Envirovet Summer Institute 2010
Session One: Terrestrial Wildlife and Ecosystem Health

Wednesday June 16 – July 3, 2010
White Oak Conservation Center (Yulee, Florida)
St. Catherines Island (Midway, Georgia)

SCHEDULE

Wednesday June 16 ARRIVAL DAY

Students arrive at White Oak throughout day.

5:30 – 6:45 pm: Introduction to Envirovet Summer Institute Session I
Presenter: Kirsten Gilardi, Co-Director, Envirovet Summer Institute, UC Davis Wildlife Health Center

Gilardi will walk students through the schedule for our two weeks at White Oak and on St Catherines Island, orienting students to White Oak Conservation Center and describing what to expect and prepare for throughout the session. Students will introduce themselves to fellow students and faculty, and share their motivations and hopes for participation in Envirovet 2010.

7:00 pm: Ice-breaker, Dinner

Thursday June 17 INTRODUCTORY PRINCIPLES

7:30 am: Breakfast

8:30 – 10:30 am: Ecosystem Health as a Discipline, a Practice, and a Condition.
Presenter: Val Beasley, University of Illinois.

Beasley will introduce concepts of ecosystem health and conservation medicine, and will challenge participants to consider how vibrant natural ecosystems yield sustainability and benefits to society, and how human systems have caused ecosystems to become dysfunctional. Participants will be challenged to start thinking about where we are in human history, and the roles and responsibilities of the veterinary profession, government, academia, the corporate sector, grassroots organizers, and other groups in implementing innovative new strategies to accelerate our progress through the current crisis to an era of ecological recovery.

10:45 am – 12:00 pm: Linkages between Human Health and the Environment
Presenter: K. Gilardi

The majority of emerging infections diseases in humans are zoonotic. Why? What causes a pathogen to jump from animals to people? How are humans contributing to this phenomenon, and when and why is it not natural? Gilardi will discuss the interrelatedness of ecosystem health and human health, focusing on examples of where and how ecosystem disturbance and loss of biodiversity impacts human health and well-being.

12:00 pm: Lunch

1:00 – 2:30 pm: Mitigating civil disparity and poverty
Presenter: Patricia Erickson, University of Vermont

Erickson will describe the mission and operations of a non-profit organization she and her husband Jon Erickson established in the Dominican Republic called Batay Libertad which strives to improve the health and well-being of a Haitian community through education and health delivery.

2:45 – 4:00 pm: Transfrontier Conservation
Presenter: Steve Osofsky, Wildlife Conservation Society

The development of Transfrontier Conservation Areas (TFCAs) to further the conservation of biodiversity and sustainable development through the harmonization of transboundary natural resource management is a priority for SADC (the Southern African Development Community). A key economic driver behind TFCAs is nature-based tourism that seeks to maximize returns from marginal lands in a sector where southern Africa enjoys a global comparative advantage. However, the management of wildlife and livestock diseases (including zoonoses – diseases transmissible between animals and people) within the envisaged larger transboundary landscapes remains unresolved and an emerging policy issue of major concern to livestock production, associated access to export markets, and other sectors, including public health, in the region. Dr. Osofsky will focus on TFCAs in southern Africa and potential ways forward.

4:15 – 5:00 pm: Grassroots Soccer
Presenter: Jon and Pat Erickson

Students will get outdoors and play Grassroots Soccer, a program to raise awareness about health and well-being issues among youth in developing countries.

7:00 pm: Dinner

Evening: OPTIONAL viewing of the PBS film "State of the Planet's Wildlife."

<u>Friday June 18</u> DRIVERS OF CHANGE; SOLUTIONS

8:00 am: Breakfast

9:00 am – 12:00 pm: Ecological Economics
Presenter: Jon Erickson, University of Vermont

How do we place economic value on healthy ecosystems? What does it cost society to implement ecosystem health programs, and what does it cost society if we don't? What are the trade-offs, and how do we work toward solutions that balance ecosystem health and conservation with the economic well-being of individuals, communities, and the business sector?

12:00 pm: Lunch

1:00 – 2:30 pm: Current Events: Oil Spills and Wildlife
Presenter: K. Gilardi

The Deepwater Horizon spill in the Gulf of Mexico is an environmental disaster that has happened before. Gilardi will present an overview of the impacts of oil on wildlife, oiled wildlife care, provide a firsthand account of working on oil spill response, and describe the Wildlife Health Center's current involvement with the Deepwater Horizon spill.

2:45 – 4:15 pm: One World, One Health
Presenter: Steve Osofsky

Human-animal interactions have important consequences for both human and animal health, as well as for the health of the environment we all share. These connections are increasingly relevant as climate change potentially facilitates expansion of disease vectors and as population growth means humans and animals increasingly share the same habitat. The "One Health" approach, focused on catalyzing problem-solving in places where tensions and challenges at the interface between animal (wild and domestic) and human health are often greatest, can be relevant at a range of scales. Osofsky will discuss various 'One Health' entry points for mitigating conflicts between conservation and development by identifying and facilitating 'win-win' opportunities. Discussion will be encouraged.

4:30 – 5:30 pm: Gilman International Conservation Projects Worldwide
Presenters: Steve Shurter, Gilman International Conservation, White Oak Conservation Center

Lukas or Shurter will provide an overview of White Oak Conservation Center, and Gilman International Conservation, and introduce flagship species conservation as an ecosystem health tool to protect remarkable sites of biodiversity.

5:30 – 6:00 pm: Group Assignment Introduction.
Presenter: K. Gilardi

Gilardi will describe the group project assignment for Session I and establish working groups.

7:00 pm: Dinner

Group Project Part I work time recommended before or after dinner.

<u>Saturday June 19</u> WOCC TOUR; DRIVERS AND SOLUTIONS (cont)

6:30 am: **Breakfast**

7:30 am – 12:30 pm: Tour of White Oak Conservation Center
Guides: White Oak Conservation Center staff

Join White Oak Conservation Center staff for a guided open-bus tour of the White Oak Conservation Center's threatened and endangered species collection. Bring your cameras!

12:30 pm: Lunch

1:30 – 3:00 pm: The Global Bushmeat Crisis
Presenter: Heather Eves, Bushmeat Crisis Task Force

Eves is a wildlife biologist whose conservation work began in Africa in 1985, with a focus on the bushmeat trade beginning in 1994. Eves will present an overview of the unsustainable bushmeat trade including trade drivers and dynamics as well as conservation and health impacts. Worldwide demand for bushmeat, including the United States, will be discussed. Successful and unsuccessful strategies to mitigate bushmeat trade will be highlighted, and existing and proposed programs, policy and legislation will be outlined.

3:15– 6:00 pm: Conserving Iconic Species: Elephant Conservation and Management
Presenter: Susan Mikota, Elephant Care International

The world's African and Asian elephant populations encapsulate the challenges facing wildlife conservation in the 21st century: habitat, hunting, disease, and politics (and by now, you know these are interrelated!). Mikota has devoted her veterinary career to elephant conservation, and in one way or another has been immersed in all of the issues facing wild and working elephants. She will discuss how elephants are affected by – and impact – ecosystem health (including human communities), the available strategies for mitigating stressors and conflict, and will highlight elephant disease issues that must be factored into all elephant conservation and management programs.

6:30 pm: Dinner

Evening: Challenges and Rewards of International Collaborations
Group Discussion – All

The composition of the Envirovet Class of 2010 truly exemplifies the opportunities and challenges of working to improve ecosystem health and conserve biodiversity: these are <u>global</u> challenges, with local implications, requiring people from multiple nations and differing educations, cultural backgrounds, and belief systems to work together. In the course of your career, you will likely work in places that are not your home, and will encounter unexpected "problems" as result of your objectives, training, preconceptions, and habits. Our faculty will kickstart a discussion, sharing their own experiences and encouraging us all to openly discuss how international collaborations work and can succeed.

<u>Sunday June 20</u> WILDLIFE EPIDEMIOLOGY AND DISEASE MODELING

7:30 am: Breakfast

8:30 – 10:00 am: Wildlife Epidemiology and Risk Assessment
Presenter: Jonna Mazet, UC Davis Wildlife Health Center

Mazet will introduce principles of wildlife epidemiology and risk assessment as they pertain to real-world problems and projects in wildlife conservation and ecosystem health.

10:15 am – 12:00 pm: Population and Disease Modeling
Presenter: Phil Miller, Conservation Breeding Specialist Group

Miller develops, tests, and applies computer-based models for risk assessment and decision making for wildlife conservation. These models, which focus on small population biology, conservation biology, human demography, social learning, and threats to sustainability including infectious diseases, have been developed to produce realistic management recommendations to prevent extinction of endangered species.

12:00 pm: Lunch

1:00– 4:00 pm: **Epidemiology / Risk Assessment and Management Exercise**
Leads: Mazet and Miller

Students will engage in a group-based exercise to develop skills needed for outbreak investigation, epidemiologic modeling, risk assessment and risk reduction

7:00 pm: Dinner

Evening: Introduction to Envirovet 2010 in Tanzania
Presenter: Jonna Mazet, UC Davis Wildlife Health Center

Mazet will provide a glimpse of your time in Tanzania: the schedule, logistics, the people you will meet, and the sites and projects the course will visit.

<u>Monday June 21</u> JACKONVILLE ZOO FIELDTRIP; CORPORATE CONSERVATION

6:00 am: Breakfast; turn in Group Project Part I

7:00 am – 2:00 pm: Jacksonville Zoo
Leader: Nick Kapustin, Senior Veterinarian, Jacksonville Zoo

Kapustin and his colleagues will present an overview of Jacksonville Zoo's local and international conservation partnerships, illustrating important contributions that zoos can make to both conservation and public awareness. We will tour the zoo's new Amphibian Conservation Center and other exhibits linked with conservation efforts, and have free time to explore the zoo.

4:30 – 6:00 pm: Corporate Environmental Responsibility
Presenter: Jackie Ogden, Vice President of Disney's Animal Programs and Environmental Initiatives, Orlando, FL.

Ogden will talk about Disney's commitment to corporate environmental responsibility, using their business and operational initiatives, stewardship and public education/outreach programs to illustrate the ways that businesses can help ameliorate threats to the environment.

7:00 pm: Dinner

Group Project Part II work time recommended.

<u>Tuesday June 22</u> WILDLIFE HEALTH

7:30 am: Breakfast

8:30 – 12:00 pm: **Anthropogenic Drivers of Disease Problems in Wildlife**
Presenter: John Fischer, Southeast Cooperative Wildlife Disease Study (SCWDS)

Fischer will present an overview of important diseases of wildlife, with an emphasis on diseases that occur as a result of human perturbation of natural ecosystems. Also, he will introduce the purpose, principles and practice of wildlife disease surveillance, and talk about the role of the wildlife disease diagnostician in monitoring ecosystem health. Students will be oriented to the afternoon laboratory session.

12:00 pm: Lunch

1:00 – 6:00 pm: Laboratory - Wildlife Necropsy Techniques
Lead: Kevin Keel, SCWDS

As part of routine white-tailed deer herd health surveillance at White Oak Plantation, students will break into groups of 4-5 each to conduct a white-tailed deer necropsy, collecting and recording extensive pertinent data.

6:30 pm: Dinner

Evening: Wildlife Translocation: Applying Principles of Risk Management
Presenter: Scott Citino, White Oak Conservation Center

As a prelude to the Wildlife Immobilization unit, Citino will discuss the implications of wildlife translocation and reintroduction programs for the health and sustainability of free-ranging populations, stressing ways to avoid pitfalls in planning and implementing a translocation program.

<u>Wednesday June 23</u> WILDLIFE IMMOBILIZATION

7:00 am: Breakfast

8:00 am – 12:30 pm: Immobilization of Wildlife - Lectures
Presenters: Scott Citino, Greg Fleming (Disney Animal Kingdom), Lin Klein (University of Pennsylvania) and Jeff Zuba (San Diego Wild Animal Park).

