

Engaging Extinction: De-Extinction, Sustainability and Society

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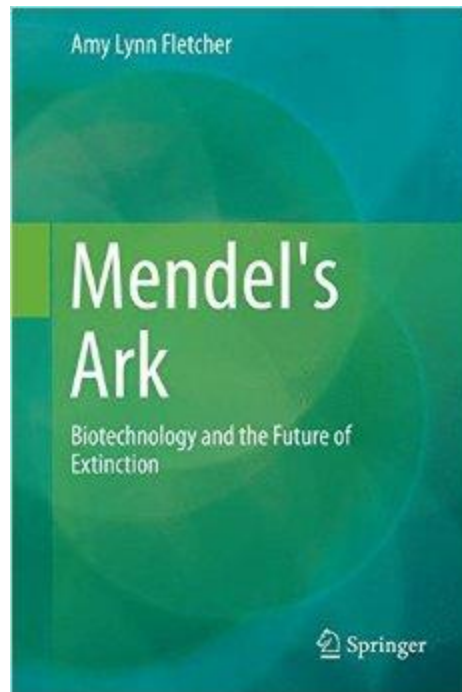
Presentation Outline

- Project Methods/Questions
- Deextinction: Science and Conservation
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 - Thylacine Cloning Project
 - Great Passenger Pigeon Comeback
 - From Deextinction to 'Genetic Rescue'?
- Interim Insights/Conclusions/Future Research

Project

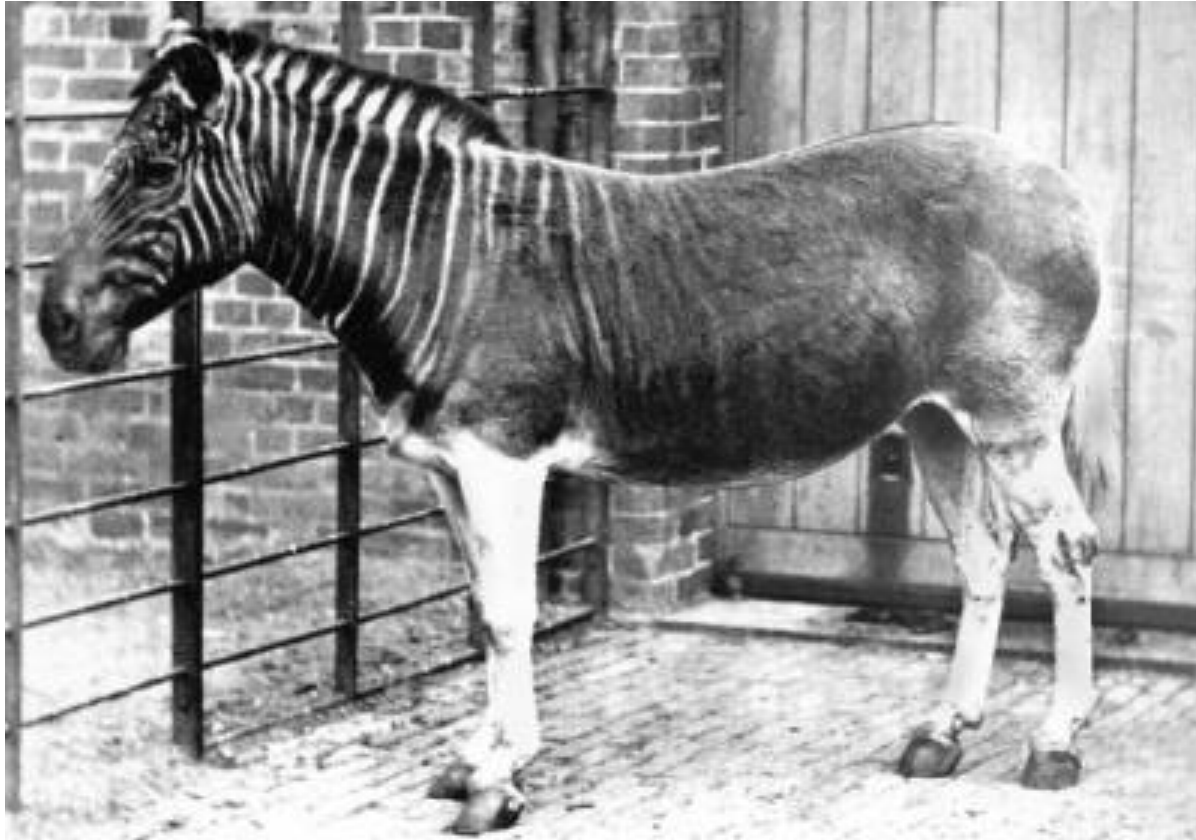
Questions, Methods

Mendel's Ark (Springer 2014)



- Bio-Inventories
 - DNA Barcoding and EOL
- Bio-Interventions
 - Cloning Endangered
- Bio-Identities
 - Cloning Recently Extinct
- Bio-Imaginarities
 - Bringing Back Species from Deep Time

Quagga (*Equus quagga quagaa*), London, Regents Park, circa 1870



De-Extinction Defined

- *Using genetic technology and DNA from museum specimens or fossils to revive species that have gone totally extinct.*
 - Long Now Foundation
 - “Extinction Reversal”
 - “Re-Creation”
 - “Resurrection”
 - “Reviving”
 - “Resuscitation”

3 Main Approaches

- Back-Breeding
- Cross-Species Cloning
- Genetic Engineering
 - Synthetic Biology

De-Extinction: A Case Study of Science in Society

- Research Questions:
 - What is the problem for which deextinction is the answer?
 - Who is pushing deextinction? Where did the idea come from and how has it developed?
 - How does deextinction relate to existing approaches to wildlife management and sustainability?
 - What political/scientific arguments are being marshaled for and against?
 - How does deextinction reflect larger political and social issues in the biotechnology sector?

