- PRINCIPLES OF ECOLOGY
- BIOLOGY 215 (10304)
- Sept 2016

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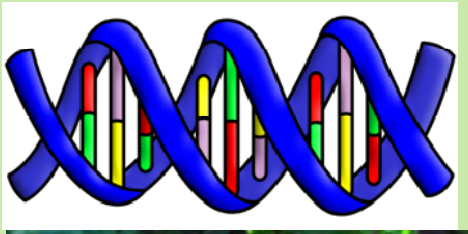
- Lectures MR: 0830-0950, David Turpin Building A120
- Labs: Cunn 245

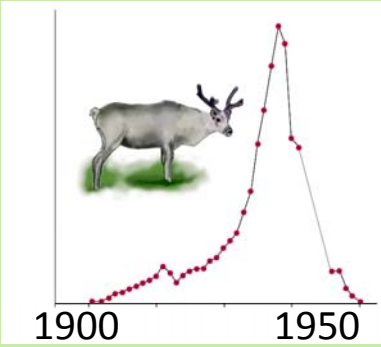
- **Course Outline**
- **Ecological genetics –genetic variability, natural selection, evolution**



- **Behavioral ecology- optimal foraging, territoriality, sex & mating systems, group living, life histories**

- **Population ecology- movement, estimating population size, life tables, mortality and survivorship curves, population growth and population regulation**

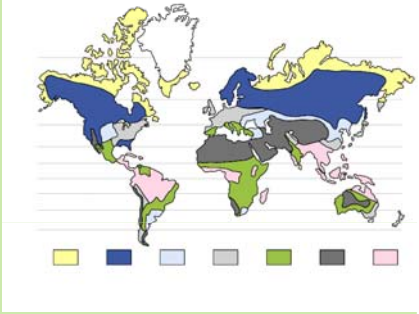
$$\frac{dN}{dt} = rN\frac{(K-N)}{K}$$



Ecological interactions- competition, niche, predation, defenses

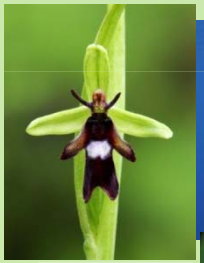
Community ecology- succession, trophic levels, nutrient cycling, keystone species

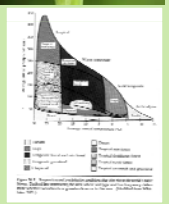
Major ecological communities- estuaries, intertidal, kelp forests, pelagic, deep sea, coral reefs, lakes, tundra, taiga, temperate forests, grasslands, deserts, tropical forests



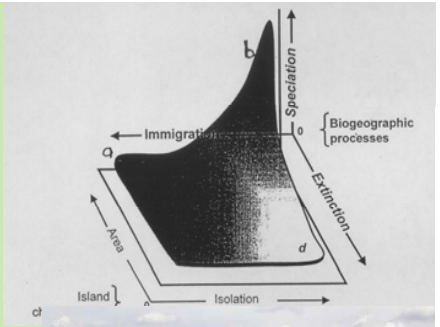
Global biodiversity- latitude, elevation, ocean depth

causes: evapotranspiration, spatial heterogeneity, geological history, complexity, stability



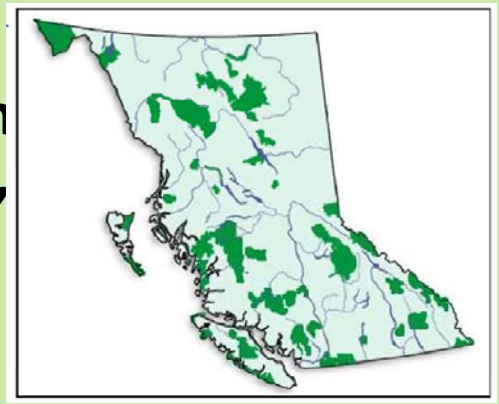


Island biogeography – island size, distance, species turnover, equilibrium & tripartite theory



Human impact on ecosystems – population growth, habitat loss, fragmentation, atmospheric contaminants, global temperature changes, freshwater and marine pollution, ocean acidification, overhunting and overfishing, superpredators, introduced species, extinctions

Conservation ecology- history, ecological footprint, IUCN categories, benefits and limitations of protected areas, SLOSS, minimum viable population (MVP), minimum viable area(MVA), critical habitats, hotspots, endemic species, park design, restoration



