

History of Humans and Wildlife

EFB 390: Wildlife Ecology and Management

Dr. Gurarie

2022-09-06

What do these animals have in common?



Elaphas maximus



Cavia tschudii



Canis lupus



Vicugna vicugna

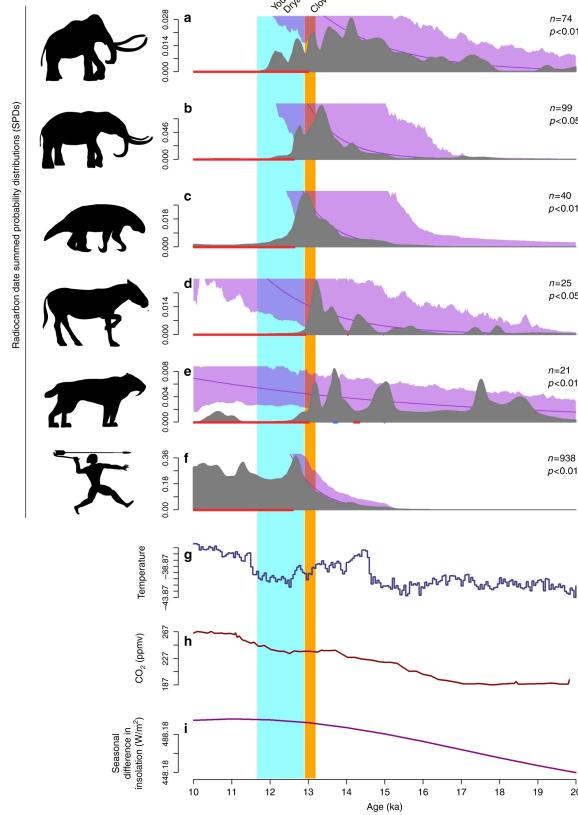


Anas platyrhynchos



Cyprus mouflon

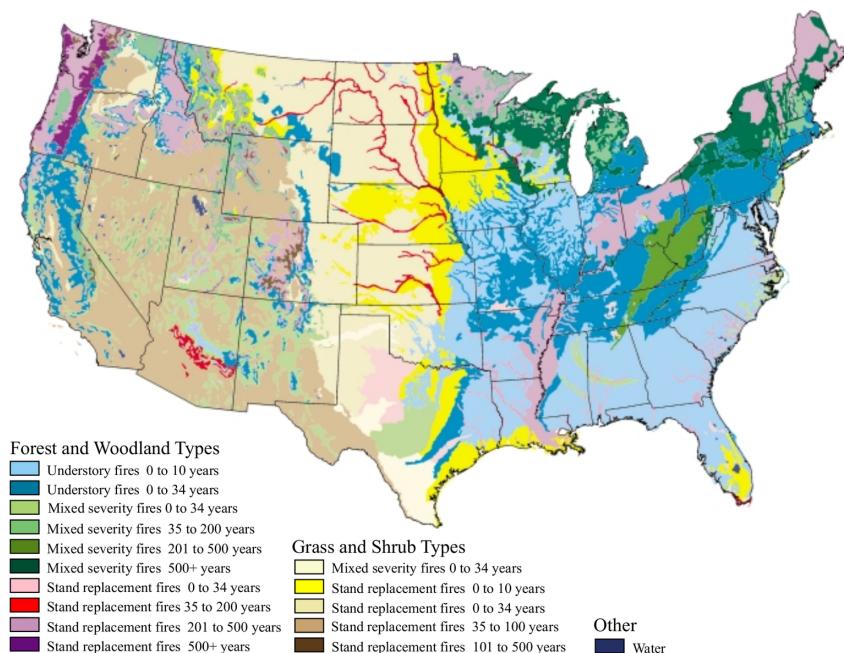
Recap: Human's first epic "management" fail.



- *Homo* rapidly diversified and spread around the globe during the Pleistocene (2.7 mya) - a drier, colder period more dominated by large **herbivores** and **grasslands** and intermittent periods of **glaciation** ("Ice Ages")
- To adapt, *Homo* increased meat protein intake, likely first via *scavenging*, then rapidly improving *hunting skills*
- As *Homo* expanded around the globe and encountered naive megafauna, many species of megafauna went **extinct**.

Did forager-hunter-gatherers manage wildlife?

(aside from driving them to extinction)

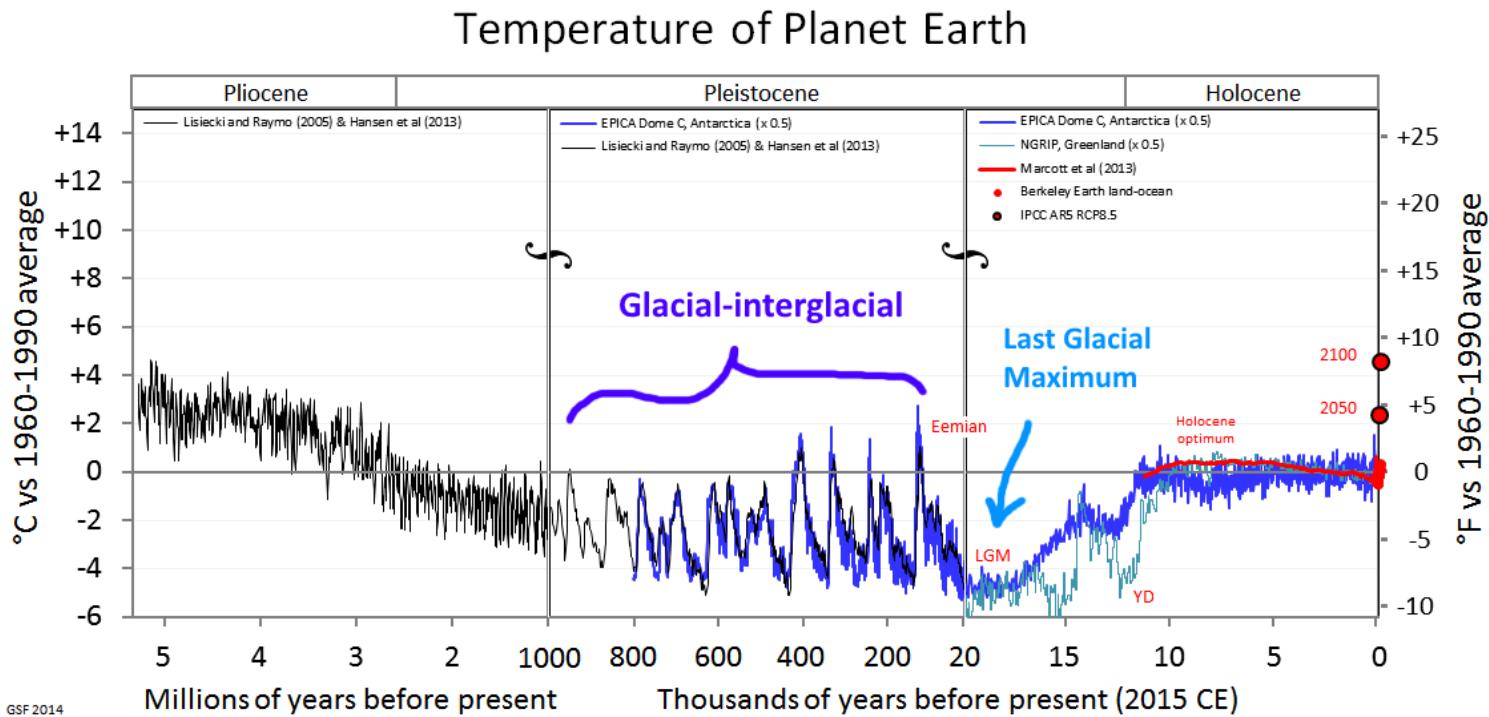


Controlled (ritual) Fires were widely used, in (large) part to create suitable habitat for large ungulate prey: deer, bison, elk, etc.

