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Programa de Conservación Biocultural Subantártica

Sub-Antarctic Biocultural Conservation Program

Universidad de Magallanes, Instituto de Ecología y Biodiversidad, Chile
& University of North Texas, USA

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

2014-2015 Schedule of Activities, Program & Syllabus

Core Professors

Dr. Jaime E. Jiménez, *wildlife ecologist*, UNT-UMAG-IEB
Dr. James Kennedy, *stream ecologist*, UNT-UMAG
Dr. Ricardo Rozzi, *conservation biologist & environmental philosopher*, UNT-UMAG-IEB
Dr. Tamara Contador, *stream ecologist*, UMAG course coordinator

Assistant Professor

Dr. Rajan Rijal, *environmental scientist*, UNT

Invited Professors

Dr. Robert Capers, *plant ecologist*, University of Connecticut, (UConn), USA
Dr. Melinda Coogan, *stream ecologist*, Buena Vista University, Iowa, USA
M.Sc. Guido Coppari, *environmental history*, Universidad Andrés Bello, Santiago, Chile
Dra. Alicia Bugallo, *philosopher*, Universidad de Ciencias Empresariales y Sociales, Bs.As.
Dr. Bernard Goffinet, *bryologist*, University of Connecticut, Connecticut, USA
Dr. Jeremy Horpedahl, *economist*, Buena Vista University, Iowa, USA
Dr. Tetsuya Kono, *philosopher*, Rikkyo University, Tokyo, Japan
Dr. JoAnn Nunnally, *Director Disability Support Services*, Texas Woman's University, TX, USA
M.A. Paola Vezzani, *visual artist*, UMAG & Omora Park, Chile

Teaching Assistant

Ramiro Crego, *doctoral student in Biological Sciences*, UNT
Lily Lewis, *doctoral student in ecology and evolutionary biology*, UConn

Omora Staff

Omar Barroso, *ornithology research assistant*, IEB-Omora Park
Paula Caballero, *extension specialist*, IEB, Punta Arenas
Simón Castillo, *wildlife & scientific tourism*, Omora Park, *accepted MS student*, UNT
Patricia Duarte, *secretary*, UMAG – Puerto Williams
Kelli Moses, *biologist, international courses coordinator*, IEB-Omora Park
Javier Rendoll, *field course support*, Master student at UMAG, IEB-Omora Park
Jennifer Torres, *accountant*, IEB-Omora Park
Miguel Troncoso, *field course support*, IEB-Omora Park
Camila Saldías, *Omora Park education coordinator*, UMAG–Puerto Williams

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

COURSE DESCRIPTION:

Overview: The University of North Texas (UNT), study abroad course, Tracing Darwin's Path (TDP) is part of UNT's Sub-Antarctic Biocultural Conservation Program (www.chile.unt.edu). It is taught in partnership with a masters-level class in conservation, Field Biocultural Conservation at the University of Magallanes (UMAG), Chile. Both courses are also taught as 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).

The Field Biocultural Conservation (FBC), and TDP courses will be held between 29 December 2014 and 16 January 2015. 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. The goals of the course are to 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 in the Omora Ethnobotanical Park (OEP), a long-term ecological study site that serves to *link society and development with biodiversity, history and ecosystems* in the Cape Horn Biosphere Reserve.

Additionally, The International Association of Bryologists 2015 "World Conference" will be held at the Omora Ethnobotanical Park along the southern shore of the Beagle Channel near Puerto Williams, the Capital of the Antarctic Province of Chile, in the UNESCO Cape Horn Biosphere Reserve (CHBR), 11 to 15 January 2015.

The students will have a unique opportunity to participate in this World Conference during the course. Participating in the international pre-conference workshops as well as field activities and seminars during the conference. The students will have the opportunity to interact with world leading researchers in the fields of environmental conservation, environmental sciences, arts, and bryology. Among the expected participants are Chilean senators and government authorities, upper administrators from academic institutions, distinguished Nobel Prize winners, and founding researchers of the Cape Horn Biosphere Reserve. This will further foster the trans-disciplinary, international experience of student, involvement exchange of ideas and exploration of opportunities to work in the field of biocultural conservation. Participating in the workshop on the novel activity, "Ecotourism with a hand lens" will help students' to be actively involved in the conference and practicing the biocultural conservation approach. The students will be ambassadors for the universities that they are attending.

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).

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, non-vascular plants) taxonomic groups.

