field, enabling them to present another side of their capabilities to future employers, or to graduate school admission committees or potential post-graduate advisors. Having a report of one's performance under adverse field conditions—"stinking hot" or "night after night"—can sway assessments of one's suitability for certain research in a way that grades and classroom performance are unable to. Similarly, letters of recommendation from the SWRS director can report on individuals' willingness to assist with varied tasks and their ability to get along with others in a community of people under field conditions. Not uncommonly, volunteers who work with a researcher one season return the following summer as a research assistant, with expenses paid, and perhaps a modest salary and an entrée into a research field.

As is typical these days, many volunteers come from urban settings. Most are not used to free-living mountain lions, black bears, coatis, ringtail "cats," and black-tailed rattlesnakes in their place of residence. These and other experiences—like the summer monsoonal rains and the subsequent biotic explosion of amphibians and insects—are adventures they take away and never forget. A camaraderie develops, whether the activity is standing in the hot sun watching and counting ants, noosing lizards from rocks, "night riding" roads for snakes, soaking in the star-filled night skies or the lightning-filled monsoonal clouds, or decorating the annual whimsical SWRS entry in the local Rodeo, New Mexico, Fourth of July parade. Volunteers make friends with people having similar interests, and perhaps dissimilar backgrounds. Some of these friendships are long lasting, with numerous matrimonial vows having developed from friendships initiated at the SWRS.

Many volunteers benefit simply by making a journey to a region of the country that is exotic to them. The romance of the southwestern deserts—their fauna, flora, and cowboy-and-Indian history—is a real attraction. For international volunteers this is particularly true, with the added benefit of experiencing another culture. For some, perfecting English speaking skills while at the SWRS is a bonus.

There are many casual reports of professional successes of former volunteers—M.S. and Ph.D. degrees, articles written, books published, and academic positions obtained. This highlights another component of the volunteer program, one that adds a dimension to the SWRS and the museum's role in the world.

VOLUNTEER PROGRAM TRENDS

Since the earliest records (in 1963), the volunteer program has grown to become a vital part of SWRS operations and life. The duration of volunteer stays was increased between 1985 and 1986 with the idea of expanding maintenance at the SWRS (table 1). This

growth trend continued over the next several years with larger numbers of volunteers each season. Numbers of volunteers working in any season in the 1990s were generally double those in the 1980s. This level has held in spite of changes in economic conditions in the country and the opening of National Science Foundation summer undergraduate programs for research mentoring. These and other factors may influence the number of applications received in any one year, but they have had little impact on the numbers of participants.

Data on the ratio of men and women in the volunteer program illustrate the role of the SWRS in introducing both sexes to field biological experiences (table 1). The long-term average percentages differ little: males 48.5 percent; females 51.5 percent. The proportion of international students in the volunteer program has grown over the years, particularly after the mid-1980s; they now constitute one-quarter to one-half of the volunteers (table 1).

The total number of work hours contributed by volunteers has only been recorded since 1986 (table 1). The trend has been toward growth. It is difficult to evaluate the exact economic impact of these work hours on the SWRS budget because some of the tasks that have been tackled and accomplished would never have happened without the volunteers. Nevertheless, a simple mathematical calculation based on recent wages for low skilled workers in the area—\$7–10 per hour—makes it clear that the SWRS is able to function for tens of thousands of dollars per year less than would be the case without the volunteer program. The alternative would be to hire people to accomplish kitchen, housekeeping, grounds, and maintenance tasks. The hours volunteers contribute to researcher projects are also impressive, but may not be kept as accurately as those for SWRS chores—often being underestimated. They are an indication of the significance of the assistance volunteers provide to scientists.

CONCLUSIONS: FACILITATING PROGRAM SUCCESS

There is no budget for this program. Its expenses fall within the operations budget of the SWRS. Clearly it funds itself and makes a significant contribution to SWRS financial well-being.

