Lecture 27, 24 Nov 2009
Con Bio in Practice

Conservation Biology
ECOL 406R/506R
University of Arizona
Fall 2009

Kevin Bonine
Mary Jane Epps

506 meet in BSE129
9am Wed (02 Dec)
T&R Jessen

Lab Friday 04 Dec
1pm departure
hat, water, snack

Readings
Primack CH7-8; Donlan et al. 2005, and optional readings
Kellerman et al. 2008

Tues 01 Dec. Creativity Exhibit (noon – 4pm in Forbes Lobby)
Thurs 03 Dec. Primack Ch8-9.

Thanks to:
Marit Alanen (USFWS), Margi Brooks (NPS), Dale Turner (TNC)
Thanks to:
Scott Bonar, Guy McPherson, Michael Rosenzweig

conservation biology, fall 2009 presents the..

7th Annual
Creativity Exhibit

student artistic expression
inspired by conservation biology

-Set up 10am
-Two volunteers each
30 min to keep eye on things
-Take down 4-4:30pm

-Space needs etc.:
Table surface?
Mount vertically?
Access to electricity?
Performance time?

Tuesday, December 1
Forbes Lobby
On display 12-4 pm
Performances & judging 2-3pm
Artist's Statement & Grading Criteria due Tues 24 Nov
Next week:
bring and place Artist's Statement & Grading Criteria on your project.

Q9
(Due by 6am Mon 07 December as .DOC attachment to MJ (mycota@gmail.com) via email.)

If you were to work for the Nature Conservancy, US Fish and Wildlife Service, or the National Parks system, which would you choose and why? What would be your job and what would you hope to accomplish in the context of conservation biology?

OR

In the context of conservation biology, what questions arose during the discussion period with Mike Rosenzweig, Scott Bonar, and Guy McPherson that you would like answered? Choose one or two of them to answer in this essay. More sophisticated, integrative, and interesting questions will garner more points than simple questions such as ‘where does Guy live in New Mexico?’.
Translating Environmental Science

SWES 415 / 515 in Spring 2009

*Soil, Water & Environmental Sciences (3 credits)*

- Scientists and journalists learn to "translate" science into language suitable for the general public.

- Writing style appropriate for *newspapers, magazines and web-based publications*, public reports and grant proposals.

- Students work in groups and with instructor to produce publication-quality articles on assigned or student-selected topics.

- **Time:** 3:30 to 4:45 p.m. Tuesdays & Thursdays, Veterinary Science room 105

- **Instructor:** Dr. Melanie Lenart
  http://www.u.arizona.edu/~mlenart/

**Contact:** Dr. Lenart at mlenart@email.arizona.edu
Interested in a preceptorship for spring 2010?

I would like someone to assist with Environmental Biology (ECOL 206)

Please contact me with questions.

Thanks,
Kevin

UA House of Minimal Effect?

SAHRA, OALS, SNRE, EEB, SWES, LTRR, Jim Riley, Solar House, Solar Car, Landscape Architecture, School of Architecture, Sustainability Committee, Parasol, etc.
Interested in research?

Apply to UBRP for the Summer of 2010!

Applications available online at:
http://ubrp.arizona.edu

Deadline:
February 1, 2010
1. Echinoderms, Ecology, and Eleni Sikelianos

In the last installment of the UA Poetry Centers fall series Oh Earth, Wait for Me, poet Eleni Sikelianos will read from her work, which has been described as avant-garde pastoral and is often about place as seen from an ecological perspective. The reading will be held on Friday, December 4, at 8 PM. Drawn to oceanography and microbiology, Sikelianos briefly was a biology student in her undergraduate career. The language of wild oceanaria and cellular activity has continued to inform her writing; in her work she discusses nature using terms unexpected in poetry, such as wentletraps, nudibranchs, and echinoderms. In addition to the reading, Sikelianos will give an open-topic colloquium on December 4 at 3:30 PM at the Poetry Center. The audience is invited to bring questions. For more information, visit http://www.environment.arizona.edu/events/574.

SEE the IE website for more info and more talks.

Quiz (24 Nov 2009) 11/10 possible:

Name and date? (1 pt) You may use your own hand-written notes.

