Lecture 24, 09 Nov 2006

Conservation Biology
ECOL 406R/506R
University of Arizona
Fall 2006

Kevin Bonine
Kathy Gerst

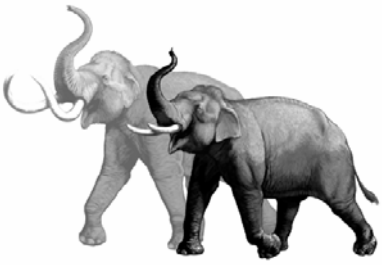

Figure 1: Could the Asian elephant (right) serve as an ecological proxy for North American mammoths (left) in an effort to restore megaherbivore function to North America? Illustration by Carl Buell.

Donlan et al. 2006

Conservation in Practice

Lab this week:

none, meet 1230 s-side BSE 328 on 17 Nov

(see website for lab readings)

1

Jon and Laura will speak for 10 minutes …

2

Thank
Don Falk
and
other speakers

7

Housekeeping, 09 November 2006

Short oral presentations :
09 Nov - Jon and Laura
14 Nov - Dan and Lane
28 Nov - Amanda and Fred

Upcoming Readings

Today: Conservation Practices
(Pleistocene Rewilding, Donlan-related, Ch 8 and 10)
Tues 14 Nov: Economics and Sustainable Development
Thurs 16 Nov: Mike Rosenzweig, Win-Win Ecology
Tues 21 Nov: Conservation Biology Professional Panel
Thurs 23 Nov: Thanksgiving

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PUBLICITY PAMPHLET

Issued by
Janice K. Brewer
Arizona Secretary of State

Ballot Propositions
&
Judicial
Performance
Review

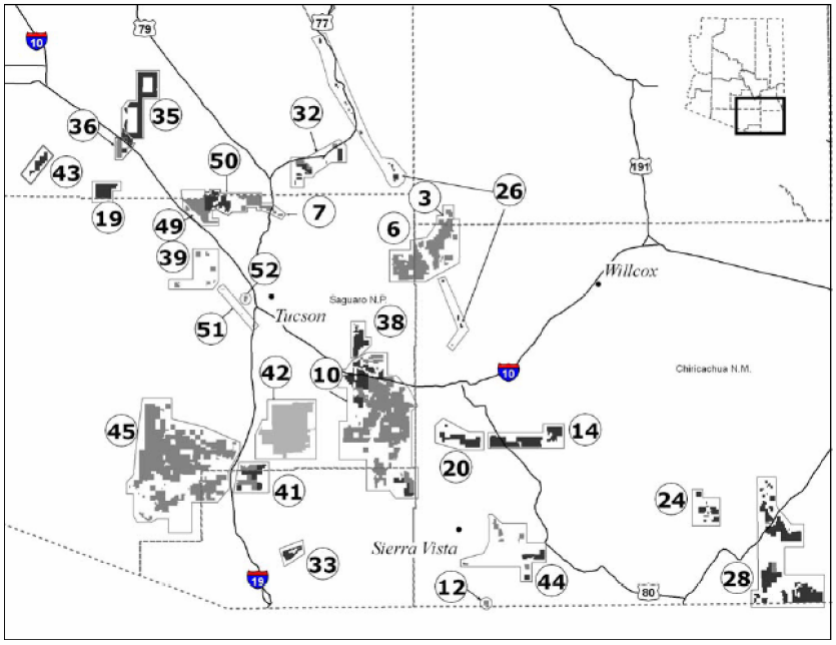
www.azsos.gov
1-877-THE VOTE

General Election

Proposition 103	Proposed amendment to the Arizona Constitution by the legislature relating to English as the official language Ballot Format

Proposition 105	Proposed amendment to the Arizona Constitution by the legislature relating to state trust land Ballot Format
Proposition 106	Proposed amendment to the Arizona Constitution by the initiative relating to state trust land Ballot Format

Proposition 207	Proposed by initiative petition relating to eminent domain Ballot Format



PROPOSITION 207
Arizona Planning Association

What is Proposition 207?

