



Hastings Natural History Reservation
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A Biological Field Research Station
Museum of Vertebrate Zoology

Hastings Cooperation with American Distance Education Consortium (ADEC)

The Hastings Natural History Reservation is a 2,500 ac. biological field station in upper Carmel Valley, Monterey County, California. Established in 1937, Hastings has over 600 research publications and supports about 50 ongoing research projects in a complex of 26 buildings. Hastings is under the administration of the UC Berkeley campus, and is a part of the Museum of Vertebrate Zoology. Hastings is also a part of the UC system-wide Natural Reserve System.

Since about 1992, Hastings has had a [web presence](#). Since 1995, Hastings' resident Reserve Director, Dr. Mark Stromberg, has been the Network Coordinator for the [Organization of Biological Field Stations](#), building that website now managed by Faerthen Felix of the UC Berkeley Sagehen Field Station. Mark has been the co-chair of the UC Natural Reserve System's Information Management Committee since 2000. One of the products of that collaboration is the online [reserve administration management system](#) developed by a committee employee, Kevin Browne. UC Berkeley's Natural History Museums received funding from NSF for a GK-12 program that integrates the use of the reserve with the natural history museums. Hastings has been heavily used by this [UC Berkeley GK-12 project](#). Hastings is also involved with our local school district, hosting webcams, visits and staff participation in the Carmel Unified School District's [Middle School's habitat program](#), a hands-on learning environment. Hastings has a long interest in distance learning as we are located in a relatively remote part of the central coastal area of California.

Our connectivity to the internet has varied over the years, starting with phone modems, a DSL line (very expensive), and is currently a Hughes satellite, DW7700 modem (800Kbs down/80-150 up) provided by a local value-added vendor, Ground Control, based in Paso Robles, CA. We are limited to 1,200Mb download a day. This Hughes system has been problematic; it varies in speed enough to make video or Skype connections tenuous at best. However, we have found that with 12-15 users a day, the throughput limits below 1,000 Mb/day are not realistic. In 2005 and 2006 we installed a network of 5 802.11 wireless access points that cover central areas of Hastings. In 2007, the California Proposition 84 provided funding to improve facilities at NRS field stations. We have been working with Cliff Frost, Dir. of [UC Berkeley's Information Systems and Technology Infrastructure Services](#). Frost and Stromberg have been in touch with AT&T to provide T1 service via underground cable and in June of 2007, Stromberg submitted a \$100,000 proposal to the Proposition 84 funding agency to install the T1 line in 2008. Currently, the Hughes satellite is funded by Center for Embedded Networked Systems (CENS) at UCLA.

We have two research projects that depend on the internet connection and could provide distance learning. First, UCLA's Prof. Charles Taylor's student, Yuan Yua, has been developing notes that use 4 microphone (each) and embedded GPS to listen to woodpeckers. For each call of the acorn woodpecker (subject of 30 years of study at Hastings by Dr. Walt Koenig and others), the notes do voice recognition, triangulate on the bird and report bird ID, location, date and time over the wireless clouds to the internet. We have been collaborating with Dr. Michael Hamilton at the UC James Reserve in developing this system, the wireless network and the [various webcams](#) we operate. The second developing project is one funded by NIH to [Dr. Matina Kalcounis](#) at U. North Carolina at Greensboro. Dr. Kalcounis has students working on the new discovery that deer mice in CA sing at night in the ultrasound. She is working on radio telemetry to both broadcast the "blip" for radio relocation as well as the song by the radio-collared animal that will be analyzed with bat-detector software. We would like to automate this data collection and extend the wireless cloud to her study sites in deep, narrow canyons. Setting up radio receiver towers, repeaters for the 802.11 signal and developing the radio transmitters/microphones for animal collars will be a challenge that would require an

engineer, programmer and field technicians. However, the world of nocturnal mice and their behavior would be fascinating and is as yet impossible to glimpse. Cost for this would roughly be about \$250,000.

Hastings holds weekly seminars for residents and these would be great talks for the K-12 (middle school) audience and the GK-12 groups at Berkeley. We would like to develop IP video conferencing capacity to also bring the weekly Berkeley seminars to the Berkeley field stations. Staff and resident researchers would be able to skip the weekly 3 hour drive (each way) to campus to attend seminars, conduct administrative business, etc. Costs for the video system could be shared with cooperating entities (eg LTER network office) would be about.....