



HAIDA GWAI
HIGHER EDUCATION SOCIETY

Applied Ecology of Coastal Terrestrial Ecosystems

HGSE 355

**** THIS IS A SAMPLE SYLLABUS, GUESTS, FIELD TRIPS AND OTHER COURSE DETAILS MAY VARY FROM YEAR TO YEAR. Contact HGHE for more details.**

Instructor:	Dr. Sue Grayston
Credits:	3

Course Description:

This course provides an in-depth examination of the processes that shape coastal terrestrial ecosystems through time and applications of that information to present-day management. Topics include geological history of BC's coast; soils; Biogeoclimatic Ecosystem Classification (BEC); stand age dynamics; productivity; nutrient, carbon, and water cycling; Haida cultural forest resources; natural and anthropogenic disturbance ecology; forest management practices; ecological succession; and biological diversity and ecological resilience.

Students will explore a wide variety of ecosystem types throughout the course and there will be a strong field component to the class. Field exercises are designed to teach students how to describe forest ecosystems and assess site quality as well as examine a variety of natural and anthropogenic forest disturbances, and understand the unique forest management on Haida Gwaii related to shared/joint decision making and the Land Use Objectives Order.

Course Objectives:

By the end of this course, students will be able to:

- Understand and recognize the terrestrial ecosystem types found on Haida Gwaii, and the primary tree/plant species that comprise them.
- Understand Haida Gwaii's geological history and its relevance to current landscape and forest composition.
- Understand forest productivity basics, carbon and nutrient cycling.
- Understand the influence of site and environmental factors, disturbance and succession in regulating forest composition.
- Understand the major agents and processes in natural and anthropogenic forest disturbances.
- Understand how to describe forest ecosystems and assess site quality.
- Understand the influence of forest management practices on the diversity and



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- resilience of terrestrial ecosystems at multiple scales.
- Understand the Haida Gwaii Land Use Objectives Order in the context of integrated decision-making.

Course Organization:

This course is comprised of field trips and exercises in the ecosystems of Haida Gwaii, lectures, guest lectures, class discussions, a debate, and a mini research project. A typical day would be lectures/discussion followed by a trip to the field to observe ecosystems and processes in situ. At the end of week 2 the course will include a trip to Gwaii Haanas where students will observe forest ecosystems and a variety of natural disturbances and receive an introduction to topics covered in the other courses during the semester.

Course Evaluations:

Field Trip Report (1) - 20%

Following the first week of class, students summarize what they have learned about the different BEC zones of Haida Gwaii in a report based on observations taken throughout the week and provides an overview of ecosystem types, key species found and any management practices observed.

Field Trip Report (2) - 20%

Following the second week of class, students summarize what they learned about the disturbance regimes in Haida Gwaii in a report based on observations taken on the field trips throughout the week and should discuss observational techniques used in determining disturbance cause.

Discussion Paper – 30%

Presentation - 20%

Students will undertake a discussion paper on the question: Should we be managing the deer populations on Haida Gwaii for plant biodiversity? (6 pages).

On the final day the class will have a debate on this question, the class will be split into two groups and one group will argue for, and one against, managing the deer populations on Haida Gwaii for plant biodiversity.

Class Participation - 10%

Active participation in class is essential and will be measured in a variety of ways. Attendance is mandatory. Students must demonstrate their engagement with the



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course by participating actively in field activities and in class discussions, both through thoughtful contributions to discussions and active listening.

Assigned Readings:

Required Text:

Pojar, J., and MacKinnon, A. 1994. Plants of coastal British Columbia. Lone Pine Publishing, Vancouver, B.C.

Required Reading:

Haida Gwaii Strategic Land Use Agreement

http://archive.ilmb.gov.bc.ca/slrp/docs/Haida_SLUPA_Dec_07.pdf

Supplementary Texts:

Perry, D.A., R. Oren and S.C. Hart. 2008. Forest Ecosystems. 2nd Edition. The Johns Hopkins University Press, Baltimore.

Chapin, F.S, P.A. Matson and H.A. Mooney. 2003. Principles of Terrestrial Ecosystem Ecology. Springer, New York.

Kimmins, J.P. 1996. Forest Ecology. Third edition. Princeton Hall, New Jersey.

D. Binkley and Fisher R.F. 2013. Ecology and Management of Forest Soils. Fourth Edition. John Wiley & Sons Inc., Toronto.

Turner, N.J. 2010. Plants of Haida Gwaii. Sono Nis Press: Victoria, British Columbia. 264pp.

Kroeger, P., Kendrick, B., Ceska O. and Christine Roberts, C. 2012. The Outer Spores. Mushrooms of Haida Gwaii. Mycologue Publications, Sidney-by-the-sea, B.C. 200pp.

Week	Theme	Readings
One	Haida Gwaii ecosystems overview; Basic stand and vegetative composition; geological history; Soil and parent materials;	Brodo I.M. (2010). The lichens and lichenicolous fungi of Haida Gwaii (Queen Charlotte Islands), British Columbia, Canada. 5. A new species of <i>Lecanora</i> from shoreline rocks. Botany 88: 352-358. Demboski, J.R., Stone, K.D. and Cook, J.A. (1999). Further Perspectives on the Haida Gwaii Glacial Refugium.