Ethnographic Methods

- Document analysis
 - Web of Science
 - ScienceDirect
 - Google Scholar
 - Google
- Interviews: F2F, via email, phone
- Participant-Observer: forums on de-extinction
- Archival literature on extinction of key species
- Analysis of Debate through Mass Media (1998 – present)

Narrative Policy Analysis

- E. Roe: *Narrative Policy Analysis: Theory and Practice* (1994, Duke University Press)
- *Sometimes what we are left to deal with are not the facts—that is why there is a controversy—but the different stories people tell as a way of articulating and making sense of the uncertainties and complexities that matter to them. (p. x)*

De-Extinction: Science and Conservation

Conservation Genetics – could deextinction techniques assist?

- Conservation Genetics
 - ultimate goal = minimize loss of genetic diversity over time
- To maintain evolutionary potential: ability of populations to adapt to environmental change
- 3 levels of genetic variation:
 - within individuals
 - within populations
 - among populations

Deextinction as a Conservation Translocation Issue

- P. 140: "*. . . De-Extinction is a conservation translocation issue and the selection of potential deextinction candidates must consider the feasibility and risks associated with reintroduction.*"
- IUCN Guidelines on Reintroductions and Other Conservation Translocations

From Deextinction to Genetic Rescue

- Deextinction
- “Deep ecological enrichment”
- Genetic Rescue (3 Levels)
 - Pure information: what is going on genetically with these species?
 - Genome editing of living, endangered species
 - Genome editing to revive extinct species

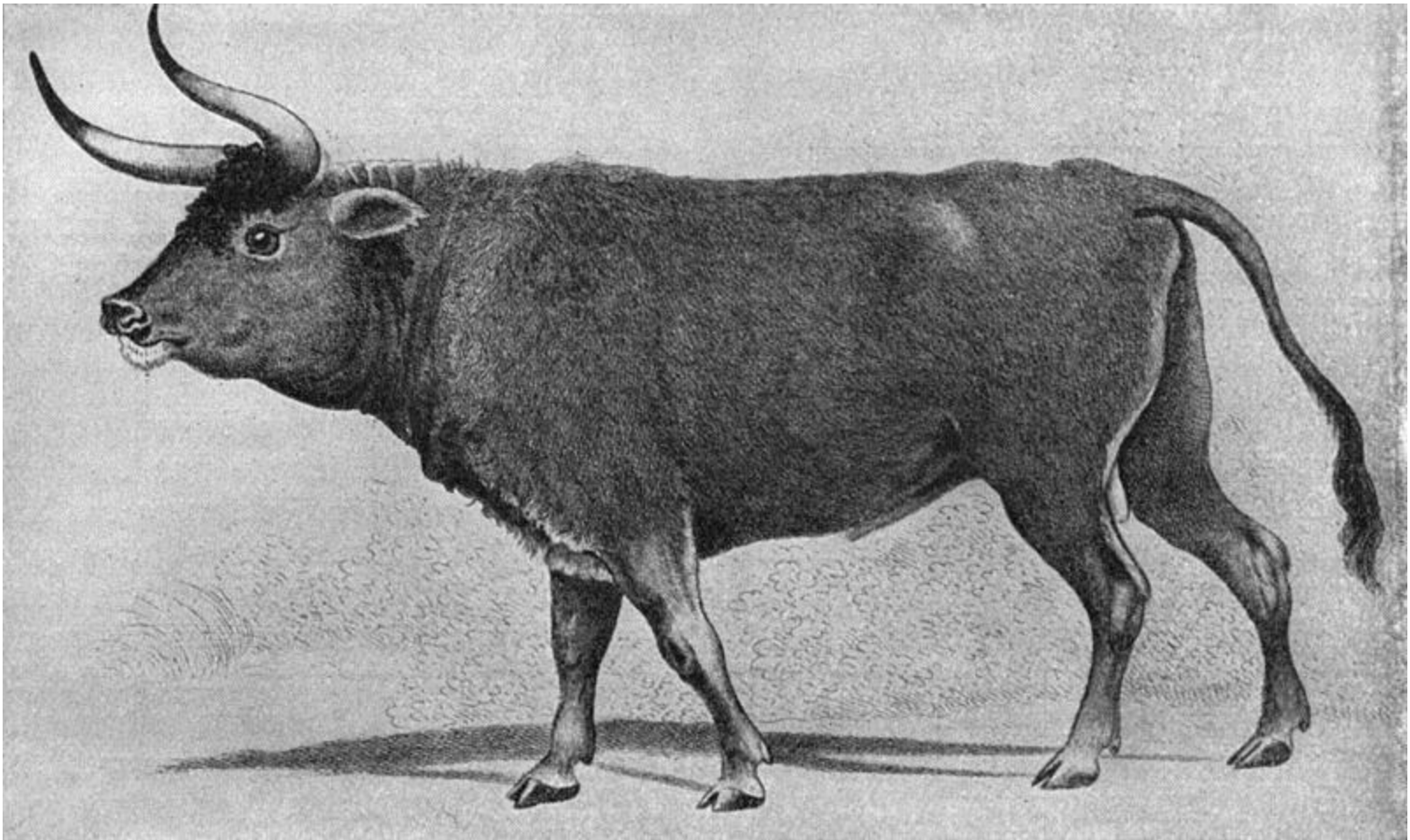
Source: The Long Now Foundation.

<http://longnow.org/revive/what-we-do/genetic-rescue/>

But Now We're Moving from Science into Society

Jacques Loeb, 1890

- *The idea is now hovering before me that man himself can act as creator even in living nature, forming it eventually according to his will.*
- Letter to Ernst Mach