Regulatory Takings- When a government deprives a person of the use of property by the application of regulations without compensating the owner.

Eminent Domain- Fifth Amendment allows for the taking of private property for a public use so long as just compensation is paid.

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Eminent Domain Effects

Property can only be physically taken for

- **Government projects**
- **Literal safety issues**

Courts will no longer be able to weigh public benefits against private controls in determining a public use in slum and blight areas.

Proposition 207 forces Arizonans to endure blight conditions and will limit future economic development opportunities.

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Regulatory Takings Effects

"if the existing rights to **use**, **divide**, **sell** or **possess** property are reduced by the enactment or applicability of **any land use law** and such action reduces the **fair market value** of the property the owner is entitled to **just compensation** from this state or political subdivision that enacted the land use law"

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Community Impacts

- Freeze development standards;

- Regulation becomes a one-way ratchet where taxpayers can decrease regulations but can **never** increase regulations without paying;

- Limit local control over development approvals;

.

15

Community Impacts

ELIMINATE/RESTRICT-

- Modifications and updates to General Plans;
- Future land use protections for military installations;
- Preservation of historic buildings;
- Neighborhood-developed area plans;
- Building design standards; and
- Modification to other regulations that impact land use such as water, sewer, drainage or transportation.
- Enactment of future property maintenance requirements.

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Community Impacts

Negative impacts:

- Cost taxpayers millions in potential takings claims and litigation;
- Hurt the economy;
- Remove funding for other government services (such as Police and Fire);
- Eliminate an important economic development tool;
- Force Arizona's to endure blight conditions;
- Limits local control over land use decisions;
- Create a new regulatory bureaucracy.

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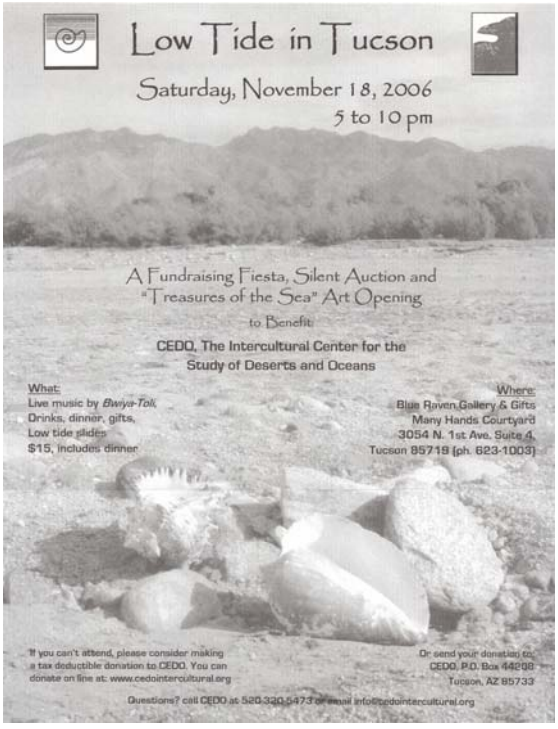

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Global Climate Change Lecture Series

All lectures will take place at UA Centennial Hall.

All lectures begin at 7pm and are free to the public. Call 520.621.4090 for more information.