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	<p>BEC, Nutrient cycling; Haida cultural forest features and traditional knowledge</p>	<p>Evolution 53: 2008-2012.</p> <p>Kranabetter JM et al., (2009). Ecological descriptions of Pacific golden chanterelle <i>Cantharellus formosus</i>) habitat and estimates of its extent in Haida Gwaii. <i>BC Journal of Ecosystems and Management</i> 10(1):59–67.</p> <p>Lavelle P (1996). Diversity of soil fauna and ecosystem function. <i>Biology International</i> 33:3-16.</p> <p>Pojar J., Klinka K., Meidinger D.V. (1987). Biogeoclimatic ecosystem classification in British Columbia. <i>Forest Ecology and Management</i> 22: 119-154.</p> <p>Prescott, C.E. and Grayston, S.J. (2013). Tree species influence on microbial communities in litter and soil: current knowledge and research needs. <i>Forest Ecology and Management</i> 309: 19-27.</p> <p>Turner NJ and Turner KL (2008). Where women get food: cumulative effects and loss of ethnobotanical knowledge and practice; case study from coastal British Columbia <i>Botany</i> 86:103-115.</p> <p>Turner NJ et al., (2009). Cultural Management of Living Trees: An International Perspective. <i>Journal of Ethnobiology</i> 29(2):237-270.</p> <p>Walker, I.J. and Barrie, J.V. (2006). Geomorphology and sea-level rise on one of Canada's most sensitive coasts: Northeast Graham Island, British Columbia. <i>Journal of Coastal Research</i> 1: 220-226.</p>
<p>Two</p>	<p>Vegetation composition and growth; Disturbance ecology</p>	<p>Daniels L. (2003). Western red cedar population dynamics in old-growth forests: Contrasting ecological paradigms using tree rings. <i>The Forestry Chronicle</i> 79(3): 517-530.</p> <p>Fukami T. et al., (2006). Above- and below-ground impacts of introduced predators in seabird-dominated island ecosystems. <i>Ecological Letters</i> 9:1299-1307.</p> <p>Hennon PE et al., (2005). Yellow-Cedar Decline in the</p>



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		<p>North Coast Forest District of British Columbia USDA Forest Service Research Note PNW-RN-549 October 2005.</p> <p>Martin JL et al., (2010). Top-down and bottom-up consequences of unchecked ungulate browsing on plant and animal diversity in temperate forests: lessons from a deer introduction. <i>Biological Invasions</i> 12:353–371.</p> <p>Mulder CPH et al., (2009). Direct and indirect effects of rats: does rat eradication restore ecosystem functioning of New Zealand seabird islands? <i>Biological Invasions</i> 11:1671-1688.</p> <p>Stroh N. et al., (2008). Deer prevent western redcedar (<i>Thuja plicata</i>) regeneration in old-growth forests of Haida Gwaii: Is there a potential for recovery? <i>Forest Ecology and Management</i> 255:3973-3979.</p> <p>Stockton SA et al., (2005). A natural experiment on the effects of high deer densities on the native flora of coastal temperate rain forests. <i>Biological Conservation</i> 126:118-128.</p> <p>Towns DR et al., (2009). Predation of seabirds by invasive rats: multiple indirect consequences for invertebrate communities. <i>Oikos</i> 118:420-430.</p> <p>Turner M.G. (2010). Disturbance and landscape dynamics in a changing world. <i>Ecology</i> 91, 2833-2849.</p>
Three	Succession; Management; Resilience	<p>Attiwill P.M. (1994) The disturbance of forest ecosystems: The ecological basis for conservative management. <i>Forest Ecology and Management</i> 63: 247-500.</p> <p>Franklin J.F., Spies T.A., Pelt R.V., Carey A.B., Thornburgh D.A., Berg D.R., Lindenmayer D.B., (...), and Chen J. (2002) Disturbances and structural development of natural forest ecosystems with silvicultural implications, using Douglas-fir forests as an example. <i>Forest Ecology and Management</i> 155 (1-3): 399-423.</p>



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		<p>Gaston AJ et al., (Eds.) (2008). Lessons from the Islands: introduced species and what they tell us about how ecosystems work. Proceedings from the Research Group on Introduced Species 2002 Symposium, Queen Charlotte City, Queen Charlotte Islands, British Columbia. Canadian Wildlife Service, Environment Canada, Ottawa</p> <p>Haida Gwaii Strategic Land Use Agreement http://archive.ilmb.gov.bc.ca/slrp/docs/Haida_SLUPA_Dec_07.pdf</p> <p>Holling, C. S. (1973) Resilience and stability of ecological systems. Annual Review of Ecology and Systematics 4: 1-23.</p> <p>Vila B et al., (2003). Response of young <i>Tsuga heterophylla</i> to deer browsing: developing tools to assess deer impact on forest dynamics. Trees 17:547-553.</p>
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Week 1	9am-12pm	1pm-4pm
Monday	Labour Day, No Class	
Tuesday	HGHEs Orientation	Lecture: Intro to the course, Interpretive Spirit Lake hike (long day)
Wednesday	Lecture: Soil properties, development and organisms; Gwaii Haanas	Field trip: CWH zone



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	orientation	
Thursday	All day field trip: ecology of the mountain hemlock and alpine tundra zones	
Friday	Lecture: Seminar	Independent Study
Week 2		
Monday	Lecture: TBD	TBD
Tuesday	Lecture: TBD	TBD
Wednesday	Guest Lecture: Intro to disturbance ecology	Lecture: Open lecture
Thursday	All day field trip: bog ecosystems, deer exclosures	
Friday	Gwaii Haanas Trip	
Saturday	Gwaii Haanas Trip	
Week 3		
Monday	Lecture: Nutrient cycling and decomposition	Guest Lecture: Forest management on Haida Gwaii
Tuesday	All day field trip: Forest sustainability tour	
Wednesday	All-Day Field trip	
Thursday	Independent Study	Final Debate
Friday	Lecture: Seminar	Independent Study