- 3) To use 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.
- 4) Partner students from different cultures along with different academic interests, cultural issues and perspectives to provide the opportunity for an interdisciplinary experience that integrates philosophical, ecological, environmental, and conservation issues. Through these opportunities students will discover and better understand their roles as global citizens.

Instructors will strive to provide a characterization of scientific and philosophical research to help make distinctions between these approaches, as well as identify complementarities between them.

Research topics of the TDP-FBC January 2014-2015 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 penguin colonies, watersheds dominated by *Nothofagus* forests, etc.).

This year, the class will participate in three long-term studies designed to better understand the ecology of the sub-Antarctic forests of the Cape Horn Biosphere Reserve (55°). The research activities will include research on:

- 1) The biology of the bird species that inhabit the southernmost forests through Omora Park's long-term bird-banding program.
- 2) Long term studies of freshwater invertebrate diversity and phenology.
- 3) Freshwater water quality assessments as they relate to human presence in Puerto Williams.
- 4) Ecotourism and Biocultural Conservation in the Miniature Forests of Cape Horn.

These activities will include study sites in OEP and in the Robalo Watershed on Navarino Island. A specific schedule of activities is provided in the tentative schedule of activities.

Bird and Terrestrial Invertebrate Studies

Specific Ornithological questions, which will be investigated by the students during this course include:

- A) How long do birds live?
- B) What do birds eat?
- C) What food is available for birds?

Aquatic Invertebrates as indicators of watershed health and long-term Climate Change in Magellanic sub-Antarctic freshwater ecosystems

- A) What are the phenological patterns of the major aquatic insect species in the rivers of the CHBR?

- B) How are life cycles of aquatic invertebrates influenced by external factors such as temperature and changes to environmental conditions in the watershed?
- C) How do aquatic insects link terrestrial and aquatic ecosystems?
- D) How do aquatic invertebrates change relative to human impacts?

Freshwater water quality assessments of rivers associated to urban areas in Puerto Williams

- A) How do key water quality characteristics change along a stream gradient?
- B) How does water quality change relative to human presence?

Ecotourism and Biocultural Conservation

Finally, students will learn, practice and experience the methodology of Field Environmental Philosophy, which integrates ecological sciences and environmental ethics through a 4-step cycle: 1) Interdisciplinary research (freshwater ecology and ornithological work); 2) Communication through the composition of simple narratives and metaphors (The miniature forests of Cape Horn, The River as a Community of Life), 3) Development of field activities with an ethical and an ecological orientation (Ecotourism with a Hand Lens, Underwater with a Hand Lens), 4) In situ Conservation (Miniature Forests of Cape Horn and Underwater Inhabitants of the rivers of Cape Horn interpretative trails).

- A) Students will practice the ecologically and ethically- guided field activities as a way of understanding ecotourism as a tool to contribute to biocultural conservation in the Magellanic sub-Antarctic ecoregion.
- B) Students will be required to take what they have learned from the course and prepare activities for tourists, and other visitors to Omora Park that include an ecological and ethical orientation.
- C) Activity approaches will aim for visitors to gain not only an understanding and knowledge about the unique sub-Antarctic biodiversity, but also provide a transformative experience to cultivate an ethical and sustainable relationship with this biodiversity, both locally and globally. Experience will focus on ecotourism with a hand-lens.

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 should be submitted by e-mail no later than 5:00pm on January 30, 2015.

2) *Ecotourism with a Hand Lens in the miniature forests of Cape Horn* (10%)

Students will gain a general overview of bryology and identify mosses, liverworts, and lichens on different substrates (bark, soil, rock) and their ecological interactions with other plants, animals, and ecosystem functions. Students will also clearly define economic, aesthetic, ecological, and ethical values of bryophytes and biodiversity in general. They will integrate this understanding with the metaphor of the hand lens and the activity of ecotourism with a hand lens, designing their own way of guiding this activity. This will prepare them to be actively involved in the conference and practicing the biocultural conservation approach to promote the integration of ecological sciences and environmental ethics, and the conservation of the tiny plant and animal inhabiting of the Miniature Forests of Cape Horn that so often are overlooked in traditional conservation initiatives. This activity will be assigned and graded during the course.

3) Description of the climate and freshwater ecosystems (10%)

Each student, using the readings (particularly useful will be Hynes 1975 and Vannote *et al.* 1979 papers), will be required to write a narrative describing the changes they expect to observe and measure in the Robalo River watershed from the headwaters to the river's mouth. The paper should also contrast annual climatic conditions in the Cape Horn region to those seen at similar latitude in the Northern Hemisphere. For credit, the completed assignment should be submitted by email no later than 5:00pm on December 28, 2014.