Citino, Fleming, Klein and Zuba will provide a comprehensive overview on comparative anesthesiology and pharmacology, immobilization methods and equipment, physical vs. chemical restraint, and safety practices for use with captive and free-ranging wildlife.

12:30 - 1:30 pm: Lunch

1:45 – 6:00 pm: Immobilization of Wildlife - Lab
Leads: Citino, Fleming, Klein and Zuba

A hands-on laboratory introducing students to equipment of value in zoos and the field for darting, immobilization, anesthesia, and monitoring of vital signs.

7:00: Dinner

Thursday June 24 WILDLIFE IMMOBILIZATION (cont)

5:45 am: Breakfast

6:30 am – 12:30 pm: Immobilization of Wildlife – Field Demonstrations. Leads: Citino, Fleming, Klein and Zuba, and WOCC animal care staff

Field demonstrations of, and hands-on experience with, physical restraint and immobilization of large ruminants (bongo), zebra, and other sensitive and/or difficult species (e.g. gerenuk).

12:30 pm: Lunch; video presentation by White Oak Animal Care staff on mechanical, physical and behavioral restraint techniques used at White Oak Conservation Center.

Afternoon: **Group project Part II work time**

7:00 pm: Dinner

Friday June 25 SMALL POPULATION MANAGEMENT

7:00 am: Breakfast

8:00 – 10:30 am: Ex-situ Conservation: Endangered Species Reproduction
Presenters: Linda Penfold (White Oak Conservation Center) and Bill Swanson (Cincinnati Zoo's Center for Conservation and Research of Endangered Wildlife)

Penfold and Swanson will present principles, techniques and strategies used to enhance the reproductive health of threatened and endangered species in captivity, as well as ways in which this research is coupled with conservation of these species in the wild, including the challenges inherent in linking captive breeding to *in situ* conservation. Penfold will also illustrate real-life problem-solving in the areas of assisted reproduction, animal translocation, and biological sample handling.

10:45 am – 12:30 pm: Conservation Genetics
Presenter: Steve O'Brien, National Institutes of Health

O'Brien will introduce students to the principles of conservation genetics, and to the issues surrounding genetic management of small populations in a conservation setting. Students will be introduced to the research and investigative tools used to study the genetics of small populations.

12:30 pm: Lunch

1:30 – 6:00 pm: Laboratories
Leads: Linda Penfold, Bill Swanson, and Cyd Teare (White Oak Conservation Center)
Students will divide into two groups and each group will rotate through concurrent laboratories on: 1) assisted reproduction techniques; and 2) biological sample handling

6:00 pm: Dinner

Evening: Special Presentation: Biodiversity and Climate Change.
Presenter: Tom Lovejoy, H. John Heinz III Center for Science, Economics and the Environment
Climate change is one of the defining environmental issues of our generation. Lovejoy will present on the importance and value of biodiversity, and on the current and future impacts of global climate change on fundamental biological processes and ecosystems.

<u>Saturday June 26</u> NON-CLINICAL COMPETENCIES

7:00: Breakfast

8:00 – 10:15 am: Grant Writing
Presenter: K. Gilardi
Gilardi has spent considerable time on both sides of the grant proposal process: writing and reviewing. She will utilize a "recipe" for grant-writing prepared by Robert Perry to walk students through the essentials of preparing an excellent proposal. Students will then read and review a grant, holding a mock grant review panel, and will decide whether or not to fund the grant proposal. We will discuss why or why not groups decided to fund the proposal and let you know what was the actual panel's decision.

10:30 am – 12:00 pm: Practicing Ecosystem Health
Presenter: Gwen Griffith, Cumberland River Compact
Griffith's career as a veterinarian has spanned the gamut between work as an equine practitioner to her present position as the director of a watershed protection program, funded by the EPA and run by a regional nonprofit, the Cumberland River Compact. Griffith's career exemplifies the many paths one can forge as a veterinarian with a commitment to wildlife and ecosystem health.

12:00 pm: Lunch

1:00 – 4:00 pm*:* Media Training
Presenter: Rob Hilsenroth, American Association of Zoo Veterinarians
Hilsenroth will advise students on how and when to work with the print and broadcast media to convey conservation messages and communicate about environmental crises. Students will have a chance to practice interview techniques. Students will practice media skills in group activities and on camera.

4:15 – 5:45 pm: Finding and Forging a Path
Presenter: Ted Mashima, American Association of Veterinary Medical Colleges

Successful careers for wildlife and ecosystem health practitioners depend on non-clinical competencies in communication (interpersonal, oral, written), networking, management, leadership, adaptability, negotiation, and facilitating mentor relationships. Mashima, a ACZM-board certified veterinarian with a breadth of experience in mentoring students, will offer insight and guidance on how to gain these skills throughout your career.

7:00 pm: Dinner

Sunday June 27 – FREE DAY!!

Monday June 28, 2010 - WILDLIFE AND ECOSYSTEM HEALTH POLICY

7:00 am: Breakfast; turn in Group Project Part II by 8 am

8:00 – 10:15 am: The Role of Government and Policy in Wildlife and Ecosystem Health
Presenter: Dean Goeldner, Congressional Agriculture Committee Staffer

Based on many years working as a veterinarian in both the legislative and executive branches of the United States government, and in the Governmental Affairs Office of the American Veterinary Medical Association, Dr. Goeldner will talk about how lawmaking works, and how and when veterinarians play a critical role.

10:30 – 12:00 pm: Scientific Citizenship - Translating Research into Action
Presenter: Patricia Conrad, UC Davis School of Veterinary Medicine.

Conrad, a veterinary parasitologist, is committed as a scientist to make sure her research is relevant to human, animal and ecosystem health, providing much-needed information for decision-makers. She has taken this commitment one step further by seeking special training in communicating science. She'll share her thoughts and experiences.

12:00 pm: Lunch

1:00 – 2:45 pm: Citizenship – Exercising Environmental Rights under the Law
Presenter: Thomas Dawson, Wisconsin Department of Justice.

Dawson will shed light on some of the country's most powerful environmental laws, discuss their limitations, and be frank about the motivations of the legal profession, corporate America, and conservationists in using courts of law to wage environmental battles. He'll inspire us all to exercise our rights as citizens to participate in the democratic process and use the law to achieve our goals.

3:00 – 4:30 pm: Civil Upheaval and War
Presenter: Mishkat Al-Moumin, Futrell Visiting Scholar, Environmental Law Institute

Al-Moumin, former Iraqi Minister of the Environment, will describe how poverty, violence, civil upheaval and war are causal of, *and caused by*, ecosystem degradation. Poverty, corruption, religious and tribal conflict, and limited access to resources can lead to cruel

governance, spark civil unrest, and cause war. Such civil violence then exacerbates human pressures on the environment. Al-Moumin will wrap up with a case study on the "ecocide" of wetlands in southern Iraq.

4:30 – 6:30: Group Project Part III work time

7:00 pm: Dinner

Evening: How to effectively work with difficult people and resolve conflicts
Presenter: Kelly Williamson, White Oak Conservation Center and White Oak Plantation

The ability to communicate effectively affects every aspect of a person's life. As well, interpersonal and intragroup conflict presents problems for many people, and the resulting stress often spills over into their lives outside of work. This session is geared towards students to help them recognize their effectiveness in communicating with others, and understand sources of, and common reactions to, conflict in the workplace.

<u>Tuesday June 29, 2010</u> CASE STUDIES IN ECOSYSTEM HEALTH

7:30 am: Breakfast

8:30 – 9:45 am: From Honeybees to Rhinoceros: Conservation engages all forms of life
Presenter: Robin Radcliffe, Cornell University and the International Rhino Foundation

Radcliffe's work focuses on the health and conservation of rhinoceros species around the globe, yet his interest in finding sustainable conservation solutions is broad-based. He will compare and contrast significant conservation challenges facing two seemingly disparate taxonomic organisms: the tiny honeybee on one end of the size scale and the megavertebrate rhinoceroses on the other.

10:00 am – 12:00 pm: African Elephants: Saving an Iconic Species from Overpopulation
Presenter: Mark Stetter, Disney Animal Programs

Stetter will describe his collaborative work to assist wildlife managers in South Africa with the problem of elephant overpopulation in parks and reserves by developing techniques for surgical sterilization of free-ranging elephants in the field

12:00 pm: Lunch

1:00 – 2:30 pm: The Mountain Gorilla One Health Program
Presenter: Mike Cranfield, UC Davis and Mountain Gorilla Veterinary Project, Inc.

As the Director of the Mountain Gorilla Veterinary Project and Co-Director of the Mountain Gorilla One Health Program, Cranfield is closely involved with addressing the complex human health and welfare issues surrounding the conservation of mountain gorillas, including the vital role that ecotourism plays in protecting the species from extinction, as well as the critical role that veterinary medicine plays in ensuring the sustainability of the species.

2:45 – 4:00 pm: Role of the wildlife veterinarian in species conservation efforts

Presenter: Dave Hunter, Turner Enterprises, Inc. and Turner Endangered Species Fund

Hunter spent the first part of his career as a wildlife veterinarian working for state wildlife agencies in California and Idaho, and now serves as head veterinarian for the domestic and wild animal populations living on Ted Turner's ranches in North and South. His experiences as a wildlife veterinarian range from darting bighorn sheep to negotiating park boundaries in foreign countries.

4:00 – 6:30 pm: **Group Project Part III work time**

7:00 pm: Dinner at the Pavilion

<u>Wednesday June 30</u> PROJECT PRESENTATIONS

9:00 am – 12:00 pm: **Group Project Presentations**

12:00 pm: Lunch

1:00 – 3:00 pm: Pack up

3:00 pm: Depart White Oak ☹; drive to St. Catherines Island ☺

5:00 to 7:30 pm: Depart dock, boat to island; set up camp upon arrival.

7:30 to 9 pm: Dinner; brief introduction to our St. Catherines Island unit.

<u>Thursday July 1</u> ST. CATHERINES ISLAND

6:30 to 7:30 Breakfast

8:00-10 am: Field Exercise: Avian disease surveillance
Instructors: Jen Hilburn, Brad Winn, Felicia Sanders, Terry Norton, Al Segars, Kirsten Gilardi, Veronica Greco, and Val Beasley

Students will get hands-on experience in setting up avian mist nets, removing captured birds from nets, and processing captured birds (handling, banding, physical exam, bleeding), and will learn about how these techniques are used to survey free-ranging bird populations for disease.

10:00-10:30 Break and transport to beach

10:30-11:45 am: Field Demonstration: Shorebird Conservation and Capture
Instructors: Winn, Sanders, Norton, Hilburn, and Greco

Students will help set up a cannon net and learn about how these nets are used to capture shorebirds, and shorebird conservation efforts along the GA coast

12:00-1:00 pm: Lunch

1:00-2:00 pm: Introduction to Map Reading
Instructor: Tim Keith-Lukas, University of the South
Students will learn how to read maps and chart paths, and to use a compass and a hand-held GPS unit.

2:00 - 4:00 pm: Field Exercise: Orienteering
Instructors: Norton, Gilardi, Beasley, Lukas, Segars
Students will test their new knowledge of maps and navigational aids by forming teams and going on an ecological "treasure hunt" through the woods.

4:30 – 5:30 pm: OPTIONAL: Reptile trapping
Instructors: Kimberly Andrews, Chris Hagen, Jess Gonyer, and John Jensen
Interested students help biologist set traps for reptiles and amphibians.

6:00 pm: Dinner

7:30 - 8:30 pm: Cultural History of St. Catherines Island
Instructor: Royce Hayes (St. Catherines Island)
Superintendent Hayes will take us to an archaeological site on the island and tell us about the rich history of the settlement of St. Catherines Island hundreds of years ago.

8:30 - 10:30 pm: OPTIONAL: Nightlife on St. Catherines Island
Instructors: Norton, Segars, Andrews, Hagen, Jensen
Students will learn to identify amphibian calls, locate amphibians and alligators at night, and then we'll check out bioluminescence at the beach.

