APPENDIX A –Current Management Case Studies

Viga Socket Covers:
The Great House and historic buildings have continuous pest issues with birds and rodents nesting in cracks and crevices. There are multiple treatments that are being done to reduce or exclude these pest species and issues from occurring. Viga sockets are a main exclusionary device that is being used to prevent the pests from nesting in the Great House and historic buildings. Viga sockets are non-permanent solutions to close up the cracks and crevices that are desirable habitat for pest species to live in. Viga sockets consist of ¼ to ⅛ galvanized wire meshing, flexible plastic inserts, stainless steel wire and coded with unamended earth.

Pesticides Approved in Accordance with PUPS during 2005-2009

Name	EPA registration #	Active Ingredient	Pest
Zinc Phosphide Concentrate for Rodent and Lagomorph Control	56228-6	Zinc Phosphide	Ground squirrels
Compound DRC-1339 98% Concentrate	56228-28	Starlicide	Pigeons
C ompound DRC - 1339 Concentrate – Staging Areas	56228-30	Starlicide	starlings
Double Strength Corn Chops	11649-5	4 Aminopyridine	Pigeons
Magnetic Roach Food	54452-2	Boric Acid	Cockroaches
Bora-Care	64405-1	Boric Acid	Subterranean Termites
Bird-X Bird Proof transparent repellent	1621-17-8708	Polybutene	Pigeons
Termidor 80 WG	7969-209	Fipronil	Termite, Western Subterranean
Prozap Insect Guard	5481-338-36208	2,2-Dichlorovinyl Dimethyl Phosphonate: DDVP; Dichlorvos; Vapona	Bees
CB-80 Extra	9444-175	Pyrethrins, piperonyl	Bees

		butoxide	
Cynoff EC insecticide	279-3081	Cypermethrin	Bees
565 Plus XLO contact insecticide formula	499-290	Pyrethrins, piperonyl butoxide, N-octyl Bicycloheptene Dicarboximide	Bees
Roundup Pro Concentrate	524-529	Glyphosate	Tumbleweed, Bromes, Bermuda Grass
Escort	352-439	Ally; Metsulfuron Methyl	Mustard
2, 4-D Amine Weed Killer	1386-43	2, 4-Dichlorophenoxyacetic acid	Broad Leaf Weeds
2, 4-D Amine 4	42750-19	Dimethalamine salt of 2, 4-Dichlorophenoxyacetic acid	Broad Leaf Weeds
Solve 2, 4-D	42750-22	2, 4-Dichlorophenoxyacetic acid	Broad Leaf Weeds
Milestone	62719-519	Aminopyralid	Malta Starthistle
Dupont Direx 4L Herbicide	352-678	Diuron	Annual Weeds
Perma-Dust	499-384	Boric Acid	Cockroaches, ants, and scorpions
Wasp Freeze PT515	499-362	Allethrin, Phenothrin, D-Phenothrin; Sumithrin	Bees
Drax Liquidator	9444-206	Boric Acid	Ants
Motherearth D pest control dust	499-509	Diatomaceous Earth	Ants

Ornamental Vegetation in Public Areas Exclusionary Devices:
Ornamental vegetation has been a part of the park landscape at CAGR for many years. This added vegetation was put in place for decorative but mostly as an educational exhibit. Although, the vegetation added to these public areas provide education it also has attracted more pest species. Several management techniques have been put into place to reduce the effects of the pest species. CAGR has put in a new drip irrigation system to limit the amount of water that is being used. Some of the vegetation has been caged in with wire to reduce the burrowing around the vegetation bases. Some of the vegetation has been treated with bitter spray, lake mead, Chile peppers, and blood meal. These are animal preventive treatments and sprays that deter the pests from eating the vegetation. During the spring, summer and fall the seed pods from the vegetation are raked up and thrown away to reduce the amount of food available to the pest species. Also in the public areas the weeds are being removed as well to reduce the vegetation available to the pest species.

Caged in Vegetation with wire meshing.