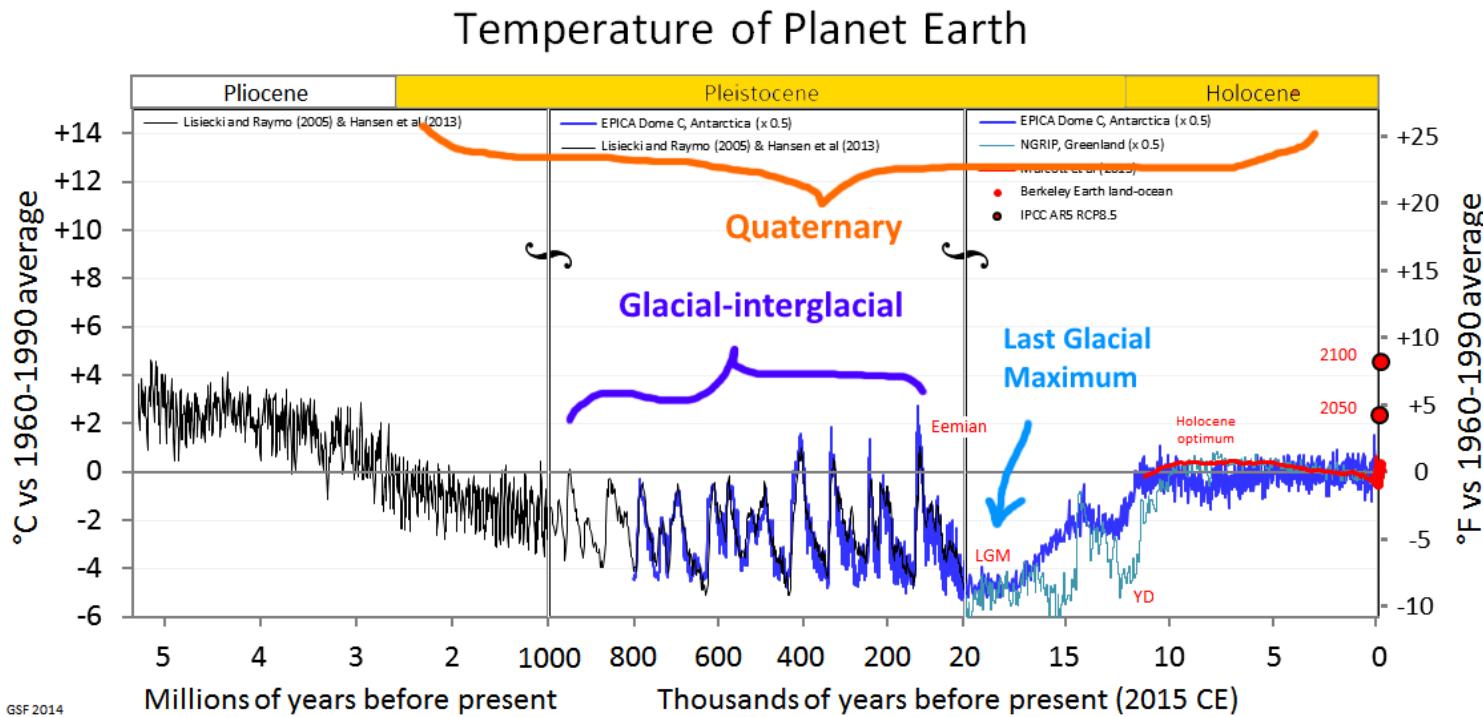
Large parts of the U.S. that is currently forested (or cultivated) was once grassland / savannah.