<u>Fri July 2</u> ST. CATHERINES ISLAND

7:00 am: Breakfast

8:00 - 9:30 am: Field Demonstration: Reptile and Amphibian Capture Techniques
Instructors: Hagen, Andrews, Norton, Segars, Gonyer, Jensen
Students will observe various traps and techniques for sampling reptile and amphibian populations, and will help biologists check traps set the night before for reptile and amphibian captures.

10:00 am -12:00 pm: **Field Exercise: Telemetry**
Instructors: Keith-Lukas, Gilardi, Inman, and Beasley
Students will use radiotelemetry receivers and antennae to locate troops of lemurs that are free-ranging on St. Catherine's Island.

12:00 pm: Lunch

1:00-1:45 pm: Gopher Tortoise Conservation on St. Catherines Islad
Instructor: Norton

An overview of St. Catherines Island's translocated gopher tortoise population.

2:00-5:00 pm: Field Exercise: Gopher Tortoise Health Assessment and Conservation
Instructors: Norton, Segars, Hagen, Andrews, Gonyer, Jensen, Greco

Students will conduct annual health assessments on the St. Catherines Island gopher tortoise population, which was established with a translocation effort from the mainland more than 10 years ago. Students will learn about diseases of free-ranging tortoises, gopher tortoise ecology and breeding biology, and free-ranging gopher tortoise management in the southeast. Some instructors may need to leave but we will give students the time they need to process their tortoises.

4:30 - 6:30 pm: Free time on island

6:30 pm: Dinner; evening free

<u>Saturday July 3, 2010</u> ST. CATHERINES ISLAND

7:00 am: Breakfast

8:00 - 10:00 am: Field Demonstration: SCI Sea Turtle Nest Protection Program
Instructors: Gayle Bishop, Norton, Segars

Students will learn about the loggerhead sea turtle nest protection program at St. Catherines and will (hopefully!) have a chance to help find and relocate a sea turtle nest to higher ground.

10:00: Pack up, pack a box lunch

11:00 am: Depart St. Catherines Island

Afternoon: **Tour of the Georgia Sea Turtle Center on Jekyll Island, lunch on the go.**

3:00 pm: Drive to Fort Pierce

Sunday July 4: U.S. Holiday; Day Off

Monday July 5: **Start Session II at Harbor Branch Oceanographic Institute**

Issues and Techniques for the Developed World with Outreach to Developing Countries
Aquatic Wildlife and Ecosystem Health
Florida Atlantic University's Harbor Branch Oceanographic Institute
Fort Pierce, Florida, USA
July 3-19, 2010
---- FINAL SCHEDULE of 1/July/2010 ----

On July 3, Envirovet students and Dr. Beasley will drive from St. Catherines Island to the Georgia Sea Turtle Center on Jekyll Island Georgia, and after visiting there, to Fort Pierce and Florida Atlantic University, Harbor Branch Oceanographic Institute (FAU/HBOI).

Unless given notice to the contrary, all students as well as faculty from outside the area will be housed at *Sandhurst Hotel & Suites*, in *Fort Pierce*. Nevertheless, to gain access to FAU/HBO, everyone apart from FAU/HBOI faculty members will need to check in at the Security Guard Post at the front gate and obtain security badges. For emergencies, FAU/HBOI staff will be on call. However, please speak with Dr. Beasley in case of any emergency.

Arrival and Check-in, Holiday Weekend, Introduction to the Facilities
Except as Noted Below: Breakfasts at Harbor Branch will be from 7:00 to 7:45 AM in the Cafeteria Each Day.

Except for July 3, nearly all the time that we are at FAU/HBOI, students will have access to the computer lab in the education building if needed. The door code for the computer lab will be in each FAU/HBOI information packet. Also, a FAU/HBOI staff member will be available much of the time.

July 4 will offer students some time to relax immediately before the intensive aquatic unit to come. There will be opportunities for the group to have an informal learning excursion on July 4 and July 12. Students who wish to do some shopping must plan to get it out of the way on one or both of those days.

Saturday, July 3 Arrive at Sandhurst Hotel & Suites in the early evening and settle into housing.

7:00 PM: Dinner. Envirovet will provide food at hotel or nearby.

8:00 PM: Free.

Sunday, July 4 **Note: No FAU/HBOI education staff will be present on site during July 4th.**

9:00 AM: Envirovet will provide transportation to groups of people to one or more venues. Breakfast on your own.

10:30 AM -- 1:00 PM: Options: Park exploration, beach, or shopping. Envirovet will provide transportation to groups of people.

1:00 – 2:15 PM: Envirovet will provide transportation to groups of people to a suitable venue. Lunch on your own.

2:15 – 4:30 PM: Options: Rest at housing, park exploration, or snorkeling at your own risk (disinfected equipment provided by FAU/HBOI will be available at the hotel for this day), or shopping. Envirovet will provide transportation to groups of people.

5:00 – 6:00 PM: Relax, shower.

6:00 – 7:00 PM: Pizza and Salad Dinner – provided by Envirovet either at the hotel or a local restaurant.

7:00 PM: **Envirovet will provide transportation for an evening gathering on the Indian River Lagoon to see a classical Independence Day fireworks display.**

Monday, July 5

7:00 – 8:00 AM: Meet in the lobby of the Education Center for the **opening breakfast**.

8:00 – 8:30 AM: ***Formal Welcome to FAU/HBOI, History of the Institution, Key Personnel, Some of What to Expect.*** Dr. Dennis Hanisak, Director, and Mrs. Brandy Nelson, educators, of the FAU/HBOI Marine Education Unit, and Dr. Val Beasley, Envirovet Program in Wildlife and Ecosystem Health, College of Veterinary Medicine, University of Illinois, Urbana, Illinois.

Assessing and Restoring Freshwater, Estuarine, and Marine Ecosystem Health

8:30 – 10:30 AM: ***Tour of the FAU/HBOI Campus and Submarine Facility***. Mr. James Nelson, FAU/HBOI Marine Operations, and Mrs. Nelson, Ms. Tracy Griffin, and Ms. Kristy McKee, all of the FAU/HBOI Marine Education Unit.

10:45 AM – Noon: ***Freshwater and Marine Ecology*****:** ***Watersheds, hydrology, tides, basic energetics, nutrient flows, human uses of water and salt water intrusion.*** Dr. Scott Haskell, Veterinary Technology Program, Yuba Community College, Marysville, California.

Noon – 100 PM: Lunch.

1:00 – 3:00 PM: ***Freshwater and Marine Ecology*****:** ***Mixing of freshwater and saltwater, where it occurs globally and how salinity and temperatures are affected. Major factors that structure the biodiversity of estuarine,***

coastal, and deeper water marine ecosystems from the equator to the poles. Dr. Haskell.

3:00 – 4:00 PM: ***Water Quality and Microbial Ecology*****.** Dr. Andy Stamper, *Disney* Living Seas, Orlando, Florida.

4:00 – 6:00 PM: ***Principles of Ecosystem Management; and Everglades Ecological Restoration as a Case Study.*** Dr. Rebekah Gibble, US Fish & Wildlife Service, Loxahatchee National Wildlife Refuge, Boynton Beach, Florida.

6:00 – 7:00 PM: Dinner.

7:00 – 8:00 AM: Free.

<u>Tuesday, July 6</u>

8:00 – 9:00 AM: ***Coral Structure, Nutrition, and Ecology.*** Dr. Josh Voss, Marine Science Department, FAU/HBOI.

9:00 – 10:00 AM: ***Coral Hatchery.*** Mr. Dustin Dorton, President, Oceans, Reefs, and Aquariums, FAU/HBOI, Drs. Voss and Stamper, and Dr. Edwin Hernández-Delgado, Coral Reef Research Group, Center for Applied Tropical Ecology and Conservation, University of Puerto Rico, San Juan, Puerto Rico.

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10:00 – 11:00 AM: ***Broad Overview of Coral Diseases. Nutrients, Algae, Cyanobacteria, Other Bacteria, Viruses, Toxins, Elements, Manmade Chemicals, Elevated Temperatures: Their Sources and Their Individual and Interactive Effects on Coral Species and on Reef Health/Sustainability.*** Dr. Voss.

11:00 AM – Noon: ***Molecular Methods Used in Diagnostic and Mechanistic Studies of Coral Disease.*** Dr. Voss.

Noon – 1:00 PM: Lunch.

1:00 – 2:00PM: ***Acidification of Marine Environments: Extent, Trends, and Projected Impacts.*** Dr. Stamper.

2:00 – 4:00 PM: ***Smithsonian Marine Ecosystems Exhibit in Ft. Pierce: Tour including multiple species of coral in mixed species exhibits, featuring the Oculina deep water coral, aspects of ecology and biology, as well as saltwater aquarium management for displays and research***. Smithsonian scientists, Mrs. Nelson, Drs. Voss, Stamper, and Dr. Hernández-Delgado.

4:30 – 5:30 PM: ***Coral Reefs In A Crystal Ball Under Climate Change: Long-Term Impacts, Lessons Learned, Management Alternatives.*** Dr. Hernández-Delgado.

5:30 – 6:30 PM: Dinner.

6:30 – 7:30 PM: ***Coral Reef and Estuarine Rehabilitation.*** Dr. Hernández-Delgado.

7:30 – 8:30 PM: ***Coral Reef and Estuarine Rehabilitation – Community Involvement.*** Dr. Stamper.

Wednesday, July 7 **NOTE: Breakfast from 6:30 – 7:30 AM Today.**

7:30 – 8:00 AM: ***Plans for Morning Field Exercises. What We Will be Looking for, Seeing, and Measuring: How and why we will make these observations and assessments.*** Mrs. Nelson, Drs. Hanisak, Beasley, and Haskell and Dr. Jim Masterson Of FAU/HBOI.

8:00 AM – Noon: ***Environmental and Ecological Assessments and Sampling. Comparisons of water quality parameters, plankton, nekton, macrophytes, and macro-invertebrates in the water column and benthic zones of clean and contaminated areas. Sampling water and sediments for toxicologic analyses.*** Students will be split into groups and rotate through all components. Mrs. Nelson, Ms. Griffin, Dr. Masterson, and FAU/HBOI Marine Botany staff, Drs. Hanisak, Stamper, Haskell, and Beasley, and Dr. Matt Allender, College of Veterinary Medicine, University of Illinois, Urbana, Illinois.

Noon – 1:00 PM: Lunch.

1:00 – 3:00 PM: ***Laboratory: Husbandry and Examination Methods for Marine Specimens Collected from the Field.*** Drs. Davidson, Haskell, Stamper, Masterson, and Allender, and Mrs. Nelson.

3:00 – 4:00 PM: ***Open and Semi-open Aquaculture Systems Used to Produce Invertebrates for Human Food. Differences among Species. Infectious and Toxicologic Diseases in Production Systems.*** Dr. Jeff Davidson, Atlantic Veterinary College, Prince Edward Island, Canada.

4:00 – 5:00 PM: ***Form, Function, and Some Major Health Problems of Bivalves. Management of Ecosystems for their Health and Long-term Sustainability.*** Drs. Davidson and Haskell.

5:00 – 6:00 PM: Dinner.

Evening: Free.

Thursday, July 8

8:00 – 11:30 AM: ***From the Water to the Mangroves to the Top of the Watershed: An Illustration of Ecological Communities, Stressors, Problems, and High- and Low-Tech Solutions.*** **Visit to a landfill, a sewage-treatment plant, and a "polishing marsh."** Drs. Hanisak, Haskell, Davidson, Beasley, and Allender, and Mrs. Nelson.

11:30 AM – 1:00 PM: Shower and then lunch.

1:00 – 2:00 PM: ***Form, Function, and Health Problems of Shrimp/Prawns. Management of Ecosystems for their Health and Long-term Sustainability.*** Dr. Davidson.

2:00 – 3:00 PM: ***Form, Function, and Health Problems of Horseshoe Crabs. Management and Ecosystem Rehabilitation for Sustainable Health of these Organisms in the Wild. Humane Treatment and Methods for Euthanasia of these Species.*** Dr. Allender.

