



Sub-Antarctic Biocultural Conservation Program
University of North Texas & Universidad de Magallanes

www.chile.unt.edu, www.umag.cl/williams, & www.ieb-chile.cl/itser

Tracing Darwin's Path-UNT course &
Field Biocultural Conservation (FBC) UMAG-IEB course

2012-2013 Schedule of Activities, Program & Syllabus

Core Professors:

Dr. Jaime Jiménez, *wildlife ecologist*, UNT-UMAG

Dr. James Kennedy, *stream ecologist*, UNT-UMAG

Assistant Professors

Dr. Tamara Contador, *stream ecologist*, IEB

Álvaro Núñez, *music composer*, IEB, *Omora Park*

Dr. Ronnie Reyes, *marine biologist*, *Omora Park*

Invited Faculty – Researchers:

Dr. Melinda Coogan, *stream ecologist*, Buena Vista University, Iowa, USA

Dr. Dominique Homberger, *zoologist*, Louisiana State University, USA

Dr. Bernard Goffinet, *bryologist*, University of Connecticut, USA.

Dr. Scott Lehmann, *philosopher*, University of Connecticut, USA

Dr. Lisa Naughton, *environmental geographer*, University of Wisconsin, USA

Dr. Heather York, *ecologist*, Buena Vista University, Iowa, USA

Course Assistants:

Cristian Celis, *veterinarian*, IEB

Viviana Bauk, *agronomist*, Omora

Kelli Moses, *biologist*, UNT coordinator

Omora Staff:

Paula Caballero, *extension specialist*, IEB-UMAG, Punta Arenas

Brian Torres, IEB *Omora Park* coordinator

Yanet Medina, *education specialist* UMAG-IEB, Punta Arenas

Course Catalogue Information: PHIL 4054/6781 and BIOL 4054/5054

Academic Dishonesty Policy: Students are responsible for reading, understanding, and knowing UNT's Academic Dishonesty Policy that can be found at: http://www.vpaa.unt.edu/academic_integrity.htm. Academic dishonesty in this class is unacceptable and will not be tolerated in any form.

Disability Accommodation Statement: The University of North Texas is on record as being committed to both the spirit and the letter of federal equal opportunity legislation; reference Public Law 92-112 – The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

Drop/Withdrawal Information: Drop/Withdrawal Information and other important Academic Dates can be found at www.essc.unt.edu/registrar/schedule/scheduleclass.html

COURSE GENERAL OBJECTIVES: Biocultural diversity has been defined as the “diversity of life in all its manifestations —biological, cultural, and linguistic— which are interrelated within a complex socio-ecological adaptive system.” Addressing modern day environmental issues requires approaches that take into account this multi-faceted meaning of diversity. In this context, this course will provide students with an interdisciplinary research, conservation and education experience at one of the most pristine wilderness areas remaining in the world. The course will explore ways of defining, studying, communicating and conserving biocultural diversity. These goals will be achieved by exposing students to a first-hand experience using the case study of the creation and implementation of the Omora Ethnobotanical Park as a long-term ecological study site that serves to *link society and development with biodiversity, history and ecosystems* in the Cape Horn Biosphere Reserve (CHBR).

The U.S. study abroad course will be taught in partnership with a masters-level class in conservation at the University of Magallanes (UMAG), Chile and is also part of the Chilean Long-Term Socio-Ecological Research Network's program of field courses, coordinated by the Institute of Ecology and Biodiversity (IEB, www.ieb-chile.cl) (UNT has MOUs with both UMAG and IEB).

SPECIFIC OBJECTIVES:

- 1) To study various ways of approximating diversity in its multiple manifestation and scales.
- 2) To observe, describe, and investigate in a philosophically comparative way and ecologically integrated way conspicuous (e.g., birds) and less conspicuous (e.g., aquatic invertebrates) groups of animals.
- 3) To utilize the Omora Ethnobotanical Park and the CHBR as concrete examples of integrating environmental ethics and ecological sciences into biocultural conservation, using the Field Environmental Philosophy approach developed by the Sub-Antarctic Biocultural Conservation program research team.

RATIONALE FOR TRAVEL:

The Sub-Antarctic Biocultural Conservation Program Office, coordinated between the University of North Texas and the Universidad de Magallanes, conducts activities in Cape Horn for three fundamental innovative reasons:

- 1) There has been a previous bias toward conservation of tropical eco-regions, and less attention has been given to temperate and high latitudes ecosystems, such as the CHBR. This focus is also reflected in U.S. higher education initiatives as well, such as the Organization for Tropical Studies. This pioneering program that intends to strengthen and

broaden the meaning of conservation, changing the subject of study to “biocultural” and using the case study of the CHBR to demonstrate the importance of innovation and “changing lenses”.