Write a question that you think would be appropriate for the final exam. By appropriate, I mean relevant and useful as an assessment of learning in this course. (2 pts)

What economic and biodiversity interaction does the Kellerman et al. 2008 paper address? You were assigned this paper for today. (2 pts)
What was the pest species in this paper? (1 pt)

What book of his did Scott Bonar discuss in class? I’m more interested in the topic than the title. There are two possible answers. (1 pt)

Based on SPARs, explain why Rosenzweig thinks that we need to protect as much habitat as possible, even if it is engineered by us. The answer involves, in part, understanding the assumptions of the equilibrium theory of island biogeography. (2.5 pts)

What does McPherson think is the best/only way to protect biodiversity? (1.5 pt)
Conservation in Practice

Reconciliation Example
Eglin Air Force Base

Longleaf Pine (90 million → 5k acres)
   Fire (germination, reduce competition)
   Red-Cockaded Woodpecker (ESA)

San Miguel Watershed
Conservation District, United States

Reserve Design Considerations
The Conservation of Habitat and Landscape
Management

Active Management

Adaptive Management

Paper Parks

[People, Poverty, Poaching]

Marine Reserves...

Lessons?
Zoning
Biosphere Reserve Model

(A) Monitoring
T Tourism and recreation
H Human settlements
R Research station, education, training

Core area
Buffer zone
Transition zone

Area de Protección de Refugio de la Vaquita Marina

Polígono de la Reserva de la Biosfera
Images from:
The Americas Policy Program, started as an initiative of the International Relations Center (now defunct), founded in 1979 as a small but dynamic nonprofit policy studies center whose overarching goal was to help forge a new global affairs agenda for the U.S. government and people—one that would make the United States a more responsible global leader and partner.
Northern Spotted Owl

- Old Growth Forests
- Thomas Report 1990

-towards an Ecosystem Approach

Figure 10.13
The northern spotted owl (Strix occidentalis caurina), a species that can be effectively preserved only with an ecosystem management approach to its obligate habitat, old-growth conifer forests.
Van Dyke 2003
Ecosystem Management
Ch10 Van Dyke text

“...land management system that seeks protect viable populations of all native species, perpetuates natural disturbance regimes on the regional scale, adopts a planning timeline of centuries, and allows human use at levels that do not result in long-term ecological degradation”

Ecosystem:
-energy and nutrient processing system with physical structure and function that circulates matter and energy.

Definitions are debatable...

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>DEFINITION</th>
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<tbody>
<tr>
<td>Department of Agriculture</td>
<td>The integration of ecological policies and social factors to manage ecosystems to safeguard ecological sustainability, biodiversity, and productivity.</td>
</tr>
<tr>
<td>Department of Commerce, National Oceanic and Atmospheric Administration</td>
<td>Activities that seek to restore and maintain the health, integrity, and functional values of natural ecosystems that are the constituents of productive, sustainable economies.</td>
</tr>
<tr>
<td>Department of Defense</td>
<td>The identification of corps areas, including Department of Defense lands, and the implementation of a “systemic approach” instead of a “species-by-species approach” in order to balance biodiversity.</td>
</tr>
<tr>
<td>Department of Energy</td>
<td>A comprehensive process based on the best available science that specifically includes human interactions and management and is national instead of political boundaries in order to restore and enhance environmental quality.</td>
</tr>
<tr>
<td>Department of the Interior: Bureau of Land Management</td>
<td>The integration of ecological, economic, and social principles to manage biological and physical systems in a manner safeguarding the long-term ecological sustainability, natural diversity, and productivity of the landscape, protection or restoration of the resources, structure, and species composition of an ecosystem, recognizing that all components are interrelated.</td>
</tr>
<tr>
<td>Fish and Wildlife Service</td>
<td>A management approach that respects all living things and seeks to maintain natural processes and the dignity of all species and to ensure that common interests flourish.</td>
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<tr>
<td>National Park Service</td>
<td>Ecosystem management to emphasize natural boundaries, such as watersheds, biological communities, and physiographic provinces, and bases management decisions on an integrated scientific understanding of the entire ecosystem.</td>
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<tr>
<td>U.S. Geological Survey</td>
<td>To maintain overall ecological integrity of the environment while ensuring that ecosystem outputs meet human needs on a sustainable level.</td>
</tr>
<tr>
<td>Environmental Protection Agency</td>
<td>An integrative approach to the maintenance of land and water resources as functional habitats for an array of organisms and the provision of goods and services to society.</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>...production</td>
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Van Dyke 2003
Ecological and Economic Services Provided by Birds on Jamaican Blue Mountain Coffee Farms

JHERIMIE L. KELLERMANN, MATTHEW D. JOHNSON, AMY M. STERCHO, AND STEVEN C. HACKETT

*Department of Wildlife, Humboldt State University, Arcata, CA 95521, U.S.A.
†Department of Economics, Humboldt State University, Arcata, CA 95521, U.S.A.