3:00 – 4:00 PM: ***Form, Function, and Health Problems of Sea Urchins. Management and Ecosystem Rehabilitation for Sustainable Health of these Organisms in the Wild. Humane Treatment and Methods for Euthanasia of these Species.*** Dr. Haskell.

4:00 – 5:00 PM: ***Invasive Species, Impacts on Aquaculture Systems, Management and Prevention.*** Dr. Davidson.

5:00 – 6:00 PM: Dinner.

6:00 – 8:30 PM: ***Laboratory: Comparative Anatomy, Bleeding of Aquatic Invertebrates, Hematology, Euthanasia, Necropsy Methods, Morphology and Health Assessments.*** Drs. Davidson, Haskell, and Allender, and Dr. Kat Hadfield, National Aquarium, Baltimore, Maryland.

Morphology, Physiology, and Management of Fishes, Amphibians, and Aquatic Reptiles in Enclosed Systems and the Wild. Microbial, Parasitic, and Toxic Stressors. Island-Based Fish Anesthesia, Health Monitoring, and Diagnostic Sampling.

Friday, July 9

8:00 – 9:00 AM: ***Comparative Morphology of Fishes. Links to Fish Behavior, Ecology, and Reproduction, and Susceptibility to Environmental Change.*** Dr. Roy Yanong, Tropical Aquaculture Laboratory, Fisheries and Aquatic

Sciences, Institute for Food and Agricultural Sciences, University of Florida, Ruskin, Florida.

9:00 – 11:00 AM: ***Comparative Physiology, Metabolism, and Pharmacokinetics/Toxicokinetics in Fishes. Cardiorespiratory and Renal Physiology. The gill as a respiratory, metabolic, and excretory organ. Phase I and Phase II metabolism by fishes. Influence of body size, temperature, and other environmental variables on xenobiotic fate in fishes.*** Dr. Kevin Kleinow, Louisiana State University, Baton Rouge, Louisiana.

11:00 AM – Noon: ***Generalized Stress Responses in Confined Fishes. Impacts of temperature, crowding, biological oxygen demand, and ammonia cycle. Case histories.*** Dr. Hadfield.

Noon – 1:00 PM: Lunch.

1:00 – 2:00 PM: ***Physical Examination Methods for Fishes.*** Dr. Hadfield.

2:00 – 3:00 PM: ***Important Viral and Bacterial Diseases of Fishes Related to Environmental Management* (*Restocking, Introductions of Exotic Species, Nutrient Loading, Water Quality Problems, Pathogen Pollution*) . *Case histories.*** Drs. Hadfield.

3:00 – 4:30 PM: ***Fish Parasitology and Ecosystem Health, Part I – Metazoan Parasites of Fishes. How Environmental Change Can Influence Parasitic Diseases.*** Dr. Yanong.

4:30 – 6:00 PM: ***Fish Parasitology and Ecosystem Health, Part II – Protozoans, Microsporidia, and Myxosporea of Fishes. Pathogenesis and Major Diseases Caused by These Organisms. How Environmental Changes Can Influence Parasitic Diseases.*** Dr. Yanong and Dr. Jan Lovy, Atlantic Veterinary College. Prince Edward Island.

6:00 – 7:00 PM: Dinner.

Evening: Start working on Group Discussion for afternoon of July 14.

<u>Saturday, July 10</u>

8:00 AM -- Noon: ***Fish Collection Using Bag Seines and Boats off the Spoil Islands in the Indian River Lagoon. Blood Collection, Anesthesia, Euthanasia, Ante-mortem Sampling for Toxicology and Parasitology, Necropsy, and Tissue Collections for Histopathology, Parasitology, Microbiology, Virology, and Toxicology.*** Drs. Yanong, Allender, Kleinow, Lovy, and

Beasley, Mrs. Nelson, and Mr. Jerry Corsaut of the FAU/HBOI Aquatic Field Research Group.

Noon – 2:30 PM ***Box Lunch, plus shower and change of clothes and shoes.*** (Bathing & changing are not optional due to biosecurity issues).

2:30 – 4:30 PM: ***Tour of FAU/HBOI Closed Aquaculture Facilities for Culture of Expensive Food Fish***. Dr. Paul Wills and Ms. Amber Garr of the Aquaculture Research and Education Program of FAU/HBOI, and Drs. Yanong, Lovy, Kleinow, and Allender.

4:30 – 5:30 PM: ***Risks and Impacts of Intensive Semi-Open Aquaculture Culture Systems on Wild Fishes and Other Components of the Environment.*** Dr. Lovy.

5:30 – 6:30 PM: Dinner.

6:30 – 7:30 PM: ***Global Stressors and Outcomes on Aquatic Animals and Ecosystems.*** Dr. Kleinow.

7:30 – 8:30 PM: ***Debate, Discussion, and Visioning for the Future of Wild Fisheries and Aquaculture Addressing Two Questions*: *What Should Be Done and How Can We Get There?*** Envirovet 2009 students, and Drs. Lovy, Yanong, Kleinow, and Allender.

Sunday, July 11

8:00 – 9:00 AM: ***Comparative Morphology of Amphibians. Integumentary, digestive, respiratory, circulatory, digestive, urinary, and reproductive adaptations; and how these set the stage for infectious and toxicologic diseases.*** Dr. Allender.

9:00 – 10:30 AM: ***Amphibian Infectious Diseases and Anesthesia for Amphibians.*** Dr. Allender.

10:30 AM – Noon: ***Amphibian Declines and Eco-toxicology.*** Dr. Beasley.

Noon -- 1 PM: Lunch.

1:00 – 2:00 PM: ***Comparative Morphology of Aquatic Reptiles. Integumentary, digestive, respiratory, circulatory, digestive, urinary, and reproductive adaptations; and how these set the stage for infectious and toxicologic diseases.*** Dr. Allender.

2:00 – 3:00 PM: ***Diseases of Aquatic Reptiles - Turtles, Snakes, and Crocodilians.*** Dr. Allender.

3:00 – 6:00 PM: ***Dissection Lab: Frogs, Salamanders, and Aquatic Chelonians, Aquatic Snakes, and an Alligator.*** Dr. Allender.

6:00 – 7:00 PM: Dinner

Evening: Free.

Monday, July 12

Day Off: Rest Up. ***Optional Ecological and Cultural Tour: Billie Swamp Safari and Ah-Tah-Thi-Ki Museum on the Big Cypress Seminole Indian Reservation at the north edge of the Everglades.***

Introduction to Ecological Pharmacology and Toxicology

Tuesday, July 13

8:00 – 10:00 AM: ***Introduction to Ecotoxicology.*** Dr. Beasley.

10:00 – 11:00 AM: ***Cyanobacterial (Blue-Green Algal) Toxins: Freshwater and brackish sources, principal effects of and countermeasures for animals exposed to cyclic peptide hepatotoxins (microcystins and nodularin) and the neurotoxins, anatoxin-a, anatoxin-a(s), and saxitoxin in birds and mammals.*** Dr. Beasley.

11:00 AM – Noon: ***Marine Phycotoxins: Estuarine and marine sources, and principal effects of saxitoxins, domoic acid, and brevetoxins in birds and marine mammals.*** Dr. Beasley.

Noon – 1:00 PM: Lunch.

1:00 – 2:00 PM: ***Background on the Endocrine System and Endocrine Disruptors.*** Dr. Heather Hamlin, University of Florida, Gainesville, Florida.

2:00 – 3:00 PM: ***Case Studies of Endocrine Disruption in Fishes.*** Dr. Hamlin.

3:00 – 5:00 PM: ***Endocrine Disruption in Alligators and other Vertebrates.*** Dr. Louis Guillette, University of Florida, Gainesville, Florida.

5:00 – 6:00 PM: Dinner.

Evening: Continue working on Group Discussion for afternoon of July 14.

Wednesday, July 14

8:00 – 10:00 AM: ***Mutagenesis, Tissue Damage, and Other Mechanisms & Manifestations of Carcinogenesis in Wildlife.*** Dr. Daniel Martineau. Canadian Cooperative Wildlife Health Center (Quebec region), Département de Pathologie et Microbiologie Vétérinaire, Faculté de Médecine Vétérinaire, Université de Montréal, St. Hyacinth, Quebec, Canada.

10:00 – 11:00 AM: ***Comparative Morphology, Physiology, and Life Histories of Water Birds (gulls, terns, related birds, waterfowl, aquatic-feeding raptors, penguins, and other sea birds).*** Dr. Michael Fry, American Bird Conservancy, Washington, DC.

11:00 AM – Noon: ***Contaminants and Wild Birds, Part 1.*** Dr. Fry.

Noon – 1:00 PM: Lunch.

1:00 – 2:00 PM: ***Contaminants and Wild Birds, Part 2.*** Dr. Fry.

2:00 – 3:00 PM: ***Drug Discovery from Marine Organisms.*** Dr. Peter McCarthy, FAU/HBOI

3:00 – 4:30 PM: ***Group Discussion: Students Meet to Refine Specific Plans to Get Toxicologic and Ecotoxicologic Insult Behind Us. Group 1 will address regional agricultural concerns in a developed country; Group 2 will address a major metropolitan area of a developed country; Group 3 will address either mining or petroleum in a developing country; and Group 4 will develop a program for the Earth to be proposed to a World Conference of National Political Leaders on Effective Methods to Prevent Ecotoxicologic Impacts through Prevention and Clean Up Efforts. Work up a power point presentation for the group to be presented by at least two members of the group.***

4:30 – 5:30 PM: ***Ten-Minute Student Presentations, Plus 5 Minutes Each for Discussion.***

5:30 – 6:00 PM: Faculty and students provide feedback.

6:00 – 7:00 PM: Dinner.

Evening: Free.

Thursday, July 15

Major Infectious, Parasitic, and Toxic Diseases of Waterbirds and Raptors.

8:00 – 9:00 AM: ***Virology Update and Why RNA Viruses are so Often Involved in Emerging and Re-emerging Diseases.*** Dr. Daniel Martineau, Canadian Cooperative Wildlife Health Center (Quebec region), Département de

Pathologie et Microbiologie Vétérinaire, Faculté de Médecine Vétérinaire, Université de Montréal, St. Hyacinth, Quebec, Canada.

9:00 – 11:00 AM ***Disease Emergence in Wild Birds: A Focus on Waterfowl and Raptors.*** Dr. Milton Friend, US Geological Survey, National Wildlife Health Center, Madison, Wisconsin.

11:00 AM – Noon: ***Avian Influenza - Overview of the Risks of a Serious Pandemic, Countermeasures, and Communications. Implications for Developed and Developing Countries.*** Dr. Justin Brown, Southeast Cooperative Wildlife Disease Study, College of Veterinary Medicine, University of Georgia, Athens, Georgia.

Noon – 1:00 PM: Lunch.

1:00 – 3:00 PM: ***Wildlife Conservation and Wildlife Health.*** Dr. Friend.

3:00 – 4:00 PM: ***Whooping Cranes – Endangered Species Introductions.*** Dr. Marilyn Spalding. College of Veterinary Medicine, University of Florida, Gainesville, Florida.

4:00 – 5:00 PM: ***Waterbird Diseases – Creating New Niches.*** Dr. Spalding.

5:00 – 6:00 PM: Dinner.

6:00 – 7:00 PM: ***Mercury in the Everglades.*** Dr. Spalding.

Friday, July 16

8:00 – 10:00 AM: ***Avian Influenza Workshop.*** Dr. Brown.

10:00 – 10:30 PM: ***Flamingo Die-offs in East Africa.*** Dr. Beasley.

10:30 AM – 1:00 PM: ***Avian Necropsy Laboratory. Examination of a range of bird species that died in the field due to a wide array of stressors.*** Drs. Brown, Martineau, Spalding, Allender, Friend, and Beasley.

1:00 – 2:00 PM: Lunch.