4) 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. For credit, the completed assignment should be submitted by email no later than 5:00pm on December 28, 2014.

5) Natural History / Art Journal (15%)

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 drawing. 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 on January 15, 2015, and may be copied before being returned to the student.

6) Guided Field Activities (15%)

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. This activity will be assigned and graded during the course.

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

A list of mandatory, suggested and supplemental readings is provided in a section following the list of activities. 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 15th.

COURSE OUTLINE AND TENTATIVE SCHEDULE:

On days when multiple activities are scheduled, course participants will be divided into smaller groups that will rotate through laboratory and field activities course activities. Please note that this schedule is tentative. Weather or other events beyond the instructors control may require changes to the schedule.

Tentative Schedule and Activities TDP: Field Biocultural Conservation (Conservacion Biocultural de Campo) 29 December 2014 – 18 January 2015				
Day of week	Date	General Activities	Thematic Topics	Readings
Mon	29	Fly from Dallas to Santiago	-	-
Tue	30	Arrive SCL and fly to Punta Arenas. Arrive in P. Arenas	-	-
Wed	31	AM: Visit to Reserva de Magallanes PM: Penguin colony at Otway (north of Punta Arenas)	Introduction to relevant course topics (J. Kennedy & R. Rijal) Disability Liberation and the Eco-Ability Movement (J. Nunnally) Taxonomic bias & chauvinism and Ecotourism with a hand-Lens (R. Rozzi, P. Vezzani & graduate students) Environmental Philosophy & Biocultural Conservation (J. Kennedy & R. Rozzi)	*Bonnet <i>et al.</i> 2002 *Leopold 1949: vii-ix, 108-112, 129-133, 201-226 *Rozzi <i>et al.</i> 2008a: 325-330 *Rozzi <i>et al.</i> 2010b: SM19-SM28
Thu	1	AM: Seminars at Hain Hostal 4:00 PM Ferry to Puerto Williams	Introduction to plant ecology and bryophytes: Inter-hemispheric comparisons (R. Capers) Introduction to Political and Economic History of Chile since 1970 (J. Horpedahl)	*Goffinet <i>et al.</i> 2012. Chapters 1, 2 & 3 McEwan <i>et al.</i> 1997 *Rozzi <i>et al.</i> 2008b
Fri	2	Navigation along the Darwin Cordillera and glaciers	Regional ecosystems (M. Coogan & J. Kennedy)	*Darwin 1838: 204-231 *Rozzi & Jiménez 2014 Chapter 1 *Rozzi <i>et al.</i> 2012a:

				226-236
Sat	3	Day: Hike to Lake Robalo Night 1: Camping at Lake Robalo	Altitudinal gradient Habitat characterization Sub-Antarctic birds: Sampling & research techniques (J. Jimenez) Field Environmental Philosophy: (FEP) Step 1 (T. Contador & graduate students)	Contador <i>et al. in review</i> Contador & Kennedy 2014 Contador <i>et al.</i> 2014 *Elphick <i>et al.</i> 2014 Ippi <i>et al.</i> 2009: 231-245 *Leopold 1949: 129-133 (Thinking like a mountain) *Vannote <i>et al.</i> 1980: 130-137
Sun	4	Day1: Field work Night 2: Camping at Lake Robalo	Group 1: Birds, mammals & plants (J. Jimenez, R. Crego & R. Capers) Group 2: Fresh water quality and invertebrates monitoring (M. Coogan, T. Contador & J. Kennedy) FEP Step 2 (T. Contador & graduate students)	*Ralph 2005 Rozzi & Jiménez 2014 *Ojeda <i>et al.</i> 2010 *Rozzi <i>et al.</i> 2010b: SM19-SM28
Mon	5	Day2: Field work Night 3: Camping at Lake Robalo	Group 2: Birds, mammals & plants (J. Jimenez, R. Crego & R. Capers) Group 1: Fresh water quality and invertebrate monitoring (M. Coogan, T. Contador & J. Kennedy) FEP Step 3 (T. Contador & graduate students)	*Hynes 1975: 1-15
Tue	6	AM: Hike back to Puerto Williams PM: Free time for showers/resting	FEP Step 4 (R. Rozzi, T. Kono & graduate students)	*Steinbeck & Ricketts 1941: Chapters 4 & 21
Wed	7	FEP & Biodiversity monitoring Introduction to Omora Ethnobotanical Park (OEP) and Ecotourism with a Hand-Lens (EHL)	Early morning Bird Group 1 Early morning Invertebrates Group 2 Early morning Plants Group 3 11AM: Introduction to OEP FEP – EHL Workshop (R. Rozzi, L. Lewis & graduates)	*Rozzi <i>et al.</i> 2012b *Goffinet <i>et al.</i> 2012
Thur	8	FEP & Biodiversity monitoring Workshop on EHL	Early morning Bird Group 3 Early morning Invertebrates Group 1 Early morning Plants Group 2 11AM: FEP – EHL Workshop (L. Lewis & R. Rijal)	Rozzi <i>et al.</i> 2010b: SM19-SM28
Fri	9	FEP & Biodiversity monitoring Workshop on EHL Workshop on Yaghan	Early morning Bird Group 2 Early morning Invertebrates Group 3 Early morning Plants Group 1 11AM: FEP – EHL Workshop (L. Lewis, P. Caballero, C. Saldías & R. Rijal)	*Sutheland 2003