The future

- **Lectures**
- **Introduction**
- **Ecological genetics**
- **Behavioral ecology**
- **Population ecology**
- **Ecological interactions**
- **Community ecology**
- **Major ecological communities**
- **Global biodiversity**
- **Island biogeography**
- **Human impact on ecosystems**
- **Conservation ecology**
- **The future**

Lectures- 60% of course mark

Midterm exam*: 25% Oct20

Final*: 35% (not cumulative)

Labs-40% of course mark

***Marks posted using last 5 digits of ID#**

No deferral unless for medical condition

Labs

BIOLOGY 215--LAB SCHEDULE--FALL--2016

DATE (WEEK OF)	LAB #	LAB CONTENT
September 12	1	Ecological sampling: quadrat sampling, transect sampling, herbivory and Garry Oak Ecosystems
September 19	2	Morphological variation: Ecological adaptations of *Nucella lamellose*, confidence limits, histograms, barcharts, summary statistics
September 26	3	Mark and Recapture *Hemigrapsus* sp.
October 3	4	Predator/Prey: Orb-weaving spiders **Quiz 1**
October 10	5	**Thanksgiving – No Labs**
October 17	6	***Lab midterm exam***
October 24	7	Island Biogeography – Beetles and forest patches
November 7	8	**Reading Break – No Labs**
November 14	9	Exploring principles of community diversity: Soil litter/edge part 1
November 21	10	Soil litter/edge, diversity indices, part 2 **Quiz 2**
November 28	11	***Lab final exam***

LABORATORY MARK DISTRIBUTION (40% of the course mark)

Laboratory Quiz 1	Week of October 3	Mark 5.0%
Laboratory Quiz 2	Week of November 21	Mark 5.0%
Laboratory midterm exam:	Week of October 17	Mark 15.0%
Laboratory final lab exam:	Week of November 28	Mark 15.0%
Total laboratory mark:		**Total 40.0%**

Note 1: The laboratory final exam is cumulative. The quizzes will be based on your lab modules and are not cumulative.

Note: Students not wanting their marks posted using ID# should notify me at the beginning of the term. It is the student's responsibility to meet the ADD/DROP dates from the UVic calendar. Students are responsible for checking their own records and registration status. A supplementary exam is not permitted for those who get less than 50% in the combined lecture exams. "UVic is committed to promoting, providing and protecting a supportive and safe learning and working environment for all its members".

Sept 20: Last day for 100% reduction of tuition fees for standard first term and full year courses. 50% of tuition fees will be assessed for courses dropped after this date

Sept 23: Last day for adding courses that begin in the first term

Sept 30: Last day for paying first term fees without penalty

Oct 11: Last day for 50% reduction of tuition fees. 100% of tuition fees will be assessed for courses dropped after this date

Oct 20: Lecture mid-term exam

Oct 31: Last day for withdrawing from first term courses without penalty of failure

- **Lecture Text: -recommended but not required**
- **- any recent (>2000) secondhand text in Ecology**
- **Example: Molles and Cahill 2008- Ecology (Canadian Edition) –**
- **-limited quantity in bookstore**

- **Ecology Texts In Reserve Reading Room, McPherson Library**
- **Stiles; Freedman; Molles; Ricklefs ; Wilson**

- -pdfs of most lecture slides on CourseSpaces website within 6 hours following the lecture
- -lecture pdfs limited to personal use and not for redistribution
- -Access to 215 website restricted to registered students with a UVic email account.
- **Electronic Lab Manual/Modules-** required (approx. $12.50@bookstore)
- -bring memory stick to each lab

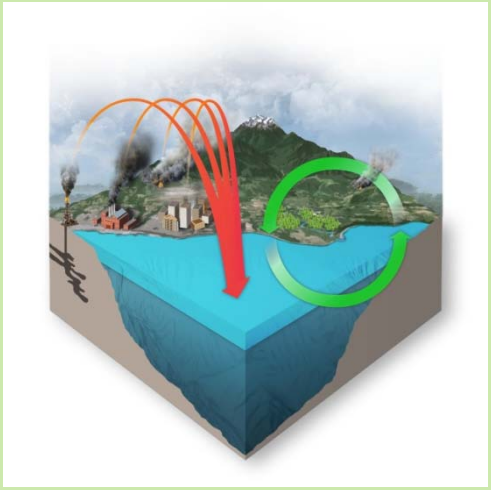
Interesting DVD's – David Attenborough, BBC (i.e. Planet Earth, Blue Planet, etc)

Additional readings to supplement lecture topics: examples- New Scientist, Conservation Biology, Ecology, Trends in Ecology and Evolution, Scientific American, Web of Science, Google Scholar, Google, Wikipedia

Literature searches????