Marine Mammals: Morphology, Physiology, Infectious and Toxicologic Diseases.

2:00 – 4:00 PM: ***Adaptive Anatomy and Physiology of Marine Mammals.*** Dr. Juli Goldstein, FAU/HBOI.

4:00 – 5:00 PM: ***Conservation of Highly Endangered Monk Seals.*** Dr. Alonso Aguirre, Wildlife Trust. New York, New York.

5:00 – 6:00 PM: ***Wildlife Trust and Other Efforts to Refine Conservation Research, Stewardship, and Education. Outreach and Educational Programs in Latin America.*** Dr. Aguirre.

6:00 – 7:00 PM: Dinner.

Evening: Free.

Saturday, July 17

8:00 – 9:00 AM: ***Bottlenose Dolphin Health Assessment Project.*** Dr. Gregory Bossart, Georgia Aquarium. Atlanta, Georgia and HBOI.

9:00 – 10:00 AM: ***Emerging Diseases of Marine Mammals.*** Dr. Bossart.

10:00 AM – Noon: ***Toxicology and Pathology of Beluga Whales in the St. Lawrence Estuary.*** Dr. Martineau.

Noon – 1:00 PM: Lunch

1:00 – 3:00 PM: ***Monitoring Arctic Marine Mammal Health. Working with Subsistence Cultures and Federal Agencies. Heavy Metals and Organohalogen Contaminants in Marine Mammals.*** Dr. Todd O'Hara, Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska.

3:00 – 5:00 PM: ***Manatees and Marine Mammal Conservation Medicine.*** Dr. Bossart.

5:00 – 6:00 PM: Dinner.

Evening: Free.

Sunday, July 18

8:00 – 9:00 AM: ***Global Research and Conservation Programs at the Georgia Aquarium.*** Dr. Bossart.

9:00 AM – 11 AM: ***Manatees: Threats and Management. An inside look at pathologic and forensic investigations, and a discussion on how findings influence management decisions.*** Dr. Martine de Wit, Florida Fish and Wildlife Conservation Commission, Marine Mammal Pathobiology Laboratory, St. Petersburg, Florida.

11 AM -- Noon: Early Lunch.

Noon – 3:00 PM: ***Necropsy Lab. Examination of a Range of Species of Marine Mammals that Died in the Field due to a Wide Array of Stressors.*** (Marine Mammal Necropsy Facility). Drs. Bossart, Martineau, de Wit, and Goldstein, with the HBOI Marine Mammal Group.

3:00 – 5:00 PM: Post Office Trip for Shipping things home.

5:00 – 5:30 PM: ***Aquatic Unit Wrap up Discussion*****:**

5:30 – 6:00 PM: **** Finish and Turn in Course Evaluations!!! ****

6:00 – 7:00 PM: Barbeque Dinner.

Evening: Free.

Monday, July 19

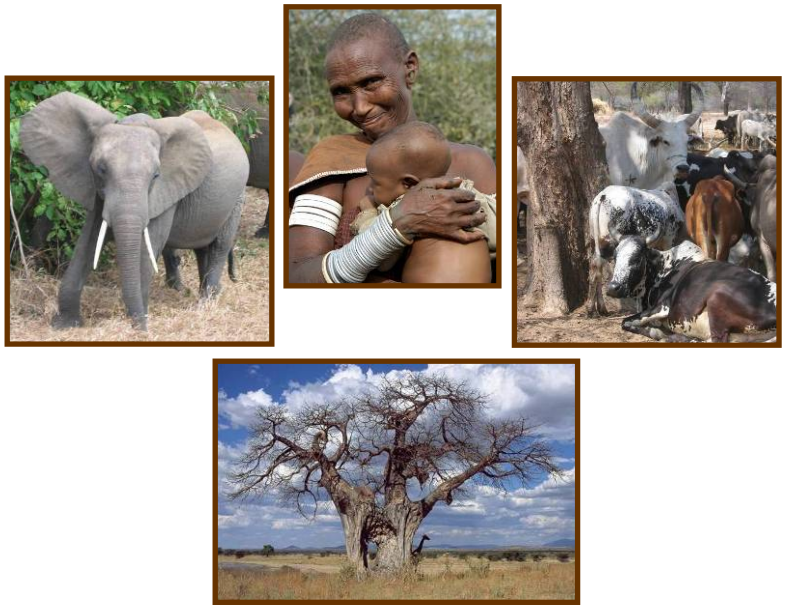
3:00 AM: Departure for West Palm Beach Airport en route to Dar Es Salaam, Tanzania.

Envirovet 2010 Developing Country Session

Terrestrial and Aquatic Wildlife and Ecosystem Health Issues and Techniques for Developing Countries

The United Republic of Tanzania, EAST AFRICA

20 July 2009 – 10 August 2010



Session Organizers:

Faculty of Veterinary Medicine, Sokoine University of Agriculture, Morogoro, TANZANIA
Wildlife Health Center, University of California, Davis, CA, USA
Tanzania National Parks, Arusha, TANZANIA
Institute of Marine Sciences, University of Dar es Salaam, Zanzibar, TANZANIA
Wildlife Conservation Society, Ruaha Landscape Program, Iringa, TANZANIA

SESSION GOALS

- **Produce globally aware ecosystem and wildlife health professionals able to solve problems in diverse cultural contexts.**
- **Develop understanding of the conditions and constraints relevant to addressing health and conservation issues in developing countries.**
- **Allow participants to develop a professional network of colleagues and exchange ideas in a supportive environment.**

INTRODUCTION & COURSE OVERVIEW

The 2010 Envirovet Summer Institute Developing Country Session in Tanzania will provide Envirovet participants with opportunities to understand wildlife and ecosystem health issues through immersion in field-based activities and interactions with developing country citizens as well as professionals whose careers currently address relevant conservation, health and development challenges.

THEMES TO BE COVERED:

In order to maximize opportunities at multiple national parks, management areas, and community sites, this portion of the course will not be organized into strict modules. Instead the following themes will be introduced and then reinforced at many of the sites throughout the course.

Theme 1 - Health and Conservation at the Wildlife-Livestock-Human Interface (HCI)

Natural resource conflicts and disease transmission are most likely to occur at the spatial and temporal interface between human populations (with their domestic animals) and wildlife. Anthropogenic changes to our ecosystems are expanding this interface with often deleterious consequences for both people and wildlife. Envirovet students will explore critical issues by talking with and learning from case studies presented by researchers who are actively working to mitigate these problems; participating in field excursions to sites of wildlife-human conflict; talking with pastoralists living near a wildlife protected area; and participating in research activities to evaluate the prevalence of zoonotic diseases at the interface between wildlife, livestock and human populations.

Theme 2 - Challenges with Diagnosis, Surveillance and Control of Zoonotic and Emerging Infectious Diseases in Developing Countries (ZED)

Zoonotic pathogens account for the greatest number and the most serious emerging infectious diseases in people. Wildlife and domestic animals are an important part of the public health picture, as they provide a "zoonotic pool" from which diseases may emerge. We will explore the challenges to diagnosing, controlling and implementing surveillance programs for zoonotic and emerging infectious diseases in Tanzania. Diseases that will be highlighted include highly pathogenic avian Influenza, Rift Valley fever, rabies, and bovine tuberculosis, with an emphasis on current research and innovative methods being developed in Tanzania for diagnosis and surveillance.

Theme 3 – Wildlife Health and Conservation Challenges in Protected Areas (CPA)

Approximately 25% of Tanzania's land lies inside protected areas. Despite this significant achievement, Tanzania's biological diversity remains threatened. Envirovet participants will learn about the health and conservation challenges faced by professionals working in Tanzanian National Parks. They will participate in projects addressing some of these issues in Udzungwa and Ruaha National Parks. By visiting two parks, participants will have the opportunity to compare and contrast the challenges facing these parks. Additionally, participants will learn about new initiatives that have created community based wildlife management areas. The course will include field exercises within the newly created Pawaga-Idodi Wildlife Management Area, and discussions of pros and cons of community-based conservation initiatives with Tanzanians

actively working in the field. The benefits and problems associated with ecotourism and cultural tourism will also be discussed. Finally, challenges and recent successes in the conservation of Zanzibar's indigenous forests and mangroves will be highlighted in a visit to Jozani Chakwa Bay Conservation Area.

Theme 4 – Health and Conservation Policy at the National and Global Level (POL)
National and international conventions and policies affect conservation in developing countries. Political, legal and policy implications arising from case studies about the drying of the Great Ruaha River and community-based conservation will be discussed. Participants will also gain familiarity with Tanzanian laws and policies regarding the environment, wildlife, and veterinary medicine.

Theme 5 – Threats to Tropical Fresh Water and Marine Ecosystems (FWM)
Tanzania's incredible biodiversity depends on the health of its freshwater and marine ecosystems. Tanzania has more inland waters than any other country in Africa. In addition, it has 1424 km of Indian Ocean coastline, plus the waters of the Zanzibar and Mafia Island archipelagos. The health and ecosystem services of Tanzania's freshwater ecosystems are severely strained by the needs of Tanzania's human population. We will highlight these issues by closely studying the 15-year conservation crisis of the Great Ruaha River. The history and consequences of the drying of the Great Ruaha River will be presented in a detailed case study. Pollution problems and the latest research in freshwater and marine ecosystems will be highlighted through discussions and field exercises at Sokoine University of Agriculture and the Institute for Marine Sciences on Zanzibar. Coral health, innovations in mariculture, and community-based sustainable use programs will be examined and discussed.

Envirovet Summer Institute - Developing Country Session

Tuesday July 20 – Tuesday August 10, 2010

The United Republic of Tanzania

Schedule

***Please note that exact times, activities, and speakers are subject to change.**

Tuesday July 20-Day 1 ARRIVAL DAY

3:20 pm: Most participants arrive Dar es Salaam. (Emirates Air)

4:30-6:45 pm: Time to rest and settle into lodgings (Landmark Hotel)

7:00 pm: Dinner and brief orientation

Wednesday July 21-Day 2 TRAVEL TO IRINGA

7:15 am: Breakfast (have luggage packed on cars prior to breakfast)

8:00-11:30 am: Travel to Morogoro

11:30 am: Lunch buffet, SUASA Club, Morogoro

12:15 pm: Welcome & Opening of Envirovet Course
Presenter: Rudovick Kazwala, Professor of Veterinary Medicine and Public Health, Sokoine University of Agriculture (SUA), Co-director Envirovet Tanzania

Kazwala, an Envirovet 2007 alumnus, will officially open the Envirovet Tanzania session, welcome participants to Tanzania and share his thoughts about the Envirovet experience.

1:00-6:00 pm: Travel from Morogoro to Iringa**.**

Participants will pass by Mikumi National Park, Udzungwa National Park and Baobob Valley on their way to the Southern Highlands of Tanzania. Points of interest along the way will be highlighted.

6:00-7:00 pm: Arrive and settle into lodgings at Riverside campsite. Laundry opportunity.

7:00 pm: Dinner

7:30-8:00pm: Introduction to Envirovet Summer Institute Developing Country Session
Presenter: Deana Clifford, Co-Director Envirovet Tanzania, Wildlife Veterinarian, California Department of Fish and Game & Research Associate, UC Davis Wildlife Health Center (UCD WHC)

Clifford will walk students through the schedule for our 3 weeks in Tanzania, orienting students to course logistics and travel in Tanzania.

<u>Thursday July 22 – Day 3</u> IRINGA – IMPROVING LIVESTOCK & LIVELIHOODS (POL/HCI/CPA)

7:30 am: Breakfast

8:30 am: Depart Riverside camp for Uhambingeto village (meet EI staff in Iringa at 9am)

10:00 am-1:30 pm: Village Visit: Community-level sustainable development using appropriate technologies to improve health and livelihoods
Leader: Andy Sharpe, Emmanuel International (EI)

Participants will visit Uhambingeto Primary school to learn about EI's rainwater harvesting and health education program for students. We will discuss the benefits and challenges associated with this project and see the various elements of the rainwater harvesting system, the latrines, and the hand washing facilities that are an integral part of improving student health and welfare. Additionally we will discuss key issues such as local sources of water, water quality, the challenges of obtaining firewood for cooking, the use of fuel efficient stoves, and solar power possibilities with EI staff and community members during a home visit.

