**6-12 How Do Large Herbivores Influence Ecosystem Processes?**
Elliott Parsons[1]
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It is well known that large herbivores including ungulates (hooved mammals) can affect plant communities by influencing plant growth, survival, and reproduction. Recent work also suggests that large herbivores can affect ecosystem N cycling through a number of different mechanisms. Browsing ungulates can shift communities from those dominated by palatable, nutrient rich species to those that are unpalatable and nutrient poor. Also, ungulate browsing and trampling can create disturbances which influence soil moisture and temperature, and this can also lead to changes in N cycling. Through these different mechanisms, ungulates can alter feedbacks between plants and soil processes, and this can affect rates of nutrient cycling and available soil nutrients. In many parts of Hawai'i, ecosystems are relatively young and are nutrient-limited. This means that large herbivores may play an important role in controlling the availability of resources to the rest of the community. In order to understand how large herbivores affect N cycling and how this might relate to ecosystems in Hawai'i, I'll draw on research from northern Michigan, East Africa, Scandinavia, and New Zealand. While data on this is currently limited in Hawai'i, a general understanding of the myriad ways in which ungulates affect ecosystems will help provide directions for future research.

**6-13 Public Policy and the Spread of Mouflon on the Island of Hawai'i**
Mary Ikagawa
*University of Hawai'i at Mānoa, Honolulu, HI*

Introduced ungulates are a primary threat to Hawai'i's native ecosystems. Mouflon sheep (*Ovis gmelini musimon*), released on the Big Island of Hawai'i in the 1960s for hunting, have reportedly experienced significant population and range expansion over the past 30 years. The only previously published reports of mouflon distribution on the island have been limited to single management units. I mapped the current range of mouflon islandwide and examined it in relation to known populations of rare Hawaiian plants and federally designated critical habitat. The results show a dramatic increase in mouflon range since 1980. I then broaden the discussion to axis deer and feral ungulate species, and examine Hawai'i's statutes and rules pertaining to management of introduced ungulates. Recent efforts to change management through legislation, and public policy in other places experiencing land modification by introduced ungulates are discussed.

**6-14 Feral Cats in Hawai'i – Population Structure and Origin**
Katrin Koch[1], Jay Penniman[4], Dave Algar[2], Fern P. Duvall II[3], Klaus Schwenk[1]
*[1]Biodiversity and Climate Research Centre (BiK-F), Frankfurt, Germany, [2]Department of Environment and Conservation, Woodvale, Perth, WA, Australia, [3]Hawai'i Department of Land & Natural Resources, Division of Forestry & Wildlife, Kahului, HI, [4]Maui Nui Seabird Recovery Project, Ha'iku, HI*

Invasive species pose a major threat on global endemic fauna. Feral cats (*Felis catus*) are extremely adaptable and are now present on all continents except Antarctica. Their ability to live in almost every habitat has led to their listing as one of the 100 world's worst invasive alien species. Domestic housecats cats were brought to Hawai'i with European ships around 1700 and first feral cats were observed in 1840. In Hawai'i they are frequent predators of endangered Hawaiian birds including ground-nesting waterfowl, tree-nesting passerines and colonial seabirds. Research on the genetic structure of feral cats was carried out with samples from Kaho'olawe and Lana'i.We studied mitochondrial and 12 highly polymorphic microsatellite markers to evaluate genetic diversity and population structure. The frequency and time span of invasion events can be determined through genetic analysis. In particular, we can determine if invasion is still ongoing or terminated. If reinvasion events are inferred, future studies with samples from more Hawaiian islands will enable us to determine where reinvaded cats originated from and where further

quarantine measures need to be established. In the future we will be able to detect putative source populations and localise demographic groups that should be targeted. These findings will thus help to enhance feral cat control strategies and effectiveness of current management efforts.

## CONCURRENT SESSION 7: AUGUST 4, 10:20 AM – 12:20 PM

### Management Tools and Technology

**7-1 GIS on Mobile Devices**
Stephanie Tom
*The Nature Conservancy, Honolulu, HI*

Did you know you can view GIS data on your smartphone or tablet? Find out which GIS apps are great for viewing geospatial data on your mobile device. Bring your own smartphone or tablet and download these apps during this session, or look on with someone else's mobile device. View relevant conservation data like 1m IKONOS imagery, ecosystems, zones, ahupua'a, TMKs, soil type, and preserve boundaries to your phone from anywhere you have wireless data coverage (e.g., 3G). Learn how to upload your own GIS data into the cloud so you can see it on your mobile device. Query all data at a location just by pointing at it. It's like having the whole world in the palm of your hand!

**7-2 Through the Eyes of a Fencer: Remote Fencing Techniques and Challenges**
Justin Luafalemana, Munsta Souza, B.J. Davis, Josiah Jury, Simoi Luafalemana, Robert Romualdo
*Oʻahu Army Natural Resources Program – RCUH/PCSU, Wahiawa, HI*

Who ever thought of putting a fence in a mountain to make it more beautiful? The need to install ungulate-proof fencing around biologically sensitive areas has increased tremendously and has sparked an evolution in the remote fencing trade. With the establishment of the Oʻahu Army Natural Resource Program's (OANRP) fence crew in 2006, remote fencing techniques have been explored at a new level. Various materials, tools and design features are being evaluated daily in order to maximize ungulate-fence effectiveness. Techniques are being adjusted in response to changing obstacles and ungulate threats. After each fence line is cleared and construction is completed, new lessons are learned. These lessons can be grouped within three broad themes: (1) effective fencing takes time, and requires a series of stages; (2) every fence presents different challenges and obstacles; and (3) to construct a proper ungulate-proof fence, one needs to understand ungulate behavior and movement. Members of the OANRP fence crew - individuals with extensive backcountry ungulate experience - will highlight examples of how these themes play out in the native forests of Oʻahu, sharing "lessons learned" for other conservation organizations. Comparisons between building fences in ecologically diverse locations such as Ēkahanui and Keaʻau in the Waiʻanae mountain range, and Helemano and Waimano in the Koʻolau mountain range will be discussed.

**7-3 A Hawaiian Biologist's Assessment of Predator Proof Fencing Projects in Aotearoa, New Zealand.**
Arthur Medeiros
*Pacific Island Ecosystems Research Center, U.S. Geological Survey, HI*

New Zealand has become a world leader in development of predator-proof and rodent-proof fencing efforts. Through the courtesy of Alan Saunders (Landcare Research), John Innes (Landcare Research), and others, leading New Zealand restoration projects utilizing predator-proof fencing in New Zealand, visited in March 2011, will be the focus of this talk. Topics will include: fence construction overview; initial and recurrent costs; control and re-incursion detection methods; methodologies for experimentally evaluating changes in vegetation, vertebrates,