Fire Management Today - 2000 - vol 60. No 3

Pleistocene - Holocene transition 11.6 kya

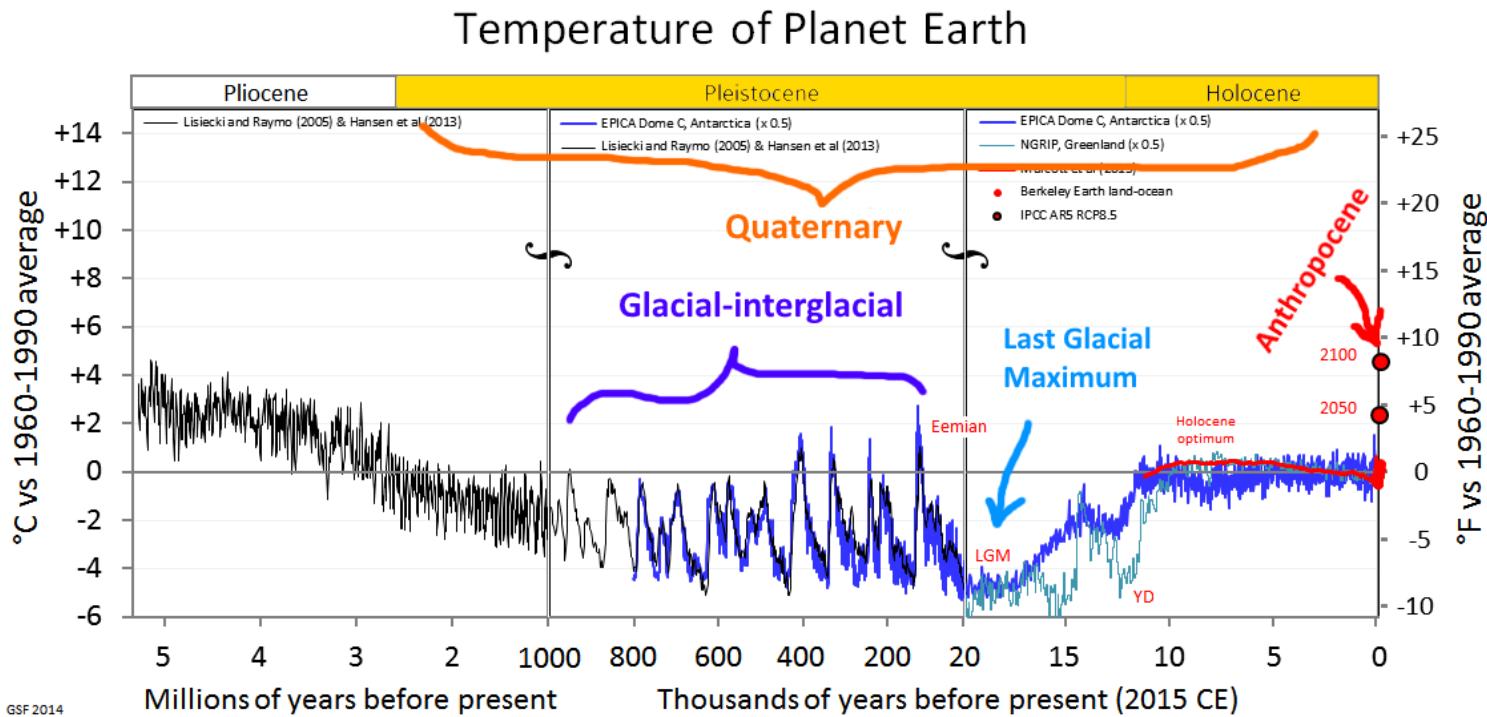


Pleistocene - Holocene transition 11.6 kya



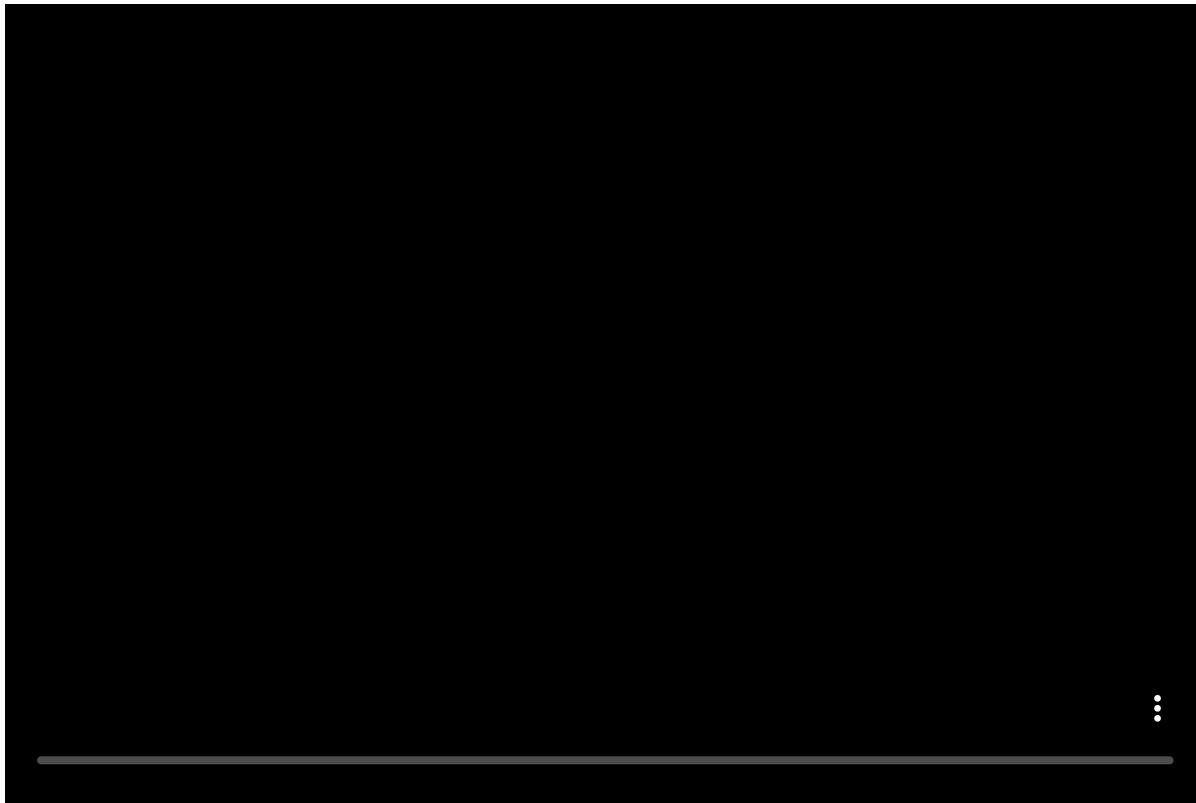
warm(er)! and stable!

Holocene to Anthropocene (1950 - ...)



Note - scale and speed of current temperature change

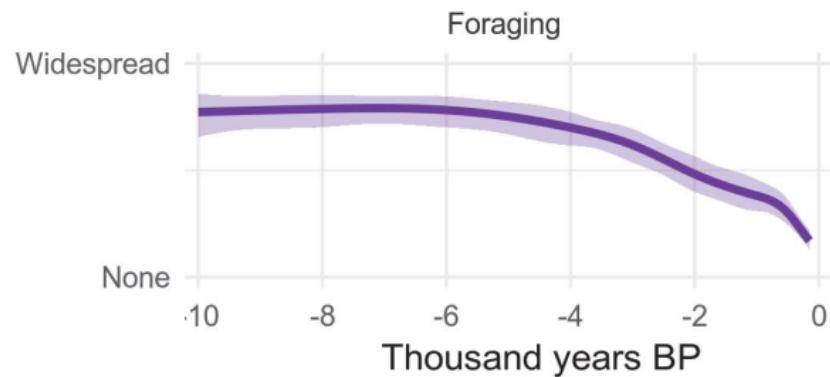
Start of Holocene all humans are foragers



End of Holocene, not so much

Foraging / hunting / gathering / fishing

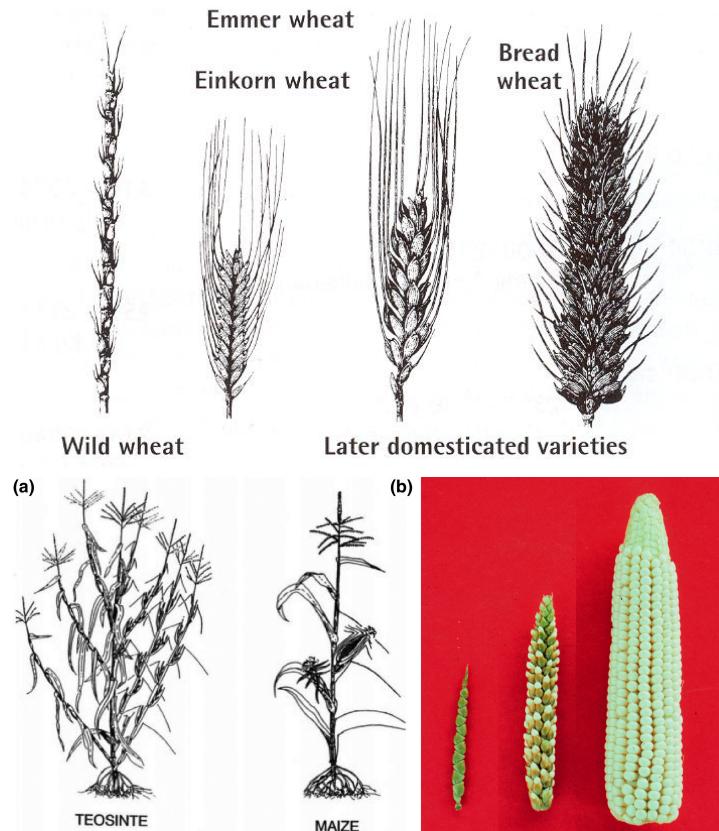
Subsistence economies and land-use practices that generally exhibit lower amounts of direct human alteration of ecosystems and control of plant and animal life cycles. (Archaeoglobe 2019)



For at least 97% [of our 300,000 year existence] our hunter-gatherer ancestors lived as many other large predators do, in small groups within the confines of local ecosystems (Gowdy 2020)

What
happened?

Neolithic revolution: Agriculture

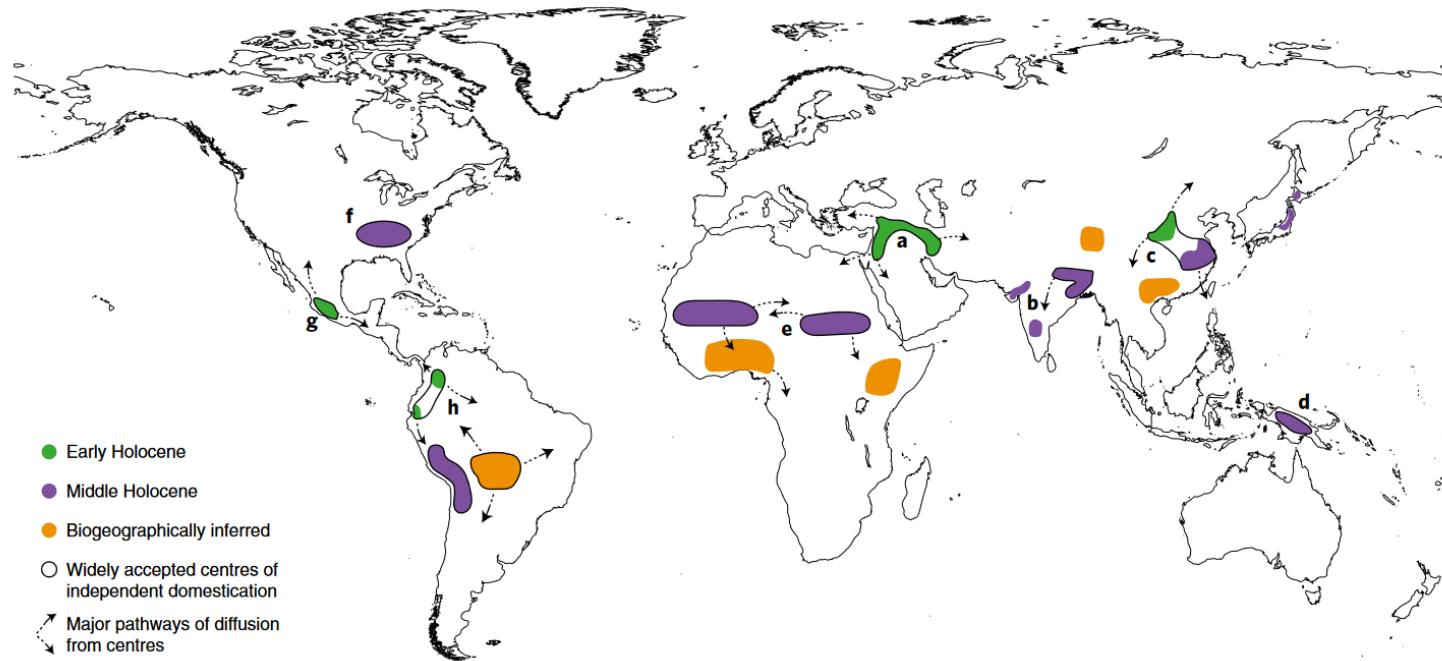


PUMPKIN
Cucurbita pepo
DOMESTICATED ~10000 YEARS AGO IN NORTH AND CENTRAL AMERICA



aka Plant domestication

developed independently in multiple locations...