Mechanical Treatments:

Mechanical treatments are applied in all types of areas within the park. In public areas and archeological sites the burrows are filled in with sterile soil, which reduces the amount of people tripping and falling; site preservation and protection. The viga sockets mentioned earlier are mechanical treatments. There is a gravel test that was conducted in the picnic area to determine if it reduces the rodent population. The gravel test consisted of geotextile, ¼ galvanized wire mesh on one half of the test plot and medium sized rocks. This test was a 10 by 10 meter plot in a high use public area. Sanitation practices are applied to all the historic buildings and the Great House. Snap traps for rodents in buildings and shooting of pigeons are mechanical practices as well. Also, sound and light deterrents are applied practices with birds around and in the Great House.

Raking seed pods in public areas reduces the pest species.	Gravel test plot 2009

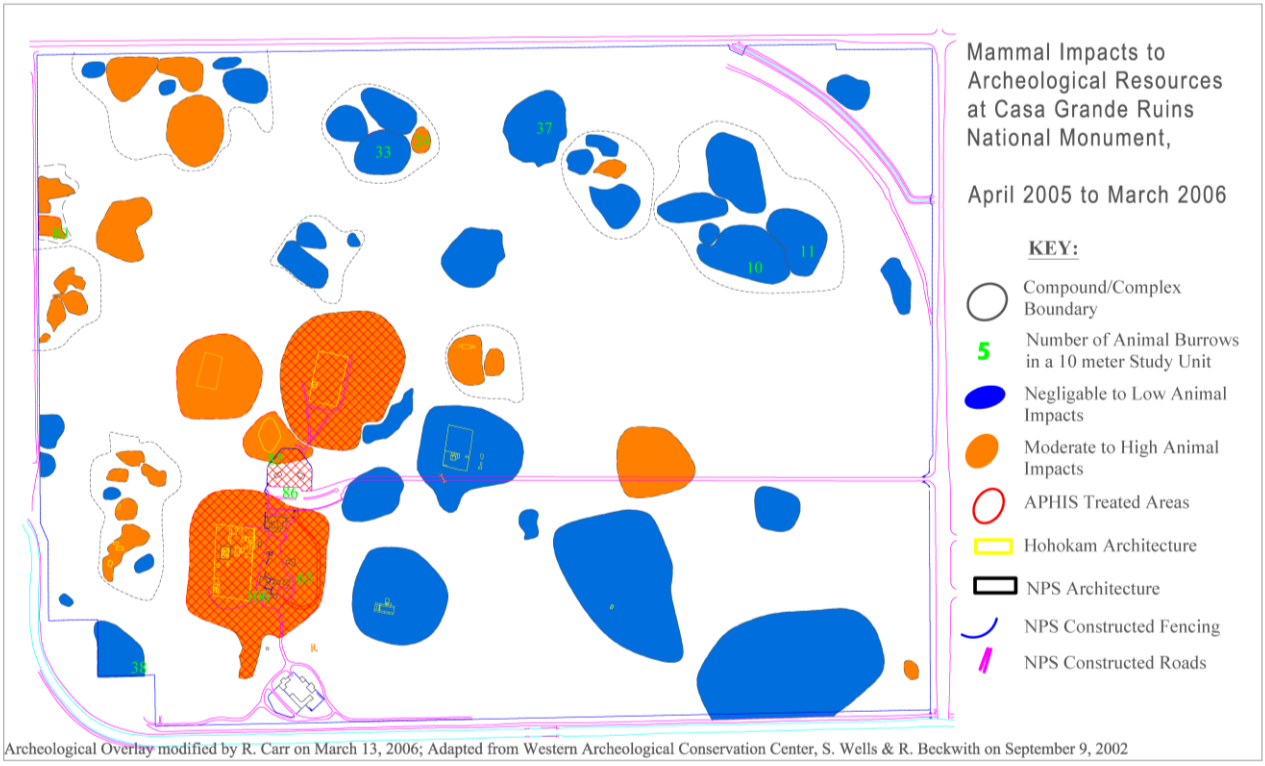
Biological Treatments:

Biological treatments would be encouragement of predator species within the monument. Improved habitat has been established to encourage predatory species that prey upon those pest populations that monitoring has identified as a threat to archeological site preservation. Installation of raptor perching poles and nesting boxes were completed in 2006-2007 as part of the current program designed to attract additional raptors to control rodent populations near the most heavily impact archeological sites. A nesting box was installed on the Great House protection shelter for the encouragement of the Great Horned Owls that are nesting on the Great House walls. With permit and approvals from the United States Fish and Wildlife Services and the National Park Service, a Great Horned Owl nestling was successfully relocated to the nesting box in 2009. An experiment was also conducted in 2006-2007 to assess the success of flying trained raptors in Compound A to deter birds from nesting in the Great House. This experiment was successful, but regularly scheduled raptor flights were halted when the resident Great Horned Owls exhibited territorial behavior.

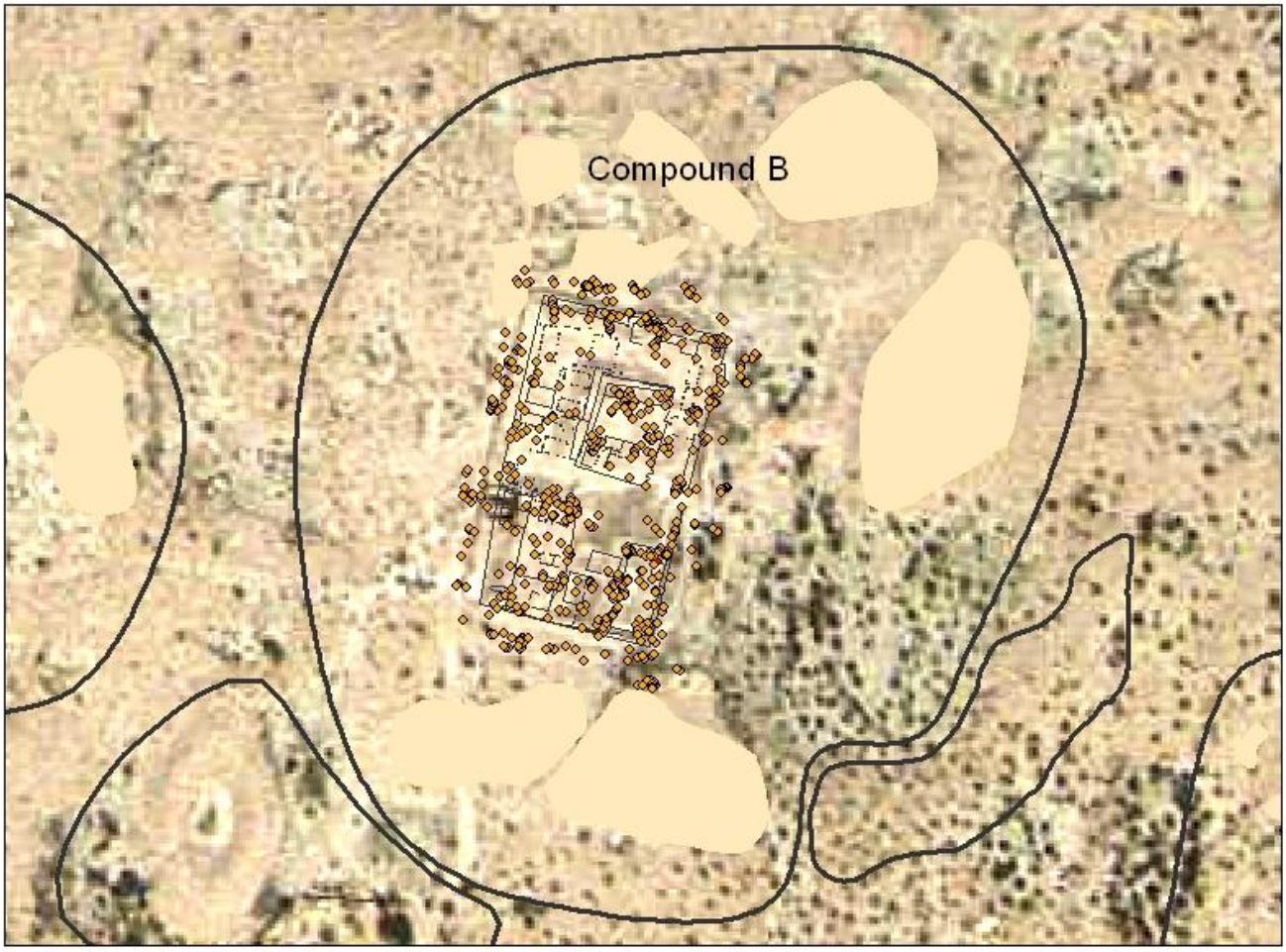
Nesting box for the Great Horned Owls.