1:30 pm: Return to Iringa (packed lunches)

3:00-5:30 pm: Visit to Kibebe Farm, Iringa
Leaders: Richard and Victoria Phillips
Participants will tour a high-input dairy farm with the owners, Richard and Victoria Phillips. The Phillips will discuss challenges relating to biosecurity, delivery of veterinary services, marketing their products and disease threats. They will also discuss their philosophy of raising livestock while protecting the natural environment.

6:30 pm: Dinner

7:15-8:15 pm: Bird Diversity, Conservation and Health in Tanzania
Presenter: Neil and Liz Baker**,** Tanzania Bird Atlas
Baker will give an overview of the incredible bird diversity that Tanzania has to offer and discuss the conservation importance of Tanzania's important bird areas. Current surveillance efforts for highly pathogenic avian influenza in Tanzania's wild birds will be highlighted. Liz Baker will discuss producing a Swahili language field guide to Tanzania's birds.

<u>Friday July 23 – Day 4</u> DISEASE AND LIVELIHOODS (ZED/HCI/CPA/POL)

7:00 am: Breakfast

8:00 am: Depart Riverside camp

8:30-10:00 am: Project Visit - Control and Surveillance for Zoonotic Diseases and Diseases of Economic Importance in Livestock
Presenters: Dr. Hamza Mwamhehe and Dr. Hilda Mrema, Veterinary Investigation Centre-Iringa (Location: Village near Iringa)

Mwamhehe and Mrema will highlight the economically important and zoonotic diseases that are priorities for surveillance and control in Tanzania in the village setting. They will also discuss the role of government in veterinary disease surveillance and the specific role of the VIC Iringa. Students will a\have the first-hand opportunity to observe an expanding village poultry operation and see how the VIC's initiatives to improve poultry health are positively impacting livelihoods.

10:45 – 11:30 am: Participants will tour facilities of the Veterinary Investigation Centre in Iringa.

11:30-1:30 pm: Lunch & Workshop Tour: Neema Crafts
Leaders: Neema Crafts staff

Neema Crafts provides opportunities for disabled Tanzanians by employing and teaching disabled people the skills to make unique ecologically-conscious crafts. Participants will tour the workshop, learning about this innovative project, interact with the staff, and have a chance to sample Neema Café's famous ice cream.

1:30-2:30 pm: Integration of Concepts – Health and Economic Challenges Faced by Pastoralists
Presenter: David Mutekanga, Assistant Director, Wildlife Conservation Society Ruaha Landscape Program (Location: Neema Crafts Conference Room)

In preparation for our visit to pastoralist households, Mutekanga will discuss the health and economic challenges faced by pastoralist households. Water limitations, access to markets for livestock products, livestock diseases, access to veterinary and human health care services will be discussed. Participants are encouraged to formulate some questions to ask the pastoralist household that will be visited the following day.

2:30-6:00 pm: Afternoon free to explore the Iringa Market and town-life (Shuttles back to Riverside will be provided).

** **LAST SHUTTLE LEAVES FROM NEEMA CRAFTS AT 6:00 PM SHARP****

6:30 pm: Dinner

7:30 pm: Environmental Education in Rural Communities near Ruaha National Park
Leader: Jackson Ngowi, Program Manager, Friends of Ruaha Society (FORS)

Ngowi will explain the mission of FORS and highlight their programs aimed at improving environmental awareness in schoolchildren and communities living near Ruaha National Park, and incorporating environmental education into school curricula. "Maji ni Uhai", an innovative environmental education film produced by FORS will be shown afterwards.

<u>Saturday July 24 – Day 5</u> CULTURE AND LIVELIHOODS (HCI)

7:00 am: Breakfast (pack luggage and prepare to leave Iringa)

8:00 am: Depart Riverside camp

8:30 am-12:00 pm: Field Trip Isimila Stone Age Site *(Pack lunch)*
Isimila is one of Africa's richest Stone Age sites; excavations have uncovered thousands of stone tools dating from about 60,000 years ago (Acheulian period). Over time the Isimila River has also created a beautiful canyon with natural sandstone pillars. Participants will learn about the historical significance of this site, hike through the canyons with a trained guide and visit the museum.

12:00-2:00 pm: Travel from Isimila to Malinzanga village

2:00 pm – 5:00 pm: Cultural Visit with Maasai Households, Malinzanga village
Leaders: Mzee Selendu, Harrison Sadiki, Deana Clifford, David Mutekanga,

Participants will visit the household and livestock boma of a Maasai family. They will have the chance to ask the questions and tour the household, view livestock and gain a deeper understanding of pastoralist culture. Traditional dancing or a livestock demonstration may be performed and Maasai jewelry made by the women of the household will be available for purchase.

5:00-6:30 pm: Travel from Malizanga to Chogela campsite, Tungamalenga village

7:00 pm: Dinner & relax at campsite

<u>Sunday July 25 – Day 6</u> VILLAGE STAY: HEALTH AND CONSERVATION AT THE HUMAN-WILDLIFE-LIVESTOCK INTERFACE (CPA/FWM/HCI/POL)
7:15 am: Breakfast

8:00-9:00 am: Discussion & Feedback: Pastoralism and Conservation. Can they Co-exist?
Leader: David Mutekanga, WCS Ruaha Landscape Program (WCS RLP)

Participants have extra time to discuss questions that may have arisen from the household visit and additional aspects of challenges faced by pastoralists. Furthermore, tensions between pastoralism and conservation will be discussed.

9:15-9:45 am: Overview of the Wildlife Conservation Society (WCS) Ruaha Landscape Program
Presenter: David Mutekanga, WCS RLP

Mutekanga will introduce participants to the wide range of conservation activities conducted by the Ruaha Landscape Program. He will talk about their approach to building local capacity for conservation; success and challenges.

9:45 am: Tea

10:00-11:00 am: Case Discussion: The Unintended Consequences of Development Assistance: the case of Usangu irrigation schemes
Presenter(s): Mzee Bakari Mbano, Director, WCS Ruaha Landscape Program

In the Usangu region of Tanzania, smallholder rice schemes established with development assistance in the 1980s and early 1990s precipitated a cascade of unintended and undesirable outcomes, many of which are still being realized. The primary and direct effect was that *legal* channelization of water facilitated a proliferation of *illegal* diversions and satellite farms surrounding the rice schemes. The resultant loss of water to the Great Ruaha River was and remains the central driver of the environmental and socioeconomic cascade of unintended effects most notably: a 77% reduction in the area of the Ihefu swamp; over 60% loss of dry season habitat in Ruaha National Park; the collapse of fisheries in Mtera Reservoir; increased potential for transmission of disease among livestock, wildlife and people (both waterborne & other); and the loss of hydroelectric power produced by the Mtera hydroelectric plant. These consequences and current actions to address them will be discussed in the larger context of pros and cons for development aid.

11:15 am-12:30 pm: Practical Exercise - Using a One Health Approach to Investigate Disease and Water Scarcity in Ruaha: the HALI Project
Presenter: Deana Clifford, UC Davis Wildlife Health Center

Participants will be presented with the pressing ecosystem health issues that led to the formation of the Health for Animals and Livelihood Improvement Project, a collaborative and stakeholder-driven research and capacity building project led by the UC Davis Wildlife Health Center, Sokoine University of Agriculture, WCS Ruaha Landscape Program, and the University of Vermont. Participants will break into groups to generate interdisciplinary approaches that could be used to investigate the health and economic impacts of zoonotic (bovine tuberculosis and brucellosis) and waterborne diseases in wildlife, livestock and people. During these discussions Clifford will share the approach that was utilized, lessons learned, key research findings that resulted from this project, and future directions for the work.

12:30-12:50 pm: Orientation to Field Exercises
Deana Clifford & Bakari Mbano

1:00 pm: Lunch

2:00-6:00 pm: Wildlife & Livestock Field Exercises
The participants will be divided into three subgroups (A, B, C) and participate in the exercises below.

Exercise 1: Walking Transect to Assess Presence and Density of Wildlife Species - Group A
Leader(s): Rogassian Mtana, Ecologist, WCS Ruaha Landscape Program, & MBOMIPA game scouts

Participants will learn how to identify tracks and other signs of various wildlife species. Methods for estimating wildlife population presence/absence and density on foot will be

discussed. The use of how wildlife density data for conservation and health studies with mapping and ArcGIS will also be discussed.

Exercise 2: East African plant communities - Group B
Leaders : Mzee Mhoro (Retired Herbarium Technician, University of Dar es Salaam), Mzee Moses (Village Chairman, Idodi) and Mzee Bakari Mbano (WCS RLP)

Participants will learn about the unique plant communities in East Africa, including plants of conservation value and of importance to wildlife. Special attention will also be given to medicinal plants utilized by people and human impacts on plant communities.

Exercise 3: Bovine Tuberculosis Testing in Pastoralist Cattle & Feedback - Group C
Leader(s): Harrison Sadiki, Salehe Muhidinn - HALI Project and PREDICT, SUA

Participants will join HALI project researchers in testing cattle for bovine tuberculosis in a Maasai boma with the help of pastoralists. Biological samples (blood, milk and feces) may also be collected from cattle, sheep or goats. Risk factors for transmission of bovine tuberculosis and brucellosis will be highlighted at these visits, and challenges with administration and interpretation of intradermal skin testing for tuberculosis in African conditions will be discussed. Additional time with Maasai families allows for discussions about cultural and livelihood issues.

7:00 pm: Dinner/campfire

Evening: Free

Monday July 26 – Day 7 **FIELD EXERCISES AT THE WILDLIFE-LIVESTOCK INTERFACE (CPA/HCI/POL)**

7:00 am: Breakfast

8:00-12:00 pm: Wildlife Field Exercises (continued*)*
Exercise 1: Walking transect for wildlife - Group C
Exercise 2: East African plants - Group A
Exercise 3: BTB testing livestock* – Group B

12:30 pm: Lunch

2:00 – 6:00 pm: Wildlife Field Exercises
Exercise 1: Walking transect for wildlife - Group C
Exercise 2: East African plants - Group A
Exercise 3: BTB testing livestock* – Group B

*****Note BTB testing activity may leave earlier or later than scheduled.

7:00 pm: Dinner

8:00-9:30 pm: Optional Night game drive in the Wildlife Management Area (tentative)
Leaders: WCS and HALI staff
Participants will have the chance to look for nocturnal wildlife in the Pawaga Idodi WMA.

<u>Tuesday July 27 – Day 8</u> PROTECTED AREAS AND WILDLIFE CONFLICTS (HCI/ZED/FWM/POL/CPA)

7:30 am: Breakfast

8:00 am: Depart Tungamalenga for Kitisi

8:30-12:30 pm: Field Visits-Wildlife Conflicts at the Human-Livestock-Wildlife Interface
Leaders: Aybu Omari Msago & Alphonce Msigwa, Ruaha Carnivore Project, Mzee Mbano, WCS-RLP

Participants will learn about efforts to reduce conflicts between agricultural activities and elephants/hippos, and livestock conflicts with carnivores by visiting sites where these activities have occurred. A unique program that uses natural chili pepper oil to deter elephants from farms and provides improved designs for livestock bomas (corrals) that reduce depredation will be highlighted. Agricultural practices agriculture-wildife-livestock conflict will be discussed

1:00 pm: Lunch

1:30 – 3:45 pm: FREE time to rest or explore Tungamalenga Snake Park, Souvenir stand etc.