- a. Southwest Asia (wheat, barley, lentil, pea, chickpea); b. India (rice (indica), millets, mungbean); c. China (broomcorn millet, foxtail millet, rice (japonica), soybean, melon); d. New Guinea (banana, taro, yam); e. Africa (date palm, sorghum, pearl millet, African rice, oil palm); f. Eastern North America (acorn and spaghetti squash, sunflower, sumpweed, goosefoot); g. Mexico (maize, pumpkin squash, common and lima beans, avocado, chilli pepper); h. South America (chilli peppers, peanut, cotton, squashes (butternut and Hubbard), common and lima beans, manioc, sweet potato, white potato, yam, quinoa).

Why/how did agriculture emerge?

H1. Surplus hypothesis -
improving environmental
conditions, increased
resource availability and
growing human population
densities

H2. Necessity hypothesis -
worse environmental
conditions led to innovation

**H3. Regional uniqueness
hypothesis** - distinct, local
processes independently
drive the different
geographic origins of
domestication

Why/how did agriculture emerge?

H1. Surplus hypothesis -
improving environmental
conditions, increased
resource availability and
growing human population
densities

Agriculture appears to
consistently appear *after*
(potential) increase in human
densities.

nature
human behaviour

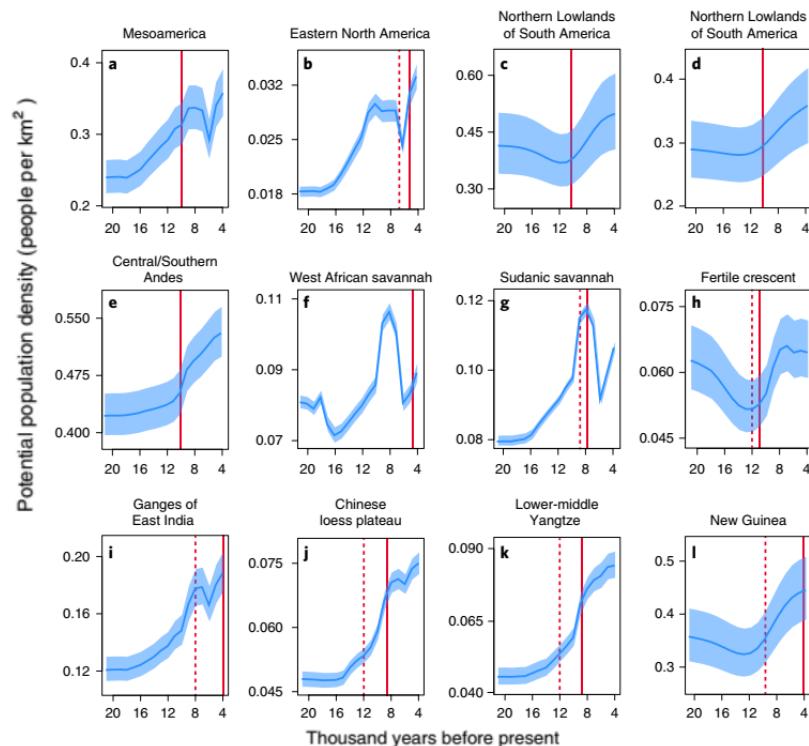
LETTERS

<https://doi.org/10.1038/s41562-018-0358-8>

**Hindcasting global population densities reveals
forces enabling the origin of agriculture**

Patrick H. Kavanagh^{1,5*}, Bruno Vilela^{2,5}, Hannah J. Haynie¹, Ty Tuff², Matheus Lima-Ribeiro³,
Russell D. Gray⁴, Carlos A. Botero^{2,6} and Michael C. Gavin¹

**Evidence for impact of improved / milder
/ more stable climate**



Consequences of agriculture

settlement and aggregation

- cities
- wealth
- food surplus

social hierarchies / complex society / armies / technology

civilization

population EXPLOSION

- ~ 4 million 11,600 kya
- ~ 200 million in 1900 AD
- ~ 7.7 billion in 2020 AD



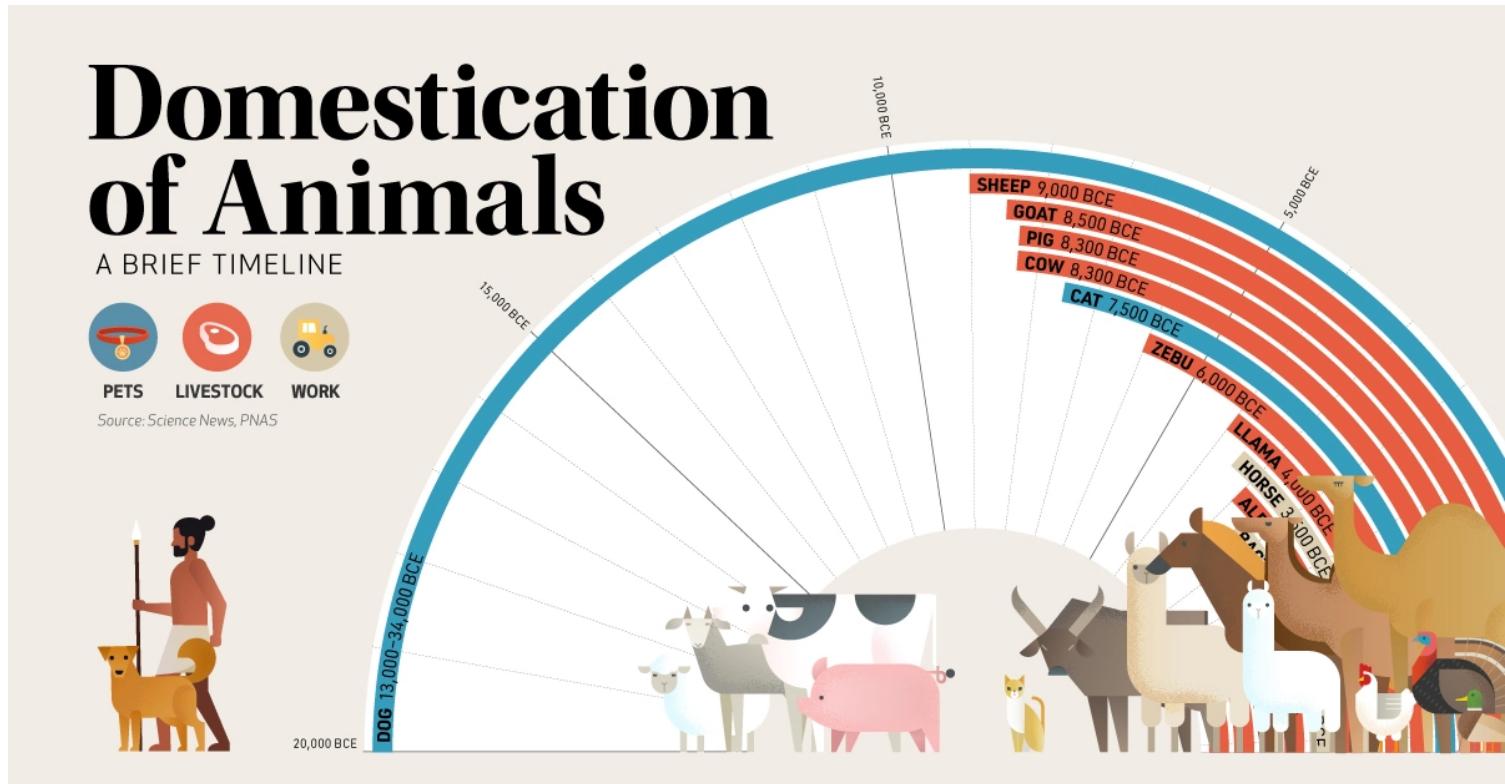
Neolithic revolution ... good or bad?