Tuesday, October 17
Global Climate Change: The Evidence
Malcolm Hughes, Professor of Dendrochronology

http://cos.arizona.edu/climate/

Tuesday, October 24
Global Climate Change: What's Ahead
Jonathan Overpeck, Director of the Institute for the Study of Planet Earth and Professor of Geosciences

Tuesday, October 31
Global Climate Change: The Role of Living Things
Travis Huxman, Assistant Professor of Ecology and Evolutionary Biology

Tuesday, November 7
Global Climate Change: Ocean Impacts and Feedbacks
Julia Cole, Associate Professor of Geosciences

Tuesday, November 14
Global Climate Change: Disease and Society
Andrew Comrie, Dean of the Graduate College and Professor of Geography and Regional Development

Tuesday, November 21
Global Climate Change: Could Geoengineering Reverse It?
Roger Angel, Regents' Professor of Astronomy

Tuesday, November 28
Global Climate Change: Designing Policy Responses
Paul Portney, Dean of the Eller College of Management and Professor of Economics

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Barely Extinct Mammals of the SW

- If you go to Southern Africa you will find many habitats like South Western US and Mexico:
- Deserts, grasslands, woodlands, tropical dry forests with many species of plants that look similar to ours.
- But you will also see elephants, lions, rhinos, zebras, and many deer and antelope.

Barely Extinct Mammals of the SW

- North America was like that until only 12,000 years ago.
- Our pronghorns probably run so fast because they evolved alongside the American Cheetah.
- Horses and camels evolved in America before moving to the old world.
- We got gypped (by our Clovis hunter predecessors)!



Barely Extinct Mammals of the SW

- Bison latifrons (longhorn bison)
- Camelops
- Hemiauchenia
- Horse
- Euceratherium (shrub ox)
- Nothrotheriops shastensis (Shasta ground sloth)
- Tapirus (tapir)




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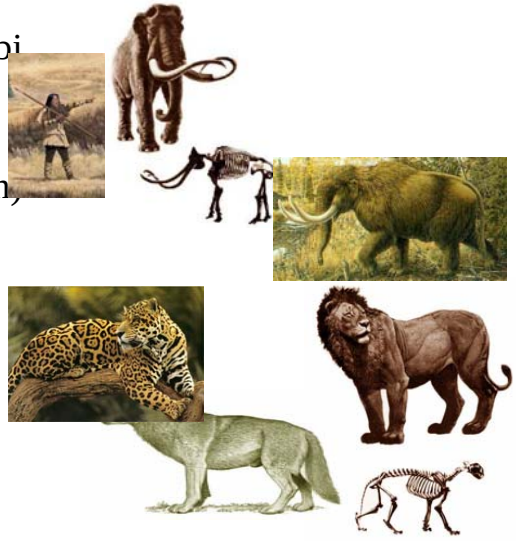
Barely Extinct Mammals of the SW

- Mammuthus columbi (Mammoth)
- Mammut (Mastodon)
- Panthera (jaguar)
- Panthera leo atrox (American lion)
- Canis dirus (dire wolf)



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(Pleistocene) Re-wilding of North America

Donlan et al. 2005, Nature, 436:913-914.

1. What happened about 13k yrs ago in N. America?
2. Are there really no apparent costs to restoring Bolson's tortoise?
3. How do you predict African cheetahs and US mountain lions would interact?
4. Is this paper about "playing God"? Are we a natural force in the evolution of life on this planet?

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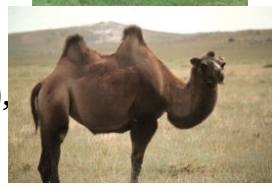
Re-wilding of North America

- Start with non-threatening herbivores:
- The 50-kg Bolson tortoise (*Gopherus flavomarginatus*) – still in Mexico
- Feral horses (*Equus caballus*) and asses (*E. asinus*), critically endangered Asian asses (*E. hemionus*) and Przewalski's horse (*E. przewalskii*).
- Bactrian camels (*Camelus bactrianus*), now on the verge of extinction in the Gobi desert.