- 2) Conservation is a transdiscipline that has largely succeeded in integrating economy (ecological economics), law, etc. A new emphasis on “biocultural” conservation requires that we undertake the incorporation of environmental philosophy, which is a work in progress being spearheaded by UNT’s Philosophy Dept.
- 3) The Sub-Antarctic Biocultural Conservation Program’s transdisciplinary approach involving scientists, philosophers, and artists together in the field represents a cutting edge innovation for conservation biology and other fields.

COURSE DESCRIPTION:

Overview: The Field Biocultural Conservation and TDP courses will be held between December 26th, 2012 and January 13th, 2013. Students participating in both courses will be involved in the same activities throughout the duration of the courses. These activities involve preparatory tasks prior to the course, and also post-course activities. Continued analysis of data for those interested.

Furthermore, this course will provide students with an interdisciplinary research, conservation and education experience at one of the most pristine wilderness areas remaining in the world. The course will explore ways of defining, studying, communicating and conserving biocultural diversity. These goals will be achieved by exposing students to a first-hand experience using the case study of the creation and implementation of the Omora Park as a long-term ecological study site that serves to *link society and development with biodiversity, history and ecosystems* in the Cape Horn Biosphere Reserve.

Research topics of the TDP-FBC 2012-2013 course: The general topic of this course is biocultural conservation. It has a strong field component in which students get first hand encounters with the diversity of people inhabiting the sub-Antarctic Magellanic ecoregion (including handcrafters from the indigenous Yahgan community, teachers from local schools, tourist operators, as well as Chilean and Latin American students, researchers, and artists), and explore together the main habitat types (including the Patagonian steppe, penguin colonies, watersheds dominated by *Nothofagus* forests, etc.).

This year, the class will continue the long-term studies on life-cycles and diversity of freshwater invertebrates and integrate this research with the study of the diet of birds inhabiting sub-Antarctic forests at Omora Ethnobotanical Park (OEP), Navarino Island, Cape Horn Biosphere Reserve (55°). This study also includes research on bird ecological interactions with plants and invertebrates. The course will be divided in 2 groups, which will alternate activities in the field and laboratory according to assigned tasks.

Specific ornithological questions of this new research area, which will be investigated by the students during this course are part of a long-term forest bird banding program at OEP, and include:

A) How long do birds live?

Methodology: To help answer this question, the course will conduct mistnetting and banding of birds at OEP. Students will go to the field in the morning to open mist nets and collect data. During the afternoons, students will focus on entering data and

analyzing samples in the laboratory. Please refer to the end of this document for a specific schedule of activities.

B) What do birds eat?

Methodology: Students will study the diet of birds by examining bird feces of birds captured in the mist nets. When a bird is captured, it defecates on the hand or in the bag that is used to keep the bird in the field. Students will collect feces with a spatula and will place them on a paper envelope. The collector will write the date, net number (habitat), species, bag number, and name or initials of who collects the feces. Later, the contents of the envelope will be placed on a Petri dish and will be analyzed with a stereoscope. Samples will be then compared with a seed and invertebrate reference collection.

- Seed and invertebrate references are prepared in the following way:

- **Seeds** are extracted from fruits (i.e., calafate, michay, canelo, leñadura, chaura, murtila, notro, graminoids, etc), cleaned and glued to a thick cardboard or wood and are classified to species.
- **Invertebrates** are classified to order level (i.e., Coleoptera, Hemiptera, Lepidoptera, etc.). Voucher specimens will be available for comparisons.

C) What food is available for birds?

Methodology: Students will study food availability for birds by collecting available seeds and insects in a determined area adjacent to the mist nets at OEP during the mist netting period. Students will collect insects and seeds from available fruits.

- Seed and invertebrate are collected in the following way:

- **Seeds** are extracted from fruits (i.e., calafate, michay, canelo, leñadura, chaura, murtila, notro, graminoids, etc.), cleaned and observed under the stereoscope to be classified to species. When collecting, the collector will write the date, habitat, species, and name or initials of who collects the seeds. Samples will be then compared qualitatively with a seed and invertebrate reference collection. Areas of sampling will be determined in the field, during site recognition.
- **Invertebrates** are collected using the following techniques: a) pitfall trap, b) modified pitfall for insects living on trees, c) aerial net, and d) light traps. When collected, insects will be carried to the laboratory and will be classified to order level (i.e., Coleoptera, Hemiptera, Lepidoptera, etc.). Areas of sampling will be determined in the field, during site recognition.