The adoption of agriculture made the average person **worse off for millennia**. Physical health declined dramatically and most of the world's people were born into **rigid caste systems** and lived as **virtual or actual slaves** ...

After agriculture, humans became **shorter and less robust** and they suffered from more **debilitating diseases**, from leprosy to arthritis to tooth decay, than their hunter-gatherer counterparts ... Only in the last 150 years or so has the longevity, health, and well-being of the average person once again reached that of the Upper Pleistocene. The average **human life span in 1900 was about 30 years**, and for **Upper Pleistocene hunter-gatherers it was about 33 years**.

Gowdy 2020

Consequences for wildlife



Note - **dogs** are our only Pleistocene Pets.

Three pathways: 1. Commensal domestication

Framework of Melinda Zeder (2012)

Animal hangs out near humans.
Ends up staying with humans.

Commensal Domesticates

- Dogs (*Canis familiaris*)
- Cats (*Felis catus*)
- Pig (*Sus scrofa*)?
- Guinea pig (*Cavia porcellus*)
- Golden hamster (*Mesocricetus auratus*)?
- Chicken (*Gallus domesticus*)
- Muscovy duck (*Cairina moschata*)
- Turkey (*Meleagris gallopavo*)

Three pathways: 2. Prey domestication

- Most major livestock species.
- Humans developed hunting strategies designed to increase prey availability.
- Gradually transformed to **herd management**

Prey Domesticates

Goat (*Capra hircus*)
Sheep (*Ovis aries*)
Cattle (*Bos taurus*)
Zebu cattle (*Bos indicus*)
Pig (*Sus scrofa*)?
Water buffalo (*Bubalus bubalis*)
Mithan (*Bos frontalis*)?
Bali cattle (*Bos javanicus*)?
Yak (*Bos grunniens*)
Llama (*Lama glama*)
Alpaca (*Lama pacos*)
Reindeer (*Rangifer tarandus*)

Three pathways: 3. Directed domestication

- Regenerative (non-prey) secondary animal resources
- Mainly: labor, transport, draft, hides, furs

Directed Domesticates

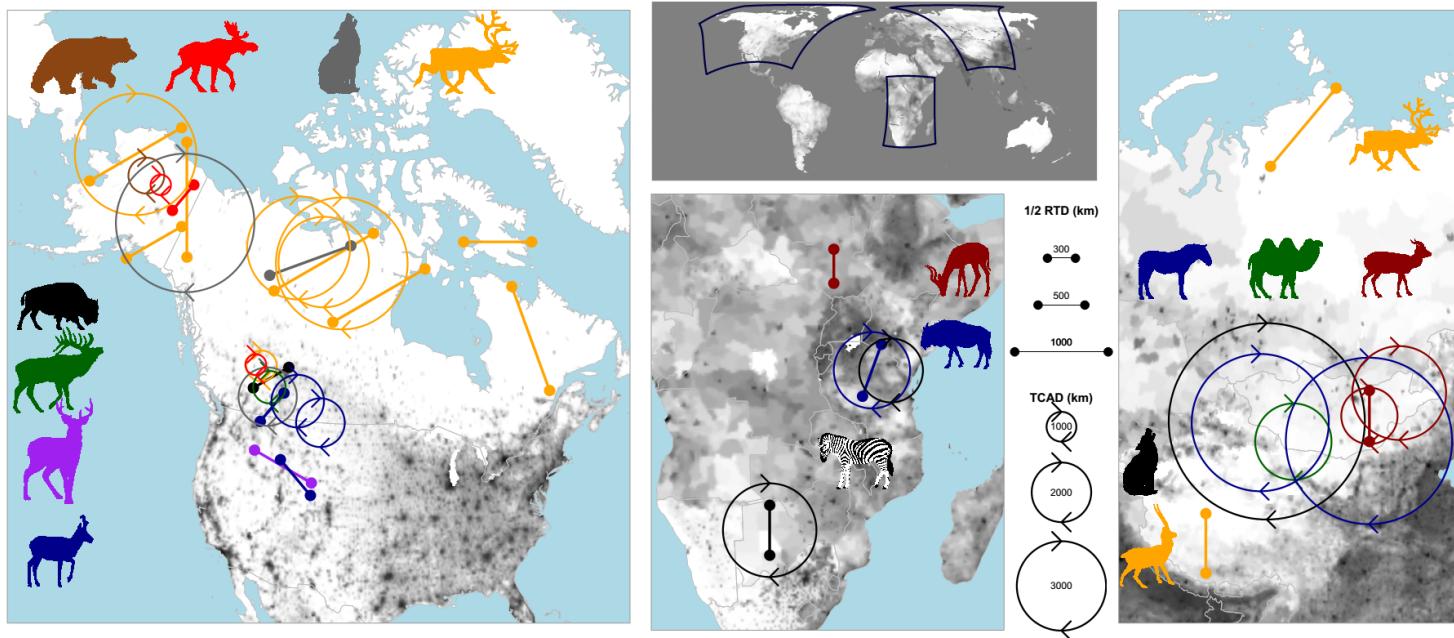
Horse (*Equus caballus*)
Donkey (*Equus asinus*)
Dromedary (*Camelus dromedarius*)
Bactrian camel (*Camelus bactrianus*)
Buffalo (*Bison bison*)
Ferret (*Mustela furo*)
Mink (*Mustela vison*)
Silver fox (*Urocyon cinereoargenteus*)
Chinchilla (*Chinchilla lanigera*)
Emu (*Dromaius novaehollandiae*)
Ostrich (*Struthio camelus*)
Recent aquatic domesticates

Bactrian camel



Brief aside on Bactrian camel

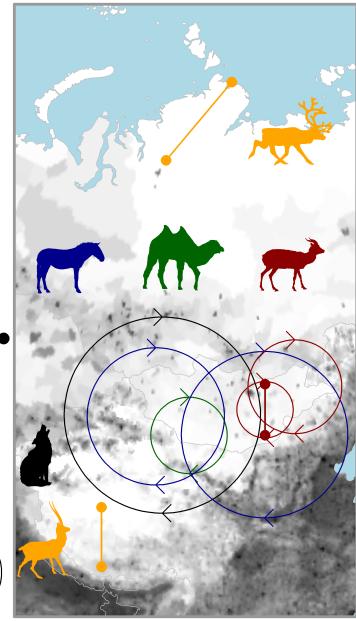
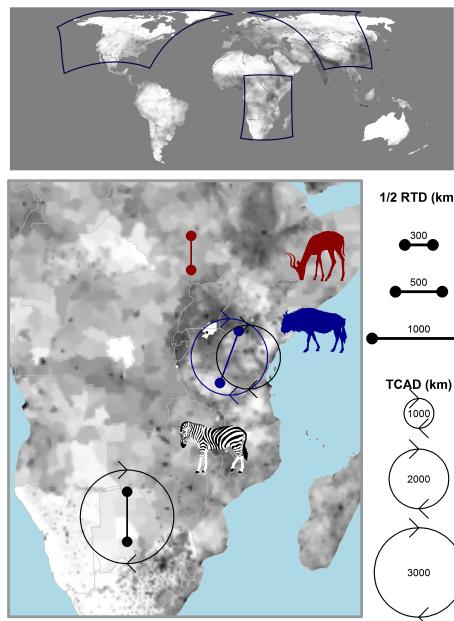
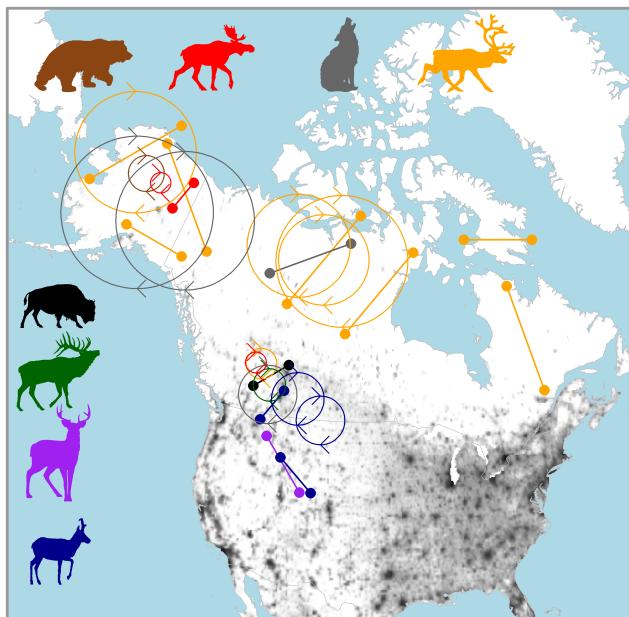
Joly, Gurarie et al. 2020, Longest terrestrial migrations and movements around the world, *Scientific reports*