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Re-wilding of North America

- Then bring in the big boys on private property:
- small numbers of African cheetahs (*Acinonyx jubatus*), Asian (*Elephas maximus*) and African (*Loxodonta africana*) elephants, and lions (*Panthera leo*).
- Eventually create 'ecological history parks', covering vast areas of economically depressed parts of the Great Plains.
- Perimeter fencing would limit the movements of otherwise free-roaming ungulates, elephants and large carnivores.
- (like parks in Africa)

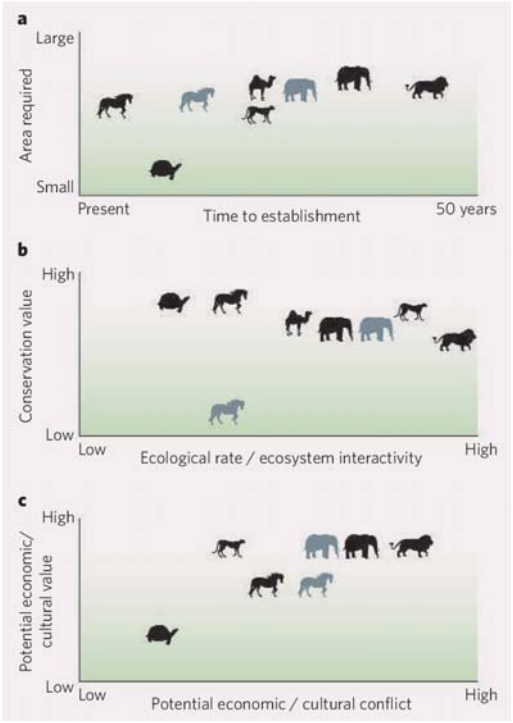

Figure 1 | Pleistocene re-wilding in North America. Symbols represent horses (*Equus caballus* and *E. asinus* in black; *E. przewalskii* and *E. hemionus* in grey), Bolson tortoises, camelids, cheetahs, Asian (grey) and African (black) elephants, and lions. **a**, The likely timescale and area required to restore proxies for extinct large vertebrates. **b**, Conservation value and ecological role (interactivity with other species) on the landscape. **c**, Potential economic/cultural value versus potential conflict.

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VOL. 168, NO. 5 THE AMERICAN NATURALIST NOVEMBER 2006

Pleistocene Rewilding: An Optimistic Agenda for Twenty-First Century Conservation

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Submitted November 2, 2005; Accepted June 6, 2006; Electronically published September 25, 2006

ABSTRACT: Large vertebrates are strong interactors in food webs, yet they were lost from most ecosystems after the dispersal of modern humans from Africa and Eurasia. We call for restoration of missing ecological functions and evolutionary potential of lost North American megafauna using extant conspecifics and related taxa. We refer to this restoration as Pleistocene rewilding; it is conceived as carefully managed ecosystem manipulations whereby costs and benefits are objectively addressed on a case-by-case and locality-by-locality basis. Pleistocene rewilding would deliberately promote large, long-lived species over pest and weed assemblages, facilitate the persistence and ecological effectiveness of megafauna on a global scale, and broaden the underlying premise of conservation from managing extinction to encompass restoring ecological and evolutionary processes. Pleistocene rewilding can begin immediately with species such as Bolson tortoises and feral horses and continue through the coming decades with elephants and Holarctic lions. Our exemplar taxa would contribute biological, economic, and cultural benefits to North America. Owners of large tracts of private land in the central and western United States could be the first to implement this restoration. Risks of Pleistocene rewilding include the possibility of altered disease ecology and associated human health implications, as well as unexpected ecological and sociopolitical consequences of reintroductions. Establishment of programs to monitor rates of species interactions and their consequences for biodiversity and ecosystem health will be a significant challenge. Secure fencing would be a major economic cost, and social challenges will include acceptance of predation as an overriding natural process and the incorporation of pre-Columbian ecological frameworks into conservation strategies.

Keywords: carnivores, ecological history, megafauna, predation, reintroduction, taxon substitutions.