Finally, freshwater invertebrate and ornithological work will involve the practice of ecotourism, as a tool to achieve biocultural conservation. This practice will require students to prepare visits for tourists, and other visitors to Omora Park that are guided with an ecological and ethical orientation. This innovative approach aims for visitors to gain not only an understanding and knowledge about the unique sub-Antarctic biodiversity, but also a transformative experience to cultivate an ethical and sustainable relationship with this biodiversity, both locally and globally.

This UNT Study Abroad Course is taught as part of the Sub-Antarctic Biocultural Conservation Program (www.chile.unt.edu) in partnership with a masters-level class in conservation at the University of Magallanes (UMAG), Chile and is also part of the Chilean Long-Term Socio-Ecological Research Network's program of field courses, coordinated by the Institute of Ecology and Biodiversity (IEB, www.ieb-chile.cl).

Grading

1) Essays (10%)

Each student will select one of the class topics (see above) and using the readings develop a 5-10 page (12 font, double spaced) essay summarizing that theme of the course. Essays will be collected on December 28th.

2) Comparison and Description of Avian Inhabitants/Habitats/Habits of Cape Horn and of High Northern Latitudes of the Americas (10%)

Each participant should use the provided list of birds to do a complete worksheet and add pictures and descriptions of each species regarding its morphological characteristics, habitat requirements, behavior, diet or other relevant habits and information. This exercise will help you prepare by way of comparison and analogy to understand new organisms based on their relationship, similarities and differences to other species you know. The completed printed document will be collected on December 28th.

3) Natural History / Art Journal (30%)

When reading Charles Darwin's journal *Voyage of the Beagle* about his 5 year trip around the world, it is striking the way he blends scientific observation with reflections about the broader implications, context and surroundings (including cultures) he was encountering. Other examples include Lewis and Clark's writings about the American West. We would like to "trace Darwin's path" and ask each student to keep a journal of the day's reading, reflections, activities and achievements. Entries should consist of reflections on the assigned readings and/or activities and observations made during field activities. Ideally field notes will be made using a waterproof pen (or pencil) in a journal with waterproof paper (such as Rite in the Rain, All-Weather Journal). However, other notebooks can be used but they must be bound and should be protected in a sealable plastic bag. Maximum size for the field notebook should be approximately 8.5" x 11" when two pages are open. This size will enable the journal to be xeroxed conveniently and also to carry in the field, which will be necessary, since recordings in journals are meant to be done on the day of the activities. In addition, an art notebook (can be the same notebook as above) will be needed with the same dimensions, but ensuring a hard cover and 180 to 240 weight paper that allows for water colors. Other art materials will be provided in Chile. Student journals will be checked randomly throughout the course. Suggestions will be made on improving the quality of the journal format. It will be expected that journal entries are, as reasonably as possible, kept up to date, legible and well organized. This document will be key to keep your valuable records, thoughts and experiences while in the field and may serve for your future purposes. *At the end of the class journals will be collected, and may be copied before being returned to the student.*

4) Guided Field Activities (20%)

The course participants will conduct a guided tour for scientists and authorities visiting the Omora Park. The goal of these "tours" is for students to learn the Omora Park's existing trail systems and interpretive content, as well as synthesize their own experiences into the narrative. As much as possible, the work groups will be structured to represent a cross section of academic interests of the course participants.

5) Participation & Presentation of Research Results (30%)

Student responsibilities are to prepare ahead of time, attend all the discussion sessions, field exercises, ask questions, and express themselves creatively and concisely in their work. Ways of earning points for participation include contributing positively to class discussion of readings and participate in field exercises. Contributing positively requires having read, and as thoroughly as possible understood, the assigned readings and at least being able to raise important questions if not providing definitive answers. Students will also prepare power point

presentations after samples have been analyzed in order to present preliminary results. These presentations will be carried out during January 10th at the Field Station.

Textbooks

Required: Rozzi, R., F. Massardo, C. Anderson, S. McGehee, G. Clark, G. Egli, E. Ramilo, U. Calderón, C. Calderón, L. Aillapan & C. Zárraga. 2010a. *Multi-Ethnic Bird Guide of the Sub-Antarctic Forests of South America*. UNT Press – Ediciones Universidad de Magallanes, Denton TX and Punta Arenas, Chile.

Optional: Jaramillo, A. 2003. *Birds of Chile*. Princeton University Press, Princeton.

Required Reading List

Contador, T.A., J. Kennedy, R. & Rozzi. 2012. The conservation status of southern South American aquatic insects in the literature. *Biodiversity and Conservation* 21: 2095-2107.

