comparison to post-treatment data. Bat boxes were checked for occupancy several times throughout the summer. Bats were removed from bat boxes and color banded for visual confirmation of species and treatment areas where bats were captured. In 2004, we captured and marked 29 bats consisting of six species: *Myotis occultus*, *Eptesicus fuscus*, *Myotis evotis*, *Myotis volans*, *Myotis thysanodes* and *Myotis auriculus*. We observed a 35% return rate for all marked bats. Bats occurred more often in south and west facing boxes. In 2005, we captured and marked 87 bats consisting of the same 6 species. We observed a 40% return rate for all marked bats. Bats occurred more often in east facing boxes. In our poster, we discuss the methodology used to monitor bats and preliminary evidence that bats will return to artificial boxes after disturbance using these methods. The influence of bat box temperature and orientation on bat occupancy will also be discussed.

Ontogeny of Play Behavior in Captive *Pteropus rodricensis*, the Rodrigues Fruit Bat. Becky A. Houck* and Julie Kunrath, University of Portland, Portland, OR

Social play behavior was first described in *Pteropus rodricensis* by in 1979. We have examined the ontogeny of play behavior in juvenile *Pteropus rodricensis* at the Oregon Zoo. We observed play wrestle and play chase in both juvenile and adult captive *Pteropus rodricensis*. No play behavior was observed in infants before 130 days of age. Play behavior developed rapidly after this age. In a focal study of one juvenile between 156 – 193 days of age, play was the largest single category of behavior observed.

Lessons in History: Colony Size and Population Decline of Brazilian Free-Tailed Bats at Carlsbad Caverns. Nickolay I. Hristov*, Margrit Betke, Thomas H. Kunz, Boston University, Boston, MA

The colony of Brazilian free-tailed bats (*Tadarida brasiliensis*) at Carlsbad Caverns is one of several well-known colonies of this highly gregarious and conspicuous species in North America. For over 80 years researchers have attempted to estimate the size of this colony with mixed results. Primitive methods and lack of repeatability have resulted in questionable estimates giving rise to poorly understood but highly popularized long-term trends. In this study, we present the most accurate and complete, seasonal, colony size estimates to date, based on a new census method, advanced thermal infrared imaging and computer vision processing. The size of the colony was estimated monthly from March through October in 2005 and 2006. Our results indicate large changes in the size of the colony within the same season and between seasons. Colony size estimates range from 23,660 to 793,838 bats, values that are lower than historical estimates for this location. In addition, consecutive daily estimates show large fluctuations in the size of the colony by as many as 290,000 individuals indicating that the colony is considerably more dynamic than previously suggested. Using realistic 3D simulations, paired with additional quantitative analyses of bat emergence behavior, we raise questions about the validity of early historic estimates that millions of bats once roosted in this cave, and prompt a reevaluation of the long-term pattern of decline that has been suggested for this species. The answer to these questions requires accurate, base-line data that incorporate seasonal and long-term observations. Thermal infrared imaging and computer vision processing provide a highly effective and reliable method for the accumulation of such data as has been demonstrated in the present study.

The effect of artificial loads on the straight flight performance of fruit bats. Jose Iriarte-Diaz*, Brown University, Providence, RI

Most bats experience significant fluctuations in their body mass. These fluctuations can be both daily, mostly due to feeding, or seasonal due to fat storage and/or reproduction. Based on predictions derived from classic aerodynamic theory, increments in body mass, such as those in observed in natural populations of bats, should severely affect their flight performance. But because bat flight is spatially and temporally complex, and bat wings continuously change shape during a wingbeat, the utility of such theoretical models is limited. For example, some bats species are able to increase their body mass up to 40% and remain capable of maneuvering in complex three-dimensional environments. How increased lift is produced when weight is increased is well understood. Thus, the purpose of this study is to evaluate the effect of added mass on the kinematics of forward, steady flight in a fruit bat. Three lesser short-nosed fruit bats (*Cynopterus brachyotis*) were trained to fly in a flight corridor with and without carrying a load of about 20% of their original body mass. Ultra-light reflective markers were placed on the body and wings and