		handicraft	3-6PM: Handicraft workshop (J. Gonzalez & T. Contador)	
Sat	10	EHL: Internal workshop	All students are prepared to guide EHL for IAB participants See International Association of Bryologists' (IAB) Program http://chile.unt.edu/iab2015 : Workshop: Arts, Science & Ethics (P. Vezzani, L. Lewis & A. Bugallo)	-
Sun	11	EHL: Workshop with local community members and tour operators World Congress of the International Association of Bryologist (IAB): Inauguration	All students are prepared to participate in EHL with members of the local community See IAB Program	-
Mon	12	<u>IAB Conference</u>	See IAB Program	-
Tues	13	<u>IAB Conference</u>	AM: Students prepare presentations PM: see IAB Program	-
Wed	14	<u>IAB Conference</u>	AM: Students prepare presentations PM: see IAB Program	-
Thur	15	AM: IAB Conference PM: Students Presentations Evening: Closing Celebration	AM: See IAB Program PM: Students presentations	-
Fri	16	AM: Depart Puerto Williams to Punta Arenas PM: Punta Arenas free time	-	-
Sat	17	Depart for Santiago for US	-	-
Sun	18	Arrive in the US	-	-

* Required readings

READINGS

Required Textbooks

- Goffinet, B., R. Rozzi, L. Lewis, W. Buck & F. Massardo. 2012. *The Miniature Forests of Cape Horn: Eco-Tourism with a Hand-lens* ("Los Bosques en Miniatura del Cabo de Hornos: Ecoturismo con Lupa"). Bilingual English-Spanish edition. UNT Press-Ediciones Universidad de Magallanes, Denton TX and Punta Arenas, Chile. 448 pp. ISBN 978-1-57441-282-6.
- Rozzi, R. & J.E. Jiménez (eds.). 2014. *Magellanic Sub-Antarctic Ornithology. First decade of long-term bird studies at the Omora Ethnobotanical Park, Cape Horn Biosphere Reserve, Chile*. University of North Texas Press-Universidad de Magallanes, Denton, TX and Punta Arenas, Chile. 364 pp. ISBN-13: 978-1-57441-531-5.
- 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. University of North Texas Press-Ediciones Universidad de Magallanes, Denton, TX and Punta Arenas, Chile. 235 pp. ISBN-13: 978-57441-282-6.