Foremost in the success of the volunteer program over the years has been the willingness of outstanding people to come to a remote area and assist with the operations of the SWRS and with the research activities. Largely, this has been a self-selection process, and the results have been excellent. The SWRS has no curriculum objective that everyone must meet, or grades for performance. Indeed, the paths to personal development rest with the volunteers themselves. Self-motivation, driven by personal objectives, is the force that results in volunteers' professional growth. The real examinations, in a sense, come as volunteers answer questions about who they are and what they want to do with their lives.

Volunteers find at the SWRS encouragement to engage their growing curiosity about the natural world and to consider how they might pursue it as professionals. One

sentiment often expressed is that after several years of undergraduate study, with its required courses and serial examinations, a student has lost sight of why he or she originally elected a career in the biological sciences. But the volunteer experience has again opened them to that part of themselves. They say something like, "Oh yes, this is why I had decided to be a biologist; it's the engagement with the natural world in an intellectually stimulating way that I want."

Growing the volunteer program at the SWRS over the past nearly 20 years has been exciting. Many aspects of it have similarities to the demands and rewards of being a parent. The program requires diligent nurturing at an individual level. Because the individuals and experiences at the SWRS are constantly in flux, the program must be adaptable. Not infrequently, staff must be open to schedule changes and unanticipated events, including emergencies at home. No two seasons are identical, nor are any two months in a season.

Other opportunities for specialized volunteer programs may abound for introducing individuals to new worlds of thought and activities at museums. How those relationships can be developed to the advantage of the institution and the individual participants, staff and volunteers, is a challenge. We have felt that clearly-defined structure, flexibility, and adaptation are important components of bringing about a successful relationship. No museum should overlook its potentially valuable attractions for those who would be willing to make significant contributions in such an exchange.

Initiation of such a program might involve a listing of museum resources, some of which might not be apparent at first. At the SWRS these include the presence of active field researchers, the availability of housing and food services at little institutional cost, the outstanding biological setting, the unique sociological factors resulting from isolation and communal living, and a spirit of cooperation among various groups of people. In addition, it is necessary to identify the tasks that will be carried out by the specialized volunteer staff, be they seasonal, unskilled, or highly skilled. With some commitment to growth and adjustments of a well-conceived program, volunteer assistance to museums can be broadened, bringing rich rewards to the institution and the participants.

ACKNOWLEDGMENTS

The SWRS volunteer program developed during the tenure (1955–1962) of founding director Dr. Mont A. Cazier, curator of entomology at the AMNH. A few young-adult children of museum trustees and others were accommodated at the SWRS during the summer, to experience life there and to assist researchers in the field. Vincent D. Roth, resident director (1962–1986), built upon this tradition, as chores were incorporated into the experience and the opportunity was opened to a wider selection of candidates. There was an active program in place when one of us (Wade C. Sherbrooke) became director in 1986 (Emily E.W. Sherbrooke arrived in 1991).

Many individuals have contributed to the success of the volunteer program. In our time at the SWRS, we have been particularly aware of the many contributions of the vol-

unteers themselves (567 of them during 1985–2003). Staff cooperation by cooks, maintenance, and office personnel has been most helpful. The willingness of research scientists to take on the nurturing of students in exchange for their assistance with data collection and other tasks has been crucial to the success of the program. The appreciation of the scientists for the assistance lent by volunteers is clear from the acknowledgments sections of many master's degree and Ph.D. dissertations, and in scientific articles based on work at SWRS.

For assistance in compiling records from monthly SWRS reports, we thank Elizabeth Sandlin, Sarah Gilbert, Shirley Cox and Diane Smith. Dawn Wilson commented on the manuscript and Raymond Mendez facilitated computer formatting of the illustrations.

REFERENCES

- DeBano, L. F., G. J. Bottfried, R. H. Hamre, C. B. Edminster, P. F. Folliott, and A. Ortega-Rubio, eds. 1995. *Biodiversity and Management of the Madrean Archipelago: The Sky Islands of Southwestern United States and Northwestern Mexico*. USDA Forest Service General Technical Report RM-GTR-264.
- Heald, W. F. 1967. *Sky Island*. Princeton, NJ: D. Van Nostrand Co., Inc.
- Sherbrooke, W. C. 2002. Developing a student research grant program at a location remote from the museum. *Curator: The Museum Journal* 45 (2):122–128.