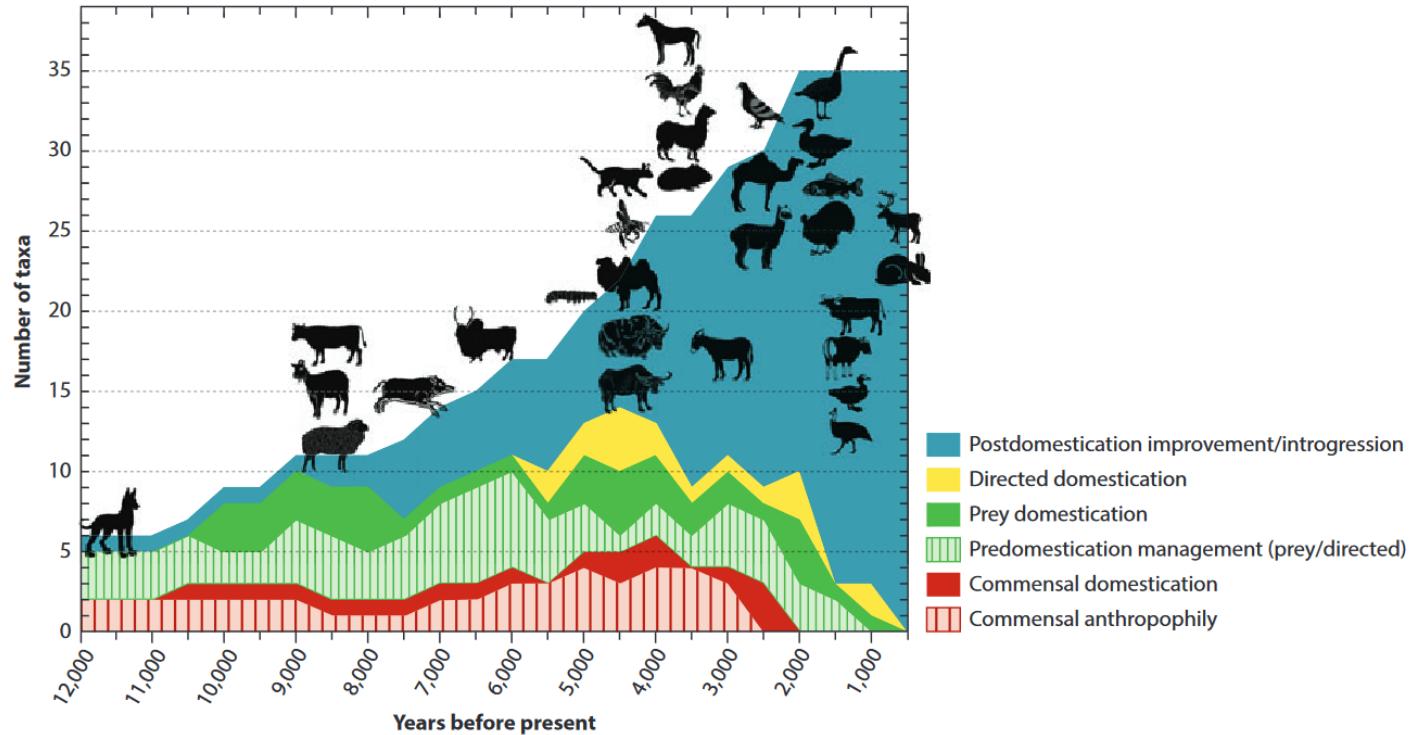
Just one comment is maybe we need to change the camel picture on Fig 1 because this picture looks like domestic camels not look like Wild camels. I have attached here real and beautiful Wild camels photograph and we can use it. - Dr. Adiya Yadamsuren

Bactrian camel fixed!

Joly, Gurarie et al. 2020, Longest terrestrial migrations and movements around the world, *Scientific reports*



Domestication of wildlife ... selective breeding



Larson and Fuller, 2014

Domestication: Rise of Pastoralism

Domesticated animals released onto **open pastures** for grazing, usually by **nomadic people** who move around with their herds.

Species: cattle, camels, goats, yaks, llamas, reindeer, horses and sheep.

Where: around the world ... where land is "marginal", i.e. too unpredictable / unproductive for intensive agriculture. Usually **open** and **arid** land.



Pastoralism

- Occupies ~20%-40% of the world's land surface, 2 billion animals
- Often in conflict with agricultural / industrial society
- Debates: is **pastoralism** equilibrium or **non-equilibrium** ecology?
- Debates: is **ranching pastoralism**?



Pastoralism over time



Domestication of wildlife ... biomass

Life on Earth: the distribution of all global biomass

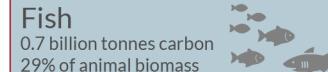
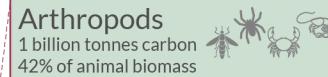
Biomass is measured in tonnes of carbon. The global distribution of Earth's biomass is shown by group of organism (taxa).

Our World
in Data

Global biomass: 546 billion tonnes of carbon



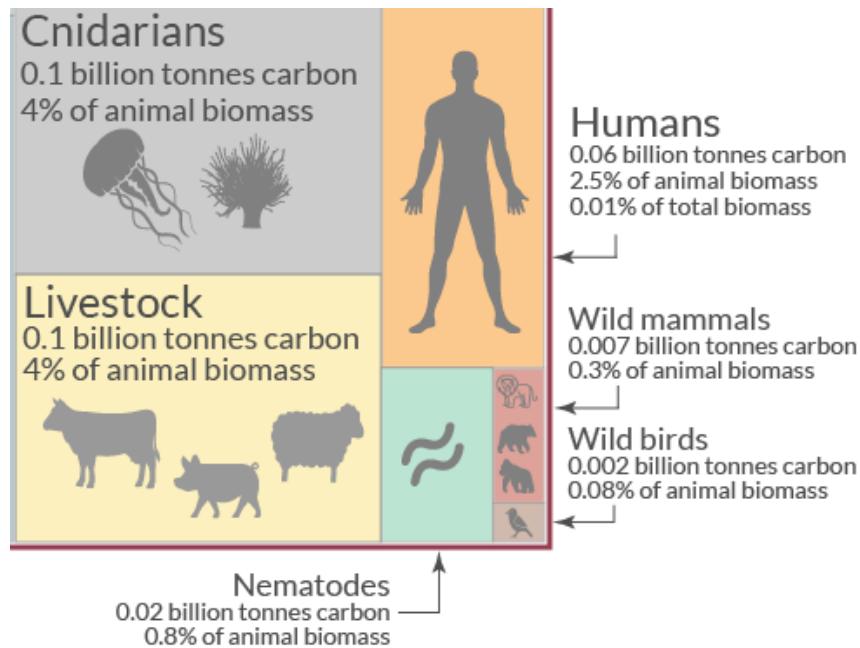
Animal biomass: 2 billion tonnes of carbon (0.4% of total biomass)



Data source: Bar-On, Y. M., Phillips, R., & Milo, R. (2018). The biomass distribution on Earth. *Proceedings of the National Academy of Sciences*. Icons from Noun Project.
[OurWorldinData.org](#) – Research and data to make progress against the world's largest problems.