Required Reading List

- Bonnet, X., R. Shine & O. Lourdaïs. 2002. Taxonomic chauvinism. *Trends in Ecology and Evolution* 17: 1-3.
- 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. 2014. Seasonal dynamics of the Sub-Antarctic bird community in different habitats of the Cape Horn Biosphere Reserve. Introduction to Section 2, pp. 185-187, in Rozzi, R. & J.E. Jiménez (eds.), *Sub-Antarctic Magellanic Ornithology, First Decade of Bird Studies at Omora Ethnobotanical Park: Cape Horn Biosphere Reserve*. UNT Press - Ediciones Universidad de Magallanes, Denton TX, USA - Punta Arenas, Chile.
- Hynes, H.B.N. 1975. The stream and its valley. Edgardo Baldi Memorial Lecture. *Verhandlungen des Internationalen Verein Limnologie* 19: 1-15.
- Leopold, A. 1949. Foreword (pp. vii-xi), 65290 (pp. 87-92), On a monument to the pigeon (pp. 108-112), Thinking like a mountain (pp. 129-133), The land ethic (pp. 201-226), in *A Sand County Almanac and sketches here and there*. Oxford University Press, New York.
- Ojeda, J., T. Contador, S. Rosenfeld, C.B. Anderson, A. Mansilla & J. Kennedy. 2010. *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., X. Arango, F. Massardo, C. Anderson, K. Heidinger & K. Moses. 2008a. Field Environmental Philosophy and Biocultural Conservation: The Omora Ethnobotanical Park Educational Program. *Environmental Ethics* 30: 325-336.
- Rozzi, R., J.J. Armesto, B. Goffinet, W. Buck., F. Massardo, J. Silander, Jr., M.T.K. Arroyo, S. Russell, C.B. Anderson, L.A. Cavieres, & J.B. Callicott. 2008b. Changing lenses to assess biodiversity: patterns of species richness in sub-Antarctic plants and implications for global conservation. *Frontiers in Ecology* 6: 131-137
- Rozzi, R., C. Anderson, C. Pizarro, F. Massardo, Y. Medina, A. Mansilla, J. Kennedy, et al. 2010b. 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. 2012a. 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.
- Vannote, R.L., G.W. Minshall, K.W. Cummins, J.R. Sedell & C.E. Cushing. 1980. The river continuum concept. *Canadian Journal Fisheries and Aquatic Sciences* 37: 130-137.

Supplementary Textbooks

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

Rozzi, R., L. Lewis, F. Massardo, Y. Medina, K. Moses, M. Méndez, L. Sancho, P. Vezzani, S. Russell & B. Goffinet. 2012b. *Ecotourism with a Hand-Lens at Omora Park*. It includes the documentary "The Invisible Journey" by Jaime Sepúlveda, and photography by Adam Wilson. Ediciones Universidad de Magallanes, Punta Arenas, Chile. 190 pp. ISBN 978-956-9160-00-4.

Supplementary Readings

- Contador, T.A. & J.H. Kennedy. 2014. *Habitantes Sumergidos bajo los ríos de Cabo de Hornos. Underwater inhabitants of the rivers of Cape Horn*. Ediciones Universidad de Magallanes. 96 pp. ISBN: 978-956-358-063-1.
- 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.H. Kennedy, R. Rozzi & J. Ojeda. *In review*. Sharp altitudinal gradients in Magellanic sub-Antarctic streams: thermal patterns and benthic macroinvertebrate communities along a fluvial system in the Cape Horn Biosphere Reserve. *Polar Biology*.
- Contador, T., J. Kennedy, J. Ojeda, P. Feinsinger & R. Rozzi. *Accepted*. Ciclos de vida de insectos dulceacuícolas y cambio climático global en la ecorregión subantártica de Magallanes: investigaciones ecológicas a largo plazo en el Parque Etnobotánico Omora, Reserva de Biosfera Cabo de Hornos (55°S). *Bosque* 35: 429-437.
- 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.
- Naess, A. 1973. The shallow and the deep, long-range ecology movements. *Inquiry* 16: 95-100.
- Pearson Ralph, C., S.E. Nagata & C.J. Ralph. 1985. Analysis of droppings to describe diets of small birds. *Journal of Field Ornithology* 56: 165-174.
- Pyle, P., S.N. Howell, R.P. Yumick & D.F. DeSante. 1987. *Identification guide to North American Passerines*. Slate Creek Press, Bolinas, California.
- Rozzi, R. & F. Massardo. 2011. The road to biocultural ethics. *Frontiers in Ecology* 9: 246-247.
- 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/>
- Vuilleumier, F. 1985. Forest birds of Patagonia: Ecological geography, speciation, endemism and faunal history. *Ornithological Monographs* 36: 255-304.

University Obligations and Policies

BEHAVIOR

Study abroad trips require considerable flexibility, maturity and cultural sensitivity. The culture and the political system you will be exposed to in this class will be different than the US and may provoke strong emotional responses. We expect that you will strive to understand the culture and learn to reason through any uncomfortable, but productive, experiences.

HEALTH, SAFETY, LEGAL ISSUES ABROAD

UNT's study abroad program will provide guidance regarding legal issues associated with travel to Chile. They will also provide travel health insurance information via the study abroad application link.

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 makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. *Students are strongly encouraged to deliver letters of accommodation during faculty office hours or by appointment. Faculty members have the authority to ask students to discuss such letters during their designated office hours to protect the privacy of the student.* For additional information see the Office of Disability Accommodation website at <http://www.unt.edu/oda>. You may also contact them by phone at 940.565.4323.

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