Far more than any other species in the history of life on Earth, humans alter their environments by eliminating species and changing ecosystem function, thereby affecting the very future of evolution (Sala et al. 2000; Myers and Knoll 2001; Smith 2003; Thomas et al. 2004a, 2004b; Meyer 2004; Flannery 2006). We will surely continue to do so for the foreseeable future, either by default or by design (Wilson and Willis 1975; Western 2001). Earth is now nowhere pristine, in the sense of being substantially free from human influence, and indeed, most major land

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Pleistocene Rewilding

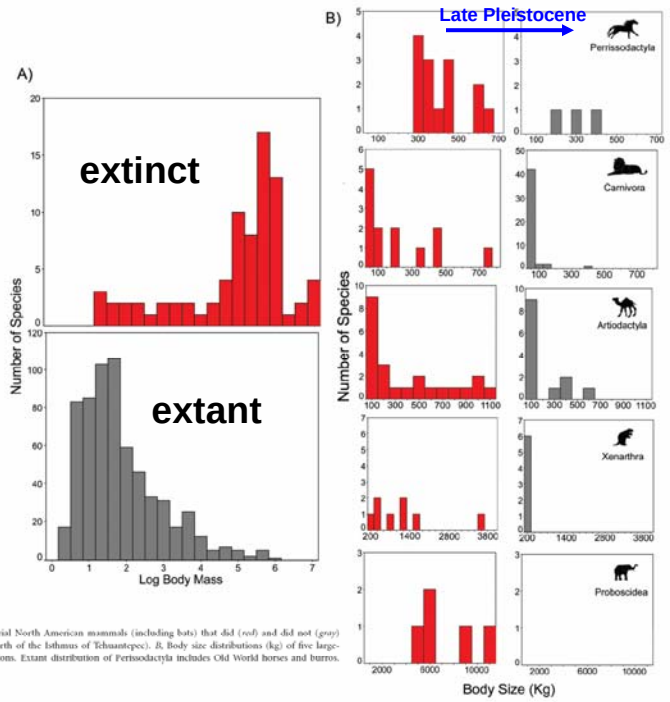

Figure 2: *A*, Body size distributions (log body mass) of terrestrial North American mammals (including bats) that did (*red*) and did not (*gray*) become extinct during the late Pleistocene (LP) extinctions (north of the Isthmus of Tehuantepec). *B*, Body size distributions (kg) of five large-bodied (>44 kg) taxonomic groups before and after LP extinctions. Extant distribution of Perissodactyla includes Old World horses and burros. Modified from Lyons et al. 2004.

Table 1: Magnitude of biodiversity loss of North American megafauna (north of the Isthmus of Tehuantepec) and potential benefits and costs of Pleistocene rewilding

Order or family	LP	Current (T/E)	Proxy[a]	Ecological benefits	Ecological costs	Economic benefits	Economic costs	Ease of establishment	Popularity
Predators:									
Felidae	13	8 (3)	Cheetah	Predation[b]	?	Tourism	Fencing; livestock mortality?[c]	++	+++
			Lion	Predation	?	Tourism; hunting	Human conflict	++	+++
Ursidae	6	3 (2)							
Canidae	9	8 (3)							
Herbivores:									
Xenarthra	14	6 (2)							
Bovidae	13	5 (2)							
Equidae	11	0	Equids	Seed dispersal; prey[d]	Potential overgrazing	Tourism	Fencing; compete with cattle	+++	++
Cervidae	10	6							
Antilocapridae	6	1							
Proboscidea	5	0	Elephants	Heterogeneity; seed dispersal[e]	Density- and scale-dependent effects	Tourism; hunting	Fencing	+	+++
Camelidae	4	0	Camels	Heterogeneity; seed dispersal[f]	Potential overbrowsing	Meat, fiber production	Fencing	+++	++
Tapiridae	4	1							
Tayassuidae	3	1							
Hydrochoeridae	2	0							
Castoridae	2	1							
Testudinidae	4	0	Bolson tortoise	Heterogeneity[g]	None/slight	Tourism	None	+++	+
Total	106	40 (10)							

Note: The table displays Late Pleistocene (LP) and current diversity of continental, large-bodied North American mammalian orders and families and some potential species proxies. The "Current" column excludes insular taxa. Extant species in each taxon are significantly biased toward smaller body size (Lyons et al. 2004). T/E = threatened or endangered, listed by United States Endangered Species Act or in the International Union for Conservation of Nature and Natural Resources 2001 Red List category "Near Threatened" (or equivalent 1994 categories "LR-cd" or "LR-nt"). A plus sign represents an increase in respective qualitative category.