Licensed under CC-BY by the authors Hannah Ritchie and Max Roser.

Domesticated vs. wildlife vs. humans



1 x Livestock =

1.6 x Humans =

14 x Wild Mammals =

50 x Wild birds

Who really inherits the Earth?

Is wildlife important to **global ecology**?

(Bar-On et al. 2018)

Consequence for wildlife

In settled, structured, agricultural societies - **hunting** becomes optional.

Transforms from **existential entwined essential experience** to *sport* (mainly for *elites*).

Often closely linked to **military** training.



Egyptian nobleman hunting fowl in marshes (1350 BCE)

This cuts across cultures



Livre de la Chasse (France, 1327)



Qing dynasty China

Early example of management

Genghis Khan (1180? - 1227) - an early ‘father’ of wildlife management.

Established wildlife protected areas and hunting season (winter) and restrictions



painting: Vadim Gorbatov

Grandson Kublai Khan (1215-1294)

assigned keepers of the forest to plant food plots of millet and other favored foods for partridges and quail and provided feeding stations.

Guaranteed abundant game for 3-month annual court hunt.



pause to admire Shah Jahan Hunting Blackbuck with Trained Cheetahs

In (feudal) Europe

Wild-lands were rapidly cultivated and developed

Feudal system preserved remaining wilderness as strictly **property of the king**, with especial claim on "higher game", esp. deer, boar, bear

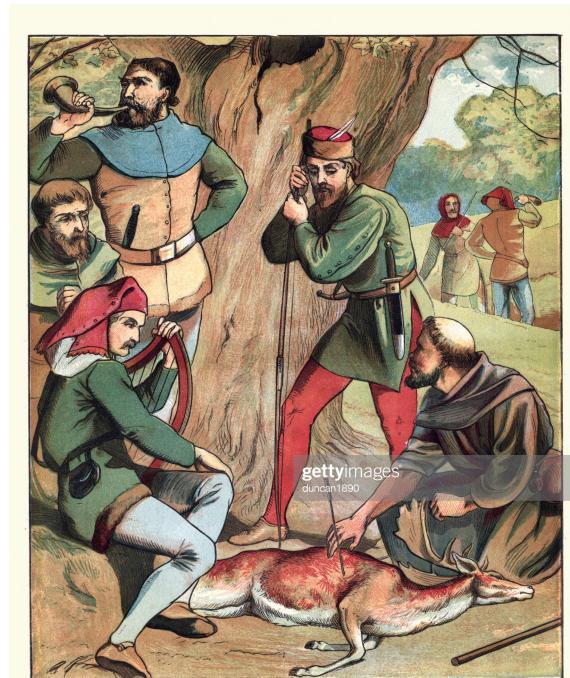
Poaching strongly deterred (hanging / blinding / maiming, etc.)

This conflicted with common-use of land, though small game (rabbit snaring, bird netting) remained legal.

Game Laws of England (~1400) made wealth was a **legal prerequisite** to hunt.

Motivated several peasant rebellions.

Robin Hood

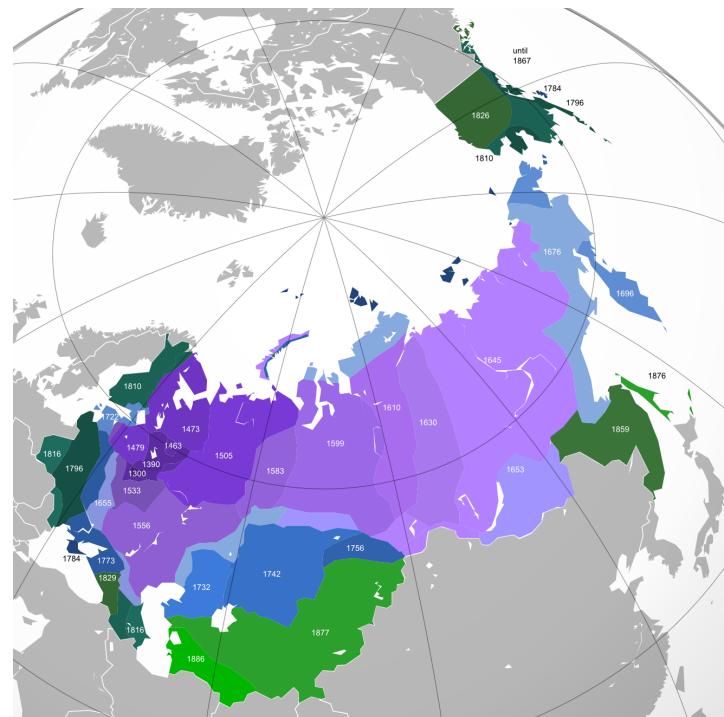


Understandable strong appeal of rebel commoner myth.

Wildlife as globally traded commodity

Export of **furs** almost entirely funded the rise, wealth and expansion of **Russian Empire** across (indigenous) Siberia and into Alaska (1300-1850).

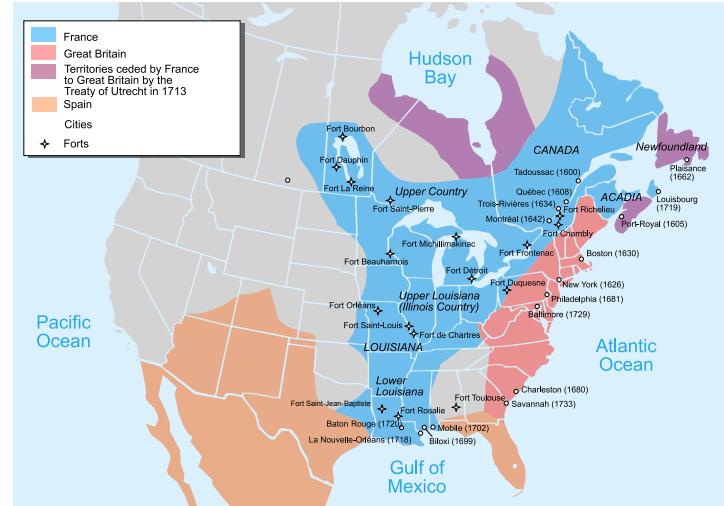
- **Key species:** Beaver, mink, sable, fox, squirrel.
 - **Expansion to N. America:** Pursuit of sea otters and fur seals



Wildlife as globally traded commodity

Fur trade drove expansion and colonization across North America, especially Canada.

British, French, Dutch, Spanish traders traded in furs **heavily** with Indigenous people of North America, fought **wars** over fur resources and land.



Canadian fur-trader

Wildlife as globally traded commodity

Especially **beaver**.

A continent was explored, an indigenous race of people degraded and its culture crushed, and many people died - in part because beaver fur produced better felt than any other fur hat.

Taber and Payne, 2003

After **beaver** crashes (because silk, and scarcity) in 1840 top fur by value in US is **raccoon** followed by **muskrat**.



from Boston Commercial Gazette, April 5, 1832



Commodities tend to get over-exploited

Industrial whaling

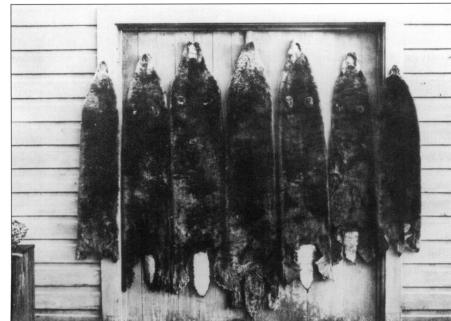
(in contrast to subsistence whaling)

Nearly drove many (most) large whale species to extinction.