First Great Horned Owl nestling that has fledged from the nesting box after being relocated to it on May 22, 2009.

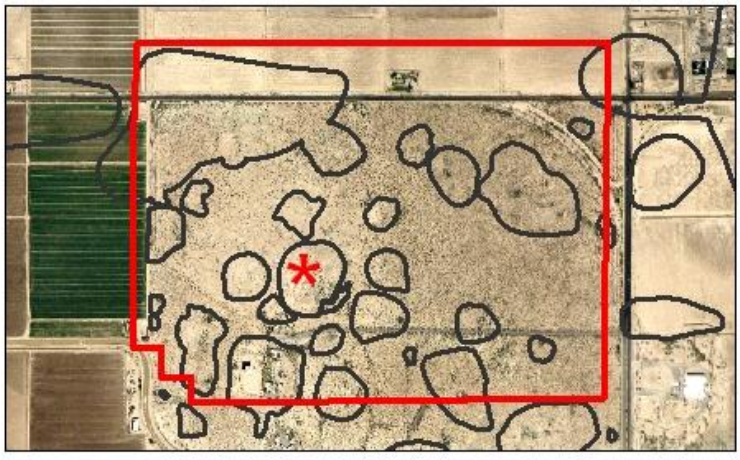
APPENDIX B- Pest Impact Survey Maps



Rodent Monitoring Holes
Compound B
Casa Grande National Monument



0 12.5 25 50 75 100
Meters



Legend

- Small Pest Holes (589)
- Medium Pest Holes (8)
- Prehistoric Architecture
- CAGR Boundary
- Site Features
- Site Boundaries

Rodent Monitoring Holes for April 2008

APPENDIX C-
2009 Immunocontraceptives Research, Ashley McCabe

Although they have been researched for more than twenty years, immunocontraceptives are a relatively new alternative for the management of wildlife and pest species. Immunocontraceptives are considered to be a contraceptive pesticide that uses the animal's own hormones or proteins to block reproduction.

> "Immunocontraceptive vaccines are directed against 'self' reproductive antigens (hormones or proteins) to which the recipient is immunologically tolerant (Miller et al)."

Basically, these pesticides releases hormones or attaches to proteins and uses the immune system to attack the animals' the reproduction and inhibits fertilization. Some of these products are species specific while others are more generalized. Immunocontraceptives have been tested on large and small mammals and some bird species. Much of this research has been conducted on mammalian species such as White-tailed deer, Elk, and Horses, and on smaller mammals such as grey squirrels in England and Norwegian Rats in the United States. The Environmental Protection Agency (EPA) approves and regulates the use of immunocontraceptives, and some products have been approved for specific species. Research on rodents is ongoing and the USDA is attempting to get an immunocontraceptive approved for use on rodents.

There are several different immunocontraceptives for wildlife. Injectables are used to vaccinate Elk and other larger mammals. Smaller mammals such as rodents or lagomorphs are vaccinated with either oral or injectable types of chemicals. The primary pesticide that has been used on rodents is GonaCon, which is a gonadotrophin-releasing hormone that the National Wildlife Research Center of the USDA has developed and tested (Fagerstone, 2008). GonaCon is not species specific but is a hundred percent effective (Miller et al). A second pesticide that was tested is MZPP, which is mouse zona pellucida (Miller et al). MZPP is species specific to rodents, but is only fifty percent effective and sterilizes females only (Miller et al).

There are other types of vaccines such as Ovocontrol that has been approved by the EPA for the immunocontraception of overabundant pigeons. DiazaCon is another immunocontraceptive but is only 47 percent effective in reducing reproduction (Nash et al, 2007).

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