[a] Potential proxies. Camel: *Camelus dromedarius, Camelus ferus, Lama guanicoe, Vicugna vicugna*; equid: *Equus caballus, Equus przewalski, Equus hemionus*; cheetah: *Acinonyx jubatus*; lion: *Panthera leo*; elephant: *Elephas maximus, Loxodonta africana*; Bolson tortoise: *Gopherus flavomarginatus*.

[b] Predation on mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) would be limited latitudinally by climate.

[c] Work in Namibia has demonstrated coexistence with ranchers and cheetah through education and alternative pastoral practices (Marker et al. 2003*b*).

[d] Janzen and Martin 1982; Berger 1986; Barlow 2000.

[e] Janzen and Martin 1982; Barlow 2000; Whyte et al. 2003; Western and Maitumo 2004.

[f] Barlow 2000; Hare 2001.

[g] Kaczor and Hartnett 1990.

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... 31

Table 10.1 Some Definitions of Ecosystem Management from U.S. Federal Agencies

AGENCY	DEFINITION
Department of Agriculture	The integration of ecological principles and social factors to manage ecosystems to safeguard ecological sustainability, biodiversity, and productivity.
Department of Commerce, National Oceanic and Atmospheric Administration	Activities that seek to restore and maintain the health, integrity, and functional values of natural ecosystems that are the cornerstone of productive, sustainable economies.
Department of Defense	The identification of target areas, including Department of Defense lands, and the implementation of a "holistic approach" instead of a "species-by-species approach" in order to enhance biodiversity.
Department of Energy	A consensual process based on the best available science that specifically includes human interactions and management and uses natural instead of political boundaries in order to restore and enhance environmental quality.
Department of the Interior:	
Bureau of Land Management	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.
Fish and Wildlife Service	Protection or restoration of the function, structure, and species composition of an ecosystem, recognizing that all components are interrelated.
National Park Service	A philosophical approach that respects all living things and seeks to sustain natural processes and the dignity of all species and to ensure that common interests flourish.
U.S. Geological Survey	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.
Environmental Protection Agency	To maintain overall ecological integrity of the environment while ensuring that ecosystem outputs meet human needs on a sustainable level.
National Science Foundation	An integrative approach to the maintenance of land and water resources as functional habitat for an array of organisms and the provision of goods and services to society.

Compiled from U.S. Congressional Research Service 1994.

…production

DOD!

DOE!

NPS - ????

Sustainable?

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Van Dyke 2003

Ecosystem Management (Ch10 Van Dyke text)

Why?
-erosion, pollution, waste disposal, sedimentation
-small or uncharismatic species, recreation, intrinsic value
-single species approach very expensive
(SDCP model)

-driven by CAPACITY to deliver goods, services, functions; NOT Demand for them
(forest as an ecosystem, not just a tree farm)

-management experimental and adaptive (SDCP)
-monitoring

-cooperation, stakeholders

"Managers recognize the need for human communities to utilize some ecosystem resources" (VanDyke p.272)

-Define "some"
-Where do we draw the line?
-Human population increase?