3:45pm: Tea

4:00-5:00 pm: Discussion: Community-based Wildlife Management
Leader: Bakari Mbano, Director, WCS Ruaha Landscape Program; Former Director, Wildlife Division, United Republic of Tanzania

Tanzania has designated over 28% of its land area under some degree of protection. Mzee Mbano will give a brief overview of the history of wildlife conservation in Tanzania, describe the structure of the current Protected Area system, and highlight new initiatives to create community-based wildlife management areas in Tanzania. Successes and challenges encountered during and after the establishment of the community-based Pawaga-Idodi Wildlife Management Area, and broader pros and cons of community-based conservation initiatives will be discussed.

5:15-6:15 pm: Case Study: Spatial Decline of Buffalo in the Ruaha Ecosystem
Presenter: Deana Clifford

Clifford will review the evidence to date suggesting that Ruaha's once large buffalo populations have suffered a spatial range contraction and possibly a population decline. Possible causes for the decline will be described and participants will have the chance to brainstorm ideas about how they would begin to study and address this issue.

7:30 pm: Special BBQ Dinner/campfire with Wahehe drama group performance

<u>Wed July 28 – Day 9</u> VILLAGE WRAP UP & RUAHA NATIONAL PARK (HCI/ZED/CPA/FWM)

7:30 am: Breakfast and pack luggage for departure

8:30-9:45 am: Village Wrap-up Discussion
Leader: Val Beasley

Participants will have time to provide feedback and discuss any thoughts or questions resulting from the presentations, village visits or labs.

10:00 am: Travel from Tungamalenga to Ruaha National Park Headquarters

11:30 pm: Arrive Ruaha NP & settle into lodgings (Park bandas and guest house)

12:30 pm: Lunch

1:30 pm: Welcome to Ruaha National Park
Presenter: William Mwakilema, Chief Park Warden

2:00-3:15 pm: Conservation and Management of Ruaha National Park
Presenter: Ole Meing'ataki, Chief Ecologist, Ruaha National Park, TANAPA

Meing'ataki, an Envirovet 2009 alumnus, will introduce participants to the reasons why Ruaha National Park is so significant from a conservation standpoint. The current ecosystem health issues, expansion of the park, plans for tourism growth, and management challenges for this park will be highlighted.

3:15 pm: Tea

4:00-6:30 pm: Evening Game Drive
Participants get a chance to see some of the amazing wildlife diversity of Ruaha.

7:00 pm: Dinner

7:30-8:30 pm: Wildlife Health in Ruaha National Park
Presenter: Epaphras Alex Muse, Veterinarian, Ruaha National Park

Alex, an Envirovet 2008 alumnus, will present an overview of his responsibilities at veterinarian for Ruaha, and describe the current health concerns in the park's wildlife. He will describe his ongoing parasite monitoring and research to elucidate the cause and impact of a novel skin disease in giraffe. He will prepare us for the next morning's field activities where we will be surveying giraffe for skin disease.

Thurs July 29 – Day 10 RUAHA NATIONAL PARK (CPA)

7:00 am: Breakfast & pick up pack lunch

8:00 am -3:00 pm: **Survey for Giraffe Skin Disease & Buffalo Herd Counts** (*Packed lunch)*
Leaders: Epaphras Alex & Ole Meing'ataki, TANAPA
Participants will split into three groups and drive through different parts of the park to determine the prevalence of skin lesions in giraffe. Counts of affected and unaffected giraffe will be determined and the locations of giraffe recorded. Digital photographs of skin lesions will be taken to build a digital library of the disease presentation. Additionally, if buffalo herds are encountered, the location will be recorded, the number of bulls, cows and calves counted, and the body condition of the herd assessed. Participants may input data to create a map of affected and unaffected individuals and buffalo herds.

3:15 pm: Tea

3:30-5:30 pm: Giraffe and Buffalo Counts discussion
Leaders: Ole Meing'ataki & Epaphras Alex, TANAPA
Each team will give a brief presentation about what was observed on their transects and any findings of interest.

(Time to shower/rest)

7:00 pm: Dinner

7:30-8:30 pm: Field exercise orientation
Instructors: Alex Epaphras, TANAPA; & Donald Mpanduji, Professor, SUA
A brief review of chemical immobilization of species to be targeted as part of ongoing research projects in Ruaha and a safety orientation will be given. Participants will be divided into two groups for immobilization exercises and given specific roles. Each group will have a lead veterinarian.

Fri July 30 – Day 11 RUAHA NATIONAL PARK (CPA)

6:30 am: Breakfast

8:00 am-2:00 pm: Field immobilization of free-ranging African wildlife *(pack lunch or return for lunch)*
Instructors: Epaphras Alex and Donald Mpanduji leads
Participants will then observe and assist with the immobilization of wildlife species as determined by the lead veterinarian. Although an immobilization exercise is scheduled, there is no guarantee that an animal will be immobilized due to weather conditions, locations and suitability of animals, and other unforeseen circumstances. Human safety and animal welfare are the first priorities. The decision to immobilize is the responsibility of the TANAPA veterinarian in charge

2:00 pm: Discussion of field exercise

3:00 pm: Tea and snacks

3:30-4:30 pm: Elephant Conservation in the Selous-Niassa Wildlife Corridor
Presenter: Donald Mpanduji, Senior Lecturer, Faculty of Veterinary Medicine, SUA

The Selous-Niassa wildlife corridor is a landscape linkage between Africa's largest protected areas: the Selous Game Reserve of Tanzania, (a UNESCO World Heritage Site and home to Africa's largest elephant, buffalo, sable and other wildlife populations) and the Niassa Game Reserve of Mozambique, which is renowned for its large elephant population. Dr. Mpanduji will detail his research investigating elephant movements in the Selous - Niassa wildlife corridor, and discuss implications of his work and the challenges associated with transboundary conservation.

4: 45 – 6:00pm: Wildlife Diseases and Conservation in Tanzania
Presenter: Robert Fyumagwa, Veterinary Research Officer, Tanzania Wildlife Research Institute (TAWIRI)

Fyumagwa, an Envirovet 2002 alumnus, will discuss his responsibilities as a veterinarian and researcher for TAWIRI. He will share how Envirovet has shaped his professional experiences and how he has put his Envirovet training into practice. He will also highlight current research priorities.

7:00pm: Dinner

<u>Sat July 31 – Day 12</u> PARKS AND COMMUNITIES (CPA/HCI)

7:30 am: Breakfast

8:00- 9:30 am: Common ground through sport - Football match between Envirovet 2010 and Ruaha Management Team

Participants will get a chance for some exercise or to cheer their classmates on in this team-building activity for Evet and Ruaha staff.

9:30 am: Tea

10.00 am - 11.00am: Environmental Education Program for primary schools pupils
Leaders: Education/Outreach warden and teachers. Presenters: Msembe Primary School Pupils (Standard 5-7 grades)

Students will present posters presentation on Wild animals, Water and Forests management and related challenges in and around Ruaha National Park. Participants will get to discuss the park's education program for its residents and neighboring communities.

11:15am- 12:00pm: Traditional dance by Msembe primary school students

12:30 pm: Lunch
1:30 – 2:50 pm: Engaging communities to improve conservation
Leader: Charles Ngendo, Outreach Warden & John Nyamhanga, Protection Warden, Ruaha NP, TANAPA

Ngendo and Nyamhanga will provide an overview of the community engagement, Park outreach programs to benefit neighboring communities and the law enforcement program to prevent poaching in the park. We will discuss Tanzanian policy in regards to poaching and law enforcement challenges.

3:00 pm- 3:40 pm: **Threats from Unmanaged Fire in the Ruaha Ecosystem**
Presenter: Ole Meing'ataki, TANAPA

Meing'ataki will describe the impact of fire on the health of the Ruaha ecosystem, and detail efforts to research the effects of fire and create a fire management regime.

4:00 – 6:15 pm: Evening Game Drive

7:15 pm: Closing Dinner/campfire and celebration with park personnel

<u>Sun August 1 – Day 13</u> TRAVEL DAY: RUAHA TO MANG'ULA (UDZUNGWA)

8:00 am: Breakfast and prepare to leave Ruaha (luggage needs to be packed and in cars by 8am)

9:00 am-12:30 pm: Travel from Ruaha to Iringa

12:30 pm: Light picnic lunch at Riverside campsite

1:30 – 6:00 pm: Travel from Iringa to Mang'ula

6:00 pm: Rest in lodgings (Udzungwa Dipa Lodge)

7:00 pm: Dinner

<u>Mon Aug 2 – Day 14:</u> COMMUNITY HEALTH AND ZOONOTIC DISEASE – IFAKARA

7:00 am: Breakfast

7:30 am: Depart for Ifakara

8:30am-12:00pm: Ifakara Health Institute (IHI) Visit
Leads: Mr H. Urassa, Dr. Boniface Jullu and IHI Staff

IHI is an autonomous, non-for-profit organization registered in Tanzania dealing with health research. The mission of IHI is "to develop and sustain a district-based health research and resource centre capable of generating new knowledge and relevant information for public health policy and actions. Participants will learn about health interventions in the community for malaria, TB and HIV and tour the IHI laboratories. Innovative approaches to HIV control, including incentivizing (paying) people to stay disease-free will be discussed.

12:30 pm: Lunch in Ifakara

1:30-2:30 pm: Bovine Tuberculosis in Africa
Presenter: Rudovick Kazwala, SUA

Prof. Kazwala will explain the history of bovine tuberculosis (BTB) in Africa and detail what we know to date regarding the significance of BTB in wildlife, livestock and human populations. He will highlight current BTB research projects in Tanzania and discuss the development of the African Bovine Tuberculosis Network.

2:45 – 3:45 pm: Rabies in Tanzania: Initiatives to control rabies for improvement of human and animal health
Presenter: Rudovick Kazwala, SUA

Kazwala will provide an overview of the impact of rabies in developing countries and highlight an exciting new initiative aimed at eradicating rabies from Tanzania.

4:00 – 5:30 pm: Case Discussion: Integrated Ecosystem Management of the Kilombero Valley Floodplain
Ramsar Site
Presenter: Panteleo Munishi, Professor of Forest Biology, Faculty of Forestry and Nature Conservation, SUA

In 2000 Tanzania ratified the Ramsar Convention of Wetlands, which stipulates wise use of wetland resources, maintaining the ecological character of the site while contributing to people's livelihoods. Munishi will discuss his work in the Kilombero Valley Floodplain Ramsar site, which contains nearly 75% of the world's population of wetland dependent Puku antelope. Participants will get to view the wetlands and discuss the issue of agricultural conversion for biofuels.

5:45 – 6:45 pm: Travel back to Udzungwa Dipa Lodge

7:00 pm: Dinner (Dipa)

Evening: Rest for early morning

<u>Tue Aug 3 – Day 15</u> UDZUNGWA MOUNTAINS NATIONAL PARK (ZED/POL/HCI)

7:00 am: Breakfast (*have luggage packed and ready by 7am)*

7:30 am: Travel to Udzungwa NP headquarters for brief orientation

8:00 am – 12:30 pm: Sanje Falls Hike Udzungwa Mountains National Park
Leader: Rukia Mallya, Tourism Warden, Udzungwa National Park, TANAPA

Mallya and her staff will lead the group on a 5 km round trip hike to experience Udzungwa NP by foot. Participants will see Sanje falls and have the chance to view some of Udzungwa's 12 primate species, birds, butterflies, and forest vegetation types. Hikers need to wear good shoes, and bring snacks, plenty of water, and swimsuit (if you want to swim).

12:30 pm: Lunch (Twiga Hotel)

1:30-3:00 pm: Discussion: Ecology and conservation of Udzungwa Mountains National Park
Presenter: Paul Banga, Chief Ecologist, Udzungwa National Park, TANAPA

Mr. Banga will highlight the ecology and conservation history of Udzungwa NP, part of the Eastern Arc, a fragmented range of mountains containing relic rain forest stretching from Southern Kenya through Southern Tanzania. The park is a World Biodiversity Hotspot and a WWF Ecoregion of global critical importance. Although the Eastern Arc Mountains cover less than 2% of Tanzania's area they hold 30-40% of the country's plant and mammal species, many of which are found no where else on Earth. Conservation challenges, the cultural and economic importance of UMNP to surrounding communities in the park, and community conservation programs will be discussed.