- Earth's atmosphere

Nitrogen: 78%
Oxygen: 21%
Carbon dioxide: 0.04%



$C0_2+H_20=H_2C0_3$

$H_2C03=HC0_3^- + H^+$

Increased C02 results in increased ocean acidification

Google ocean acidification

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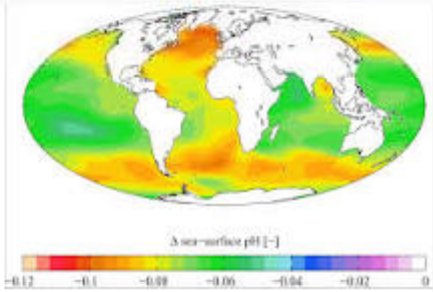
Ocean acidification is the ongoing decrease in the pH of the Earth's **oceans**, caused by the uptake of carbon dioxide (CO_2) from the atmosphere. Seawater is slightly basic (meaning pH > 7), and the process in question is a shift towards pH-neutral conditions rather than a transition to acidic conditions (pH < 7).



[Ocean acidification - Wikipedia, the free encyclopedia]
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O Hoegh-Guldberg, PJ Mumby, AJ Hooten... - ..., 2007 - science.sciencemag.org

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Anthropogenic **ocean acidification** over the twenty-first century and its impact on calcifying organisms

JC Orr, VJ Fabry, O Aumont, L Bopp, SC Doney... - Nature, 2005 - nature.com

Abstract Today's surface **ocean** is saturated with respect to calcium carbonate, but increasing atmospheric carbon dioxide concentrations are reducing **ocean** pH and carbonate ion concentrations, and thus the level of calcium carbonate saturation. **...**

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SC Doney, VJ Fabry, RA Feely, JA Kleypas - Marine Science, 2009 - annualreviews.org

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U Riebesell, PD Tortell - **Ocean acidification**, 2011 - books.google.com

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Volcanic carbon dioxide vents show ecosystem effects of **ocean acidification**

JM Hall-Spencer, R Rodolfo-Metalpa, S Martin... - Nature, 2008 - nature.com

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Impacts of **ocean acidification** on marine fauna and ecosystem processes


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By: Silva, Catia S. E.; Novais, Sara C.; Lemos, Marco F. L.; et al.

Ocean acidification has lethal and sub-lethal effects on larval development of yellowfin tuna, Thunnus albacares

By: Frommel, AY (Frommel, Andrea Y.)[1]; Margulies, D (Margulies, Daniel)[2]; Wexler, JB (Wexler, Jeanne B.)[2]; Stein, MS (Stein, Maria S.)[2]; Scholey, VP (Scholey, Vernon P.)[3]; Williamson, JE (Williamson, Jane E.)[4]; Bromhead, D (Bromhead, Don)[5]; Nicol, S (Nicol, Simon)[5]; Havenhand, J (Havenhand, Jon)[6]

JOURNAL OF EXPERIMENTAL MARINE BIOLOGY AND ECOLOGY
Volume: 482 **Pages:** 18-24
DOI: 10.1016/j.jembe.2016.04.008
Published: SEP 2016
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Abstract

Ocean acidification (OA), the process by which increasing atmospheric CO2 is absorbed by the ocean, lowering the pH of surface waters, has been shown to affect many marine organisms negatively. It has been suggested that organisms from regions with naturally low pH waters, such as upwelling areas, could serve as models for future effects of OA and may be adapted to increased pCO(2) levels. In this study, we examined the effects of OA on yellowfin tuna, a highly pelagic species that spawns in the eastern tropical Pacific, an area that includes regions of strong upwelling events. Larvae reared at decreasing pH levels (pH 8.1, 7.6, 7.3 and 6.9) showed increasing organ damage in the kidney, liver, pancreas, eye and muscle, which correlated with decreased growth and survival. These findings complement earlier studies on organ damage in Atlantic cod and herring larvae and demonstrate that OA may have detrimental effects on fish larvae, regardless of their pre-exposure to low pH waters.