Unit of ecosystem management?
-watershed?
-make sure include important components
(Everglades and Lake Okeechobee)

Ecosystem Processes: Necessary vs. Sufficient
-Hawaii missing 90% native vertebrates
-fire, water, herbivory, predation

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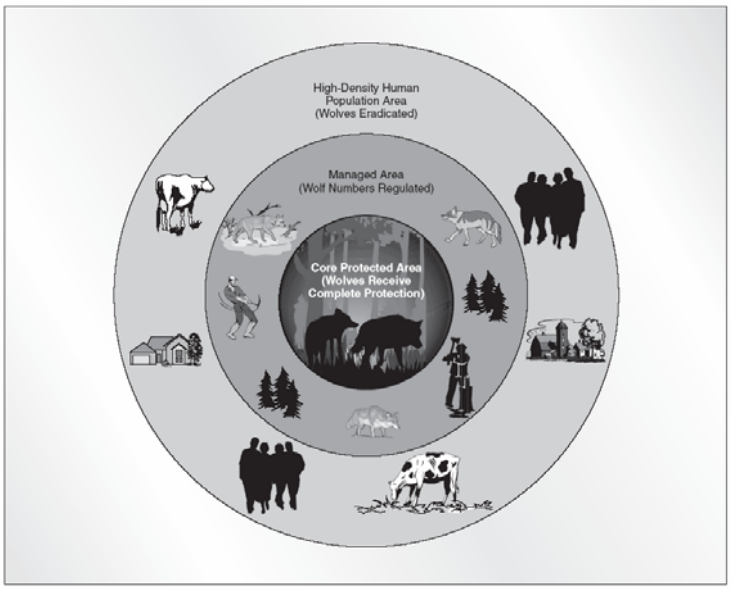
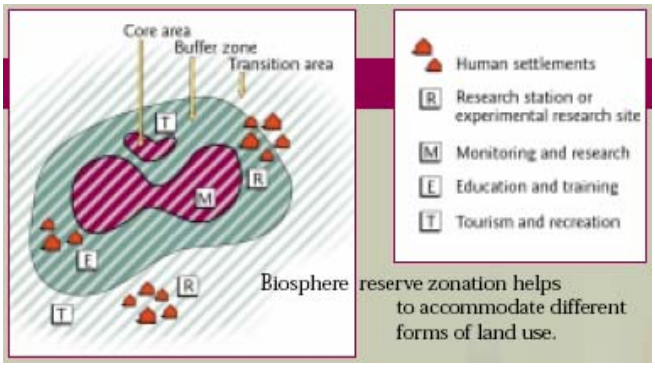
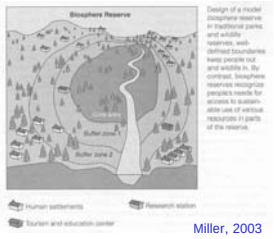


Figure 10.10
"Zonation management" for wolves or other large, mobile predators. In a core protected area with low human densities and minimal human impacts, wolves receive complete protection. In a surrounding area (management area), wolf numbers are regulated and individual wolves that kill livestock or pets are destroyed. In surrounding areas of high human population densities and impacts, wolves are killed if they enter the area. 35
Based on a concept described by Mech (1995).