3:00 pm: Depart UMNP for Sokoine University of Agriculture (SUA), Morogoro

7:30 pm: Dinner and settle into lodgings in Morogoro (Dinner on-campus then go to lodgings)

<u>Wed August 4 – Day 16</u> SOKOINE UNIVERSITY- ZOONOTIC DISEASE AND VETERINARY EDUCATION (ZED/HCI/FWM)

7:30 am: Breakfast

8:30-8:45 am: Introduction and Welcome to Sokoine University of Agriculture
Presenter: Philimone Wambura, Dean, SUA Veterinary School

8:45-9:30 am: Veterinary Education in Tanzania: Roles of the public and private sector
Dominic Kambarage, Deputy Vice Chancellor of Academic Affairs, SUA

Kambarage will explain the history and current capacity for veterinary education in Tanzania, with references to current employment options in the public and private sectors. Challenges to the delivery of veterinary services and veterinary education will also be discussed.

9:30-10:15 am: Rift Valley Fever: Lessons from the 2007 outbreak, health significance, and implications of climate change
Presenter: Rudovick Kazwala, Prof. of Veterinary Medicine & Public Health, Envirovet Tanzania Co-director, SUA

Rift valley fever is a viral disease transmitted by contact with blood or tissues as well as via insect vectors that commonly bite animals and humans. The disease most often occurs following seasonal or non-seasonal rainfall exceeding normal amounts in areas where the virus and insect vectors are available. The importance of the disease arises from the fact that it affects animals and humans causing massive losses directly through deaths and indirectly through reduction of productivity. RVF occurred in Tanzania in 2007 with mortalities in both human and animal populations. Linkage of occurrence of RVF and climatic changes shall be discussed.

10:15 am: Tea

10:45 am-12:00 pm: Tour of Sokoine University Veterinary School
Leaders: SUA Veterinary Faculty Members, Graduate Students, and Staff

Participants will tour the small and large animal clinics, rabies isolation unit, anatomy and pathology facilities, animal areas, instruction facilities and the Mycobacterium laboratory.

12:30 pm: Lunch

2:00-4:00 pm: Innovations in Disease Diagnostics for the Developing World: Tour and demonstration of APOPO Vapour Detection Technology
Leaders: Apopo staff

APOPO trains groups of sniffer rats to detect explosives and also to diagnose disease. This innovative idea has been developed into a competitive technology by a group of Belgian and Tanzanian researchers and animal trainers. Participants will visit the APOPO facility to hear more about this unique program and to see a demonstration of the sniffer rats trained to detect tuberculosis in sputum samples.

4:00 pm: Tea

4:15 – 5:15 pm: TBA

5:30- 6:30 pm: Case Study: Chytrid Fungus and the Population Collapse of the Kihansi Spray Toad
Presenter: Gerald Misinzo, Lecturer, Faculty of Veterinary Medicine, Sokoine University of Agriculture

The Kihansi Spray Toad (KST) is a diminutive, ovoviviparous Bufonidae, endemic to the Kihansi gorge, located within the Udzungwa mountains in Tanzania. Diversion of the Kihansi river in December 1999 for the Lower Kihansi hydroelectric project reduced the river flow and destroyed KST habitat. In fear of extinction of KSTs, a few KST were translocated to Toledo and Bronx zoos in the United States. Since 2004, no KSTs have been sighted in Kihansi gorge spray wetlands. One of the key factors presumed to have caused the disappearance of KST in the wild is an outbreak of chytridiomycosis. Chytrid fungus infection of KST causes 100% mortality. Survival of KST in chytrid fungus-contaminated Kihansi gorge is possible if KST were resistant to chytridiomycosis. Misinzo will describe efforts at SUA to develop biological control of chytridiomycosis in KST as there are no known chemical control measures of the disease in the wild. A program to reintroduce toads captive bred in US zoos back to Tanzania will be discussed.

6:30 pm: Dinner

7:45-8:30 pm: Small Animal Practice and Animal Welfare in Tanzania
Presenter: Armandus Muhairwa, Senior Lecturer, SUA

Muhairwa will discuss the current state of companion animal veterinary medicine and welfare in Tanzania. Most common diseases diagnosed in primary cases will be discussed as how they reflect the owner's small animal disease, nutrition and welfare awareness. Animal welfare education at the Faculty of Veterinary Medicine and the need of extending the education

to the public as ways of improving welfare and care of small animals belonging to native Tanzanians will also be covered. Experience and input about small animal medicine and welfare from the participants will be invited during the discussion.

Thur August 5 – Day 17 HEALTH AND POLLUTION LABORATORIES (FWM/ZED)

7:00 am: Breakfast

8:00 am-12:00 pm: Focused Sessions on Health and Pollution
The participants will divide into two groups and rotate through each laboratory.

Session One: **Avian Influenza and Village Poultry Health-Group A**
Instructor(s): Armandus Muhairwa, Senior Lecturer, SUA

The potential impact of and possible entry points for Highly pathogenic avian influenza (HPAI) in Tanzania will be discussed. Surveillance limitations for HPAI in developing countries will be addressed, and a new initiative to create Village Biosecurity through improved poultry health will be highlighted. During a hands-on laboratory participants will i) learn how proper handling of chickens, ii) take appropriate biological samples for HPAI testing, iii) use and interpret the rapid influenza test, and iv) learn how to minimize virus contamination during processing for food consumption. Community benefits of poultry farming will be highlighted.

Session Two: Using Biomarkers to Assess Environmental Pollution in Tanzania-Group B
Instructor: Robinson Mdegela, Senior Lecturer, SUA & Hezron Nonga, PhD Student, SUA

Mdegela, an Envirovet 2008 alumnus, will describe his research assessing biomarkers for pollutants in the widely distributed African sharptooth catfish. Participants will have a chance to examine the catfish as they are used in the conduct of ecotoxicological testing.

12:30 pm: Lunch

2:00-6:00 pm: Session One – Group B and Session Two – Group A
Groups switch laboratories for the afternoon session.

7:30 pm: Special Dinner Out

Fri August 6 – Day 18 TRAVEL TO ZANZIBAR

6:00 am: Breakfast and prepare to leave SUA

7:00-11:00 am: Travel from Morogoro to Landmark Hotel, Dar es Salaam

11:15 am – 12:30 pm: Control and prevention of human and bovine tuberculosis in people
Presenter: Sayoki Mfinanga, Medical Research Scientist, National Institute Medical Research, Dar es Salaam, Tanzania

Mfinanga will discuss his research to understand the role of bovine tuberculosis in the human TB epidemic in Tanzania. He will discuss current programs (COMDOTS) and other

efforts to control TB and highlight our current state of knowledge regarding the role of zoonotic TB and other zoonoses in human populations in Tanzania.

12:30 pm: Lunch

1:30 pm: Travel to Dar es Salaam international airport

3:40 pm: Flight Dar to Zanzibar (Precision Air Flight 713)

4:10 pm: Arrive Zanzibar and settle into lodgings

6:00-7:15 pm: Conservation of endemic species and their landscapes in Zanzibar
Presenter: Kirsten Siex, Assistant Director Africa Programs & Director Zanzibar Program, WCS

Seix will introduce us to the major objectives of the WCS Zanzibar Program, and talk about their efforts to conserve the endemic red colobus monkey and Ader's Duiker, and the habitat they need to survive. Previous colobus health research and ecotourism challenges will be discussed.

7:30 pm: Dinner - Chinese Restaurant

<u>Sat Aug 7 – Day 19</u> MARINE ECOSYSTEM HEALTH, ECONOMICS AND SUSTAINABLE LIVELIHOODS (FWM/CPA)

7:30 am: Breakfast (Abuso downstairs)

9:00-9:30 am: Welcome & Introduction to the Institute of Marine Sciences (IMS)
Instructor: Dr. Margareth S. Kyewalyanga, Director, IMS

Kyewalyanga will describe the activities of IMS and the general effect on the ecological, economic and social development of the coastal communities. The Institute has had a long history of interaction with both governments especially on policies and environmental assessment and more recently this has moved to local communities. A number of small scale ecological and economic initiatives have been developed and some of these are in full scale economic implications stage.

9:30 -10:30 am: Water quality and Marine Pollution in Tanzania
Presenter: Aviti Mmochi, Lecturer, Physical and Environmental Marine Sciences, IMS

Mmochi will highlight the world status of water, definitions of water quality and marine pollution and the state of pollution in Tanzania. Case studies on the agricultural, sewage and tourism pollution in Zanzibar.

10:30 am: Tea

10:45 am – 11:45 am: TBA

12:00 pm: Lunch Archipelago

1:30-6:30 pm: Free time to explore Stone Town

7:00 pm: Dinner (Mercury's)

Sun Aug 8 – Day 20 ISLAND CONSERVATION AND SUSTAINABLE ENTERPRISE (CPA/FWM)

7:00 am: Breakfast

7:30 am: Depart Stone Town

8:00 am – 12:30 pm Seaweed farming in Paje village
Leader: Flower E. Msuya, Laboratory Scientist, Marine Biology and Resources Management, IMS

Seaweed farming which was a strong initiative of Prof Keto Mshigeni of the University of Dar es Salaam started in Paje village in Zanzibar Island in 1989. The mainly women livelihood activity has grown to make Tanzania the 3rd in combined mariculture production of *Eucheuma denticulatum and Kapaphyicus* alvarezii and the leading producer in E. denticulatum. Dr Msuya has been working with the Tanzanian farmers since 1989 will take you on a tour that will enable you to talk with the farmers and the buyers. Msuya will highlight traditional seaweed farming methods, gender participation, strategies to combat seaweed die-offs and development of new techniques of seaweed farming will be discussed. Innovation of the seaweed industry – using the seaweed in the country and how to increase the production and the future of the seaweed industry. Participants may get the chance to help plant seaweed so come prepared to walk in the water.

12:30 pm: Lunch (Paje)

2:00-6:00 pm: Jozani-Chwaka Bay National Park
Leaders: Park guides, WCS Zanzibar program representative (tentative)

Jozani Forest is the largest remnant of the indigenous forest that once covered the island, and is at the center of the island's only terrestrial nature reserve. The park also contains swamp forest, evergreen thickets, mangroves and salt-tolerant grasslands, and a wide variety of wildlife including, Ader's duiker, suni antelopes, blue monkeys and the endangered Kirk's red colubus monkey (Zanzibar endemic). Participants will hike through this unique area, learn about local conservation efforts and get the chance to see rare species.

7:30 pm: Dinner (Archipelagos)

Mon, August 9th – Day 21

7:00 am: Breakfast

8:00 am-12:00 pm: Field Activities: Snorkeling or Spice Tour/hike
Leader(s): Mmochi and IMS faculty

Participants will go snorkeling to observe Zanzibar's coral reef diversity first hand. As an alternative option participants can choose to travel to a spice farm and learn about the exotic spices produced on Zanzibar.

12:30 pm: Packed lunch delivery from Passing Show

1:00-4:00 pm: Visiting Bweleo village in Fumba Peninsula
Leaders: Dr Nariman Jiddawi, Senior Lecturer & Head of Section, Marine Biology and Resources Management, IMS

Participants will see first hand the pearl farming and the shell polishing enterprises that benefit women and local communities, get to talk with the producers, and ask additional questions.

4:00 – 5:00 pm: Envirovet 2010 Course Wrap-Up
Leader: Val Beasley, Envirovet Director

7:15 pm: Leave Stone Town for dinner

7:30 pm: Special end of course dinner

<u>Tues, August 10 – Day 22</u> DEPART ZANZIBAR AND TANZANIA

7:00 am: Breakfast and time to pack

8:00 am SHARP: Depart for Airport

10:10 am: Flight Zanzibar to Dar es Salaam International Airport.

10:40 am: Arrive Dar, assemble luggage and transfer to outbound flights.