Contador, T.A., J. Kennedy, R. Rozzi, F. Massardo, R. Molina, A. Stambuk, J. Ojeda et al. Applying Field Environmental Philosophy at the Omora Ethnobotanical Park: aquatic invertebrates of southernmost watersheds. *Revista Chilena de Historia Natural*. In review a.

Darwin C. 1838. Tierra del Fuego pp. 204-231, in *The Voyage of the Beagle*. Reprint, London: Everyman's Library, 1975.

Elphick, C.S., J.E. Jiménez, R. Reyes & R. Rozzi. Seasonal dynamics of the Subantarctic bird community in different habitats of the Cape Horn Biosphere Reserve. Introduction to Section 2, pp. XX-XX, in Rozzi, R. & J.E. Jiménez (eds.), *Ornitología Subantártica Magallánica, Primera Década de Estudios de Aves del Parque Etnobotánica Omora, Reserva de Biosfera Cabo de Hornos, Chile*. In preparation.

Leopold, A. 1949. Foreword, 65290, On a monument to the pigeon, Thinking like a mountain, The land ethic, in *A Sand County Almanac and sketches here and there*. Oxford University Press, New York.

Pearson Ralph, C., S.E. Nagata & C.J. Ralph. 1985. Analysis of droppings to describe diets of small birds. *J. Field Ornithology* 56: 165-174.

Rozzi, R., X. Arango, F. Massardo, C. Anderson, K. Heidinger & K. Moses. 2008. Field Environmental Philosophy and Biocultural Conservation: The Omora Ethnobotanical Park Educational Program. *Environmental Ethics* 30: 325-336. Rozzi, R., C. Anderson, C. Pizarro, F. Massardo, Y. Medina, A. Mansilla, J. Kennedy, et al. 2010. Field environmental philosophy and biocultural conservation at the Omora Ethnobotanical Park: Methodological approaches to broaden the ways of integrating the social component ("S") in Long-Term Socio-Ecological Research (LTSER) Sites. *Revista Chilena de Historia Natural* 83: 27-68.

Rozzi, R., J. Armesto, J. Gutierrez, C. Anderson, F. Massardo, G. Likens, A. Poole, K. Moses, E. Hargrove, A. Mansilla, J. Kennedy, M. Willson, K. Jax, C. Jones, J.B. Callicott & M. Arroyo. 2012. Integrating ecology and environmental ethics: Earth stewardship in the southern end of the Americas. *BioScience* 62: 226-236.

Steinbeck, J. & E.F. Ricketts. 1941. *Sea of Cortez: A Leisurely Journal of Travel and Research*. Viking Press. Chapters 4 and 21.

Sutherland, W.J. 2003. Parallel extinction risk and global distribution of languages and species. *Nature* 423: 276-279.

Vuilleumier, F. 1985. Forest birds of Patagonia: Ecological geography, speciation, endemism and faunal history. *Ornithological Monographs* 36: 255-304.

Supplementary Readings

- Contador, T.A., J. Kennedy & C.B. Anderson. Benthic macroinvertebrate distribution and functional feeding structure along the altitudinal gradient of a Sub-Antarctic fluvial system in the Cape Horn Biosphere Reserve, Chile (55°S). *Freshwater Science*. In review b.
- Darwin, C. 1838. *The Voyage of the Beagle*. Reprint, London: Everyman's Library, 1975.
- Ippi, S., C. Anderson, R. Rozzi & C. Elphick. 2009. Annual variation of abundance and composition in forest bird assemblages on Navarino Island, Cape Horn Biosphere Reserve, Chile. *Ornitología Neotropical* 20: 231-245
- Leopold, A. 1949. *A Sand County Almanac and sketches here and there*. Oxford University Press, New York.
- McEwan, C., L.A. Borrero & A. Prieto (eds.). 1997. Excerpts from *Patagonia: Natural History, Prehistory and Ethnography at the Uttermost End of the Earth*, Princeton University Press.
- Ojeda, J., T. Contador, S. Rosenfeld, C.B. Anderson, A. Mansilla & J. Kennedy. *Guía para la identificación de los invertebrados marinos y dulceacuícolas de la Reserva de Biosfera Cabo de Hornos*. Ed. Universidad de Magallanes, Punta Arenas.
- Ralph, C.J. 2005. The body grasp technique: a rapid method of removing birds from mist nets. *North American Bird Bander*. Apr-Jun: 65-70.
- Rozzi, R. & F. Massardo. 2011. The road to biocultural ethics. *Frontiers in Ecology* 9: 246-247.
- Rozzi, R. & J.E. Jiménez (eds.). *Ornitología Subantártica Magallánica, Primera Década de Estudios de Aves del Parque Etnobotánica Omora, Reserva de Biosfera Cabo de Hornos, Chile*. In preparation.
- Rozzi, R., F. Massardo, C. Anderson, K. Heidinger & J. Silander Jr. 2006. Ten Principles for Biocultural Conservation at the Southern Tip of the Americas: The Approach of the Omora Ethnobotanical Park. *Ecology & Society* 11(1): 43. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art43/>
- Vannote, R. et al. 1980. The river continuum concept. *Canadian Journal Fisheries and Aquatic Sciences* 37: 130-137.