Coffee Berry Borer

Source: International Coffee Organizations (ICO)

Berry Borer

Highlightened Area
Abstract: Coffee farms can support significant biodiversity, yet intensification of farming practices is degrading agricultural habitats and compromising ecosystem services such as biological pest control. The coffee berry borer (Hypothenemus hampei) is the world’s primary coffee pest. Researchers have demonstrated that birds reduce insect abundance on coffee farms but have not documented avian control of the berry borer or quantified avian benefits to crop yield or farm income. We conducted a bird-exclusion experiment on coffee farms in the Blue Mountains, Jamaica, to measure avian pest control of berry borers, identify potential predator species, associate predator abundance and borer reductions with vegetation complexity, and quantify resulting increases in coffee yield. Coffee plants excluded from foraging birds had significantly higher borer infestation, more borer broods, and greater borer damage than control plants. We identified 17 potential predator species (73% were wintering Neotropical migrants), and 3 primary species composed 67% of migrant detections. Average relative bird abundance and diversity and relative resident predator abundance increased with greater shade-tree cover. Although migrant predators overall did not respond to vegetation complexity variables, the 3 primary species increased with proximity to noncoffee habitat patches. Lower infestation on control plants was correlated with higher total bird abundance, but not with predator abundance or vegetation complexity. Infestation of fruit was 1-14% lower on control plants, resulting in a greater quantity of saleable fruits that had a market value of US$4-$10/ha. In 2005/2006, landscape heterogeneity in this region may allow mobile predators to provide pest control broadly, despite localized farming intensities. These results provide the first evidence that birds control coffee berry borers and thus increase coffee yield and farm income, a potentially important conservation incentive for producers.

Figure 1. Mean (SE) proportion of coffee berries infested with coffee berry borers from bird-exclusion plots and control plants on 4 farms in Jamaica over 5 survey periods from November 2005 and May 2006. Our sample size was the number of control and exclosure shrub pairs, and it declined during the study because some experimental plants were completely harvested (survey 0, n = 36; 1, n = 29; 2, n = 28; 3, n = 25; 4, n = 20).
Figure 2. Distance from center of 400-m² survey plots to nearest habitat patch and the average number of detections of primary predators from February to April 2006 on coffee farms in the Blue Mountains, Jamaica.

Table 2. Economic benefit of birds per hectare calculated for 4 Jamaican Blue Mountain coffee farms during the 2005–2006 production year.

<table>
<thead>
<tr>
<th>Farm</th>
<th>Average berry/flower reduction (Δ, %)</th>
<th>Boxes/ha</th>
<th>US$/box</th>
<th>Mature coffee (lbs)</th>
<th>US$ benefit of birds/lb (5% CI)</th>
<th>US$ benefit of birds/ha (5% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rowan’s Royale</td>
<td>0.026 (0.020)</td>
<td>82</td>
<td>48</td>
<td>0.6</td>
<td>102 (79)</td>
<td>62 (48)</td>
</tr>
<tr>
<td>Clifton Mount</td>
<td>0.012 (0.006)</td>
<td>77</td>
<td>48</td>
<td>54</td>
<td>44 (24)</td>
<td>1446 (775)</td>
</tr>
<tr>
<td>McGrath</td>
<td>0.013 (0.012)</td>
<td>85</td>
<td>48</td>
<td>6</td>
<td>55 (17)</td>
<td>171 (119)</td>
</tr>
<tr>
<td>Wallenford</td>
<td>0.024 (0.019)</td>
<td>91</td>
<td>48</td>
<td>22</td>
<td>105 (84)</td>
<td>2544 (1865)</td>
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