Van Dyke 2003

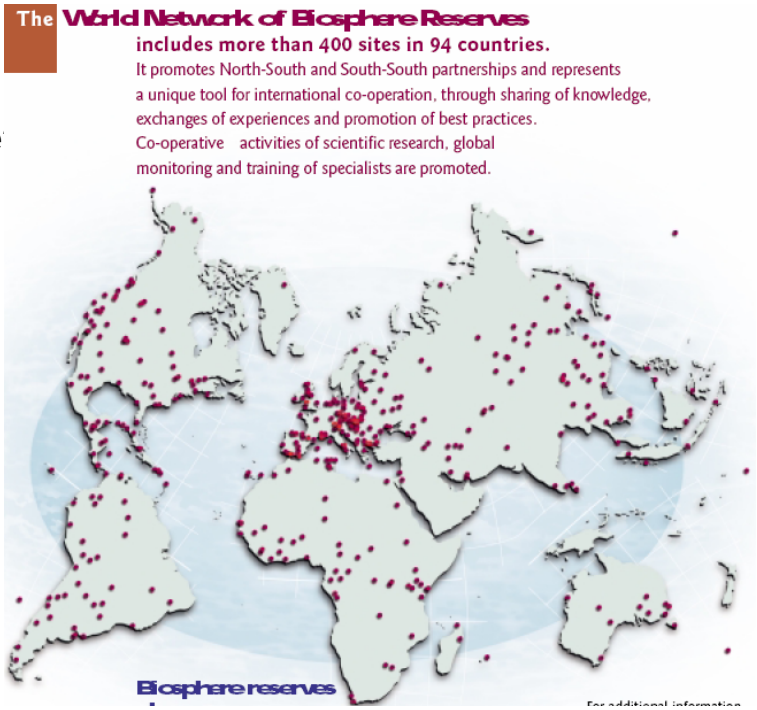


Biosphere reserves (core, buffer, transition)
- Research and Monitoring
- Conservation
- Local Development

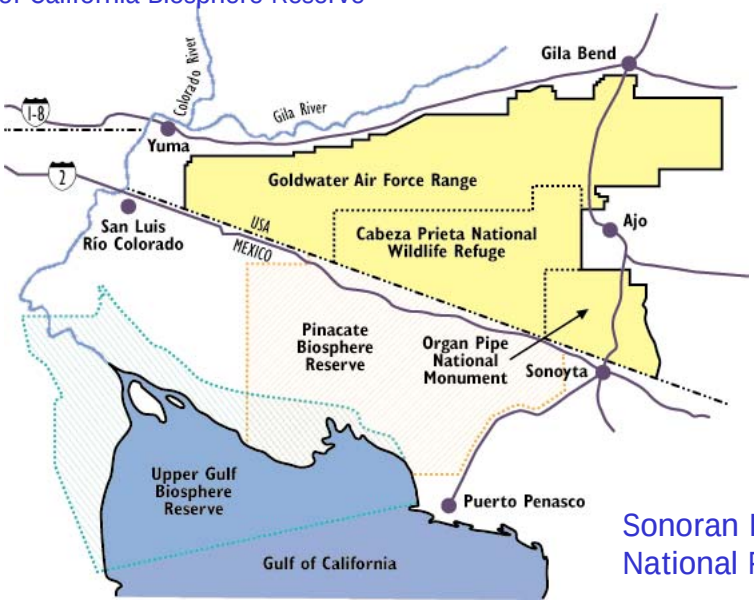


Miller, 2003
Chapter 7

Where
Why?

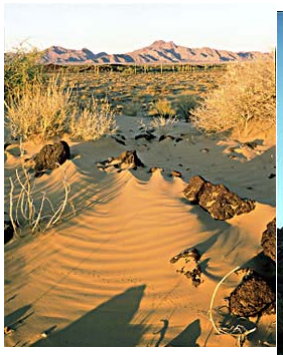


Organ Pipe Cactus National Monument
Pinacate Biosphere Reserve
Gulf of California Biosphere Reserve



Sonoran Desert
National Park?

Organ Pipe Cactus National Monument
Pinacate Biosphere Reserve
Gulf of California Biosphere Reserve



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Let us know what you need:

How much table space?
Space on a poster display board?
TV? VCR? DVD player? Slide projector?

Other things we haven't thought of?

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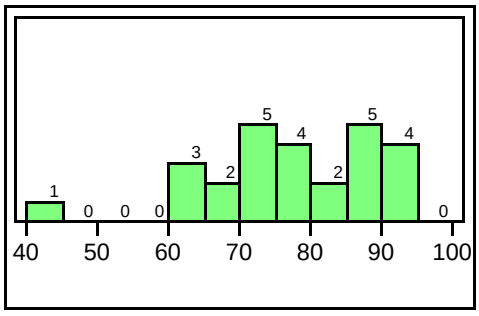
Exam Two…

Mean: 76.9

Median: 77

Minimum: 42.5

Maximum: 93.5



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