TENTATIVE SCHEDULE

| DAY | DATE | CITY | GENERAL ACTIVITIES | THEMATIC TOPICS | READINGS *Required |
|-----|-------|------------|--|---|---|
| Wed | 12/26 | DFW-SCL | Fly from Dallas to Santiago | - | - |
| Thu | 12/27 | SCL-PUQ | Arrive in Santiago and continue to Punta Arenas | - | - |
| Fri | 12/28 | PA | Visit Maggiorino Borgatello museum and penguin colony | Introduction to the region and historical background | McEwan et al. 1997 *Darwin 1838: 204-231 |
| Sat | 12/29 | PA | Visit Pali Aike | Regional ecosystems | *Rozzi et al. 2012: 226-236 |
| Sun | 12/30 | PA | Visit Magallanes NR and museum | Regional ecosystems | *Rozzi et al. 2012: 226-236 |
| Mon | 12/31 | PUQ-PW | Fly to Puerto Williams Tour to Omora Park | Introduction to Omora Park | Rozzi et al. 2006, *2008: 325-336 |
| Tue | 1/1 | PW | Hike to top of Bandera hill | Altitudinal gradient characterization | |
| Wed | 1/2 | PW | Introduction to birds mist netting and aquatic invertebrate sampling Habitat recognition activities at Omora Park Ethno-ecology activity w/Julia Gonzalez (reeds collecting, Yahgan Village) | Introduction to sub-Antarctic birds and aquatic invertebrates Ethno-ecology | *Vuilleumier 1985 *Contador et al. 2012 *Sutherland 2003: 276-279 Rozzi & Massardo 2011: 246-247 Vannote et al. 1980: 130-137 |
| Thu | 1/3 | PW | Bird mist netting and aquatic invertebrate sampling Field Environmental Philosophy Bryophyte conservation | Sampling and research techniques Introduction to field environmental philosophy and conservation | *Rozzi et al. 2010: SM19-SM28 Bryophyte reading Ralph 2005 Ojeda et al. 2010 |
| Fri | 1/4 | PW | Bird and aquatic invertebrates sampling and data collection Bird diet analysis | Sampling and research techniques at Omora Park | *Elphick et al. <i>in preparation</i> : TBA *Pearson Ralph et al. 1985 Ippi et al. 2009: 231-245 |
| Sat | 1/5 | PW | Hike to and camp at Robalo Lake | Field environmental philosophy Methodological practice at Camp Site | *Leopold 1949: vii-ix, 201-226 |
| Sun | 1/6 | PW | Sampling and data collection of birds and aquatic insects in the Robalo watershed | Field environmental philosophy Methodological practice | *Leopold 1949: 87-92, 108-112, 129-133 |
| Mon | 1/7 | PW | Sampling and data collection of birds and aquatic insects in the Robalo watershed | Reflections on experiences | *Steinbeck & Ricketts 1941: Chapters 4 & 21 |
| Tue | 1/8 | PW | Hiking back to Puerto Williams | - | - |
| Wed | 1/9 | PW | Analysis of samples and data preparation for presentations | Laboratory work | *Pearson Ralph et al. 1985 Ojeda et al. 2010 |
| Thu | 1/10 | PW | Analysis of samples and data preparation for presentations, continued Students' presentations | Laboratory work and synthesis | *Pearson Ralph et al. 1985 Ojeda et al. 2010 Rozzi & Jiménez <i>in preparation</i> |
| Fri | 1/11 | PW-PA | Farewell and closing discussions Collection of field notebooks Fly to Punta Arenas | - | - |
| Sat | 1/12 | PA-SCL-DFW | Fly to Santiago Fly to the U.S. | - | - |
| Sun | 1/13 | DFW | Arrive in Dallas-Fort Worth | - | - |

DFW: Dallas-Fort Worth Airport, SCL: Santiago, PUQ: Punta Arenas Airport, PA: Punta Arenas, PW: Puerto Williams