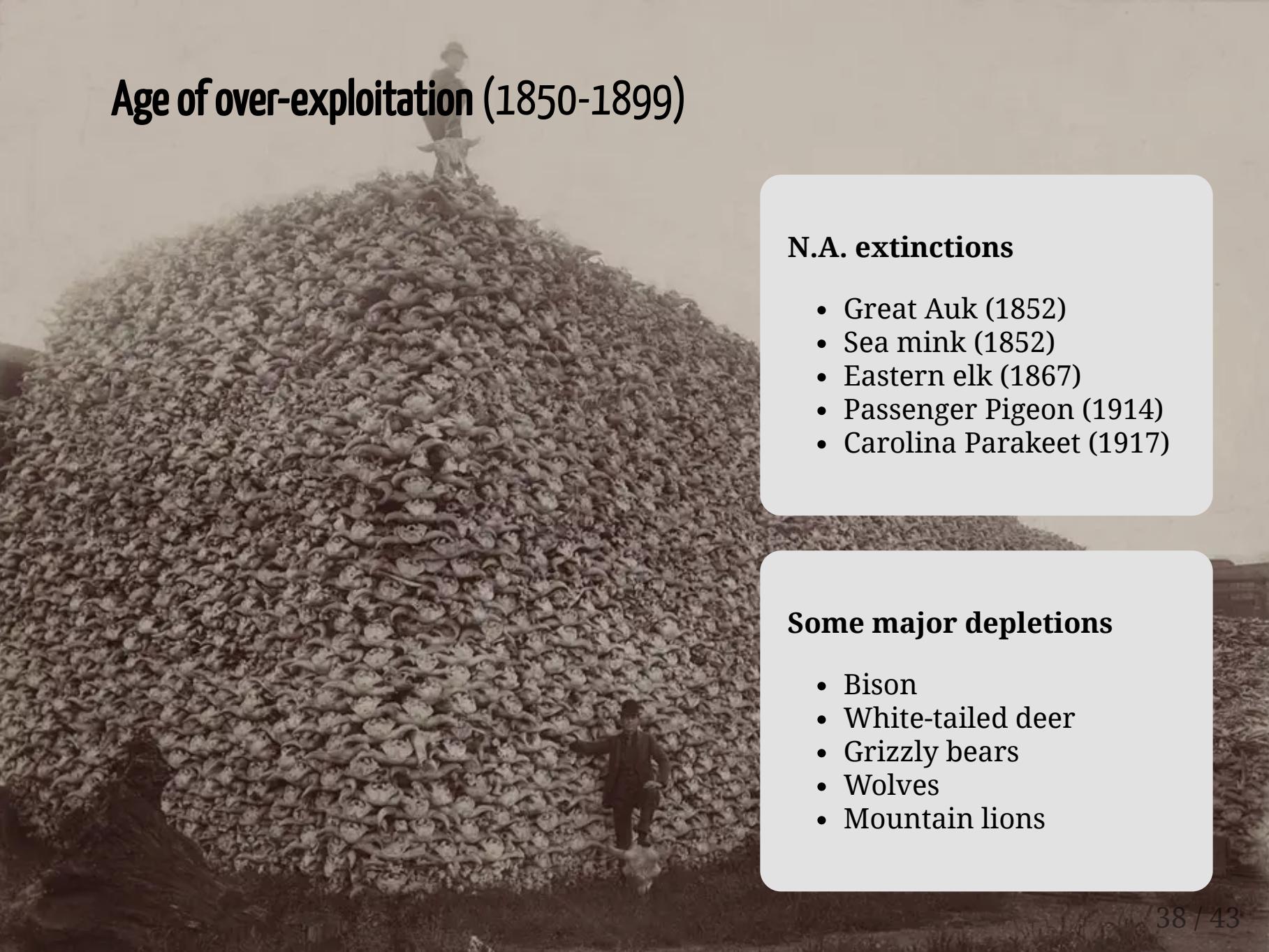
Maritime fur trade

Especially **fur seals** and **sea otters**





Age of over-exploitation (1850-1899)



N.A. extinctions

- Great Auk (1852)
- Sea mink (1852)
- Eastern elk (1867)
- Passenger Pigeon (1914)
- Carolina Parakeet (1917)

Some major depletions

- Bison
- White-tailed deer
- Grizzly bears
- Wolves
- Mountain lions

20th century developments

- Conservation Ethos (Theodore Roosevelt & friends)
- Land Ethic (Aldo Leopold)
- Game Management Science
- Environmental movement
- Legal frameworks for conservation and protection
- Rise of North American Model of Wildlife Management
- Recovery of many species
- Breakthroughs in **Wildlife Ecology and Conservation Biology**

but also certainly

- Rapid climate change
- Biodiversity crises
- Population growth
- More extinctions
- Human-wildlife conflicts
- Global perspectives

We'll come back to a lot of this later ...

21st century questions

Will we be remembered as the **Era of Conservation Science**
or the **Era of Extinction?**

What's the role of **Science**?

What's the role of **Management**?

What's the role of **Traditional Knowledge**?

Some take-aways (11,500 - 100 ya)

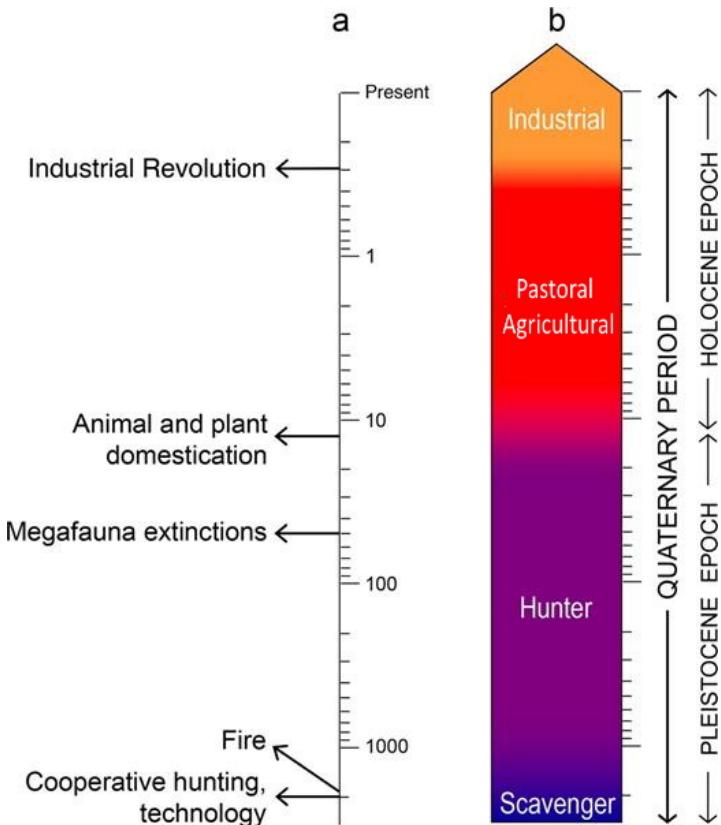
The **Holocene** has been warm and extraordinarily stable.

Allowed for **domestication** of plants and animals.

New modes of subsistence:
agriculture and **pastoralism**.

Wildlife - basically - suffered from:

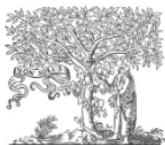
- competition with livestock
- competition with agriculture
- habitat loss
- decrease in **human** value
- increase in **commercial** value



Back to the deep past future

Without climate stability ... it is unlikely that agriculture will be possible in the 21st century and beyond. Civilization will either collapse or gradually disappear over the coming centuries...

In the long run, the vision of **returning to a hunting and gathering way of life** is **wildly optimistic** compared to the technological dystopias envisioned by many science fiction authors and social philosophers. Every characteristic that defines us as a species — compassion for unrelated others, intelligence, foresight and curiosity — evolved in the Pleistocene. **We became human as hunters and gatherers and we can regain our humanity when we return to that way of life.**



Essays

Futures

journal homepage: www.elsevier.com/locate/futures

Our hunter-gatherer future: Climate change, agriculture and uncivilization*

John Gowdy*

Professor of Economics Emeritus, Rensselaer Polytechnic Institute, Troy, NY, USA



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<https://doi.org/10.1017/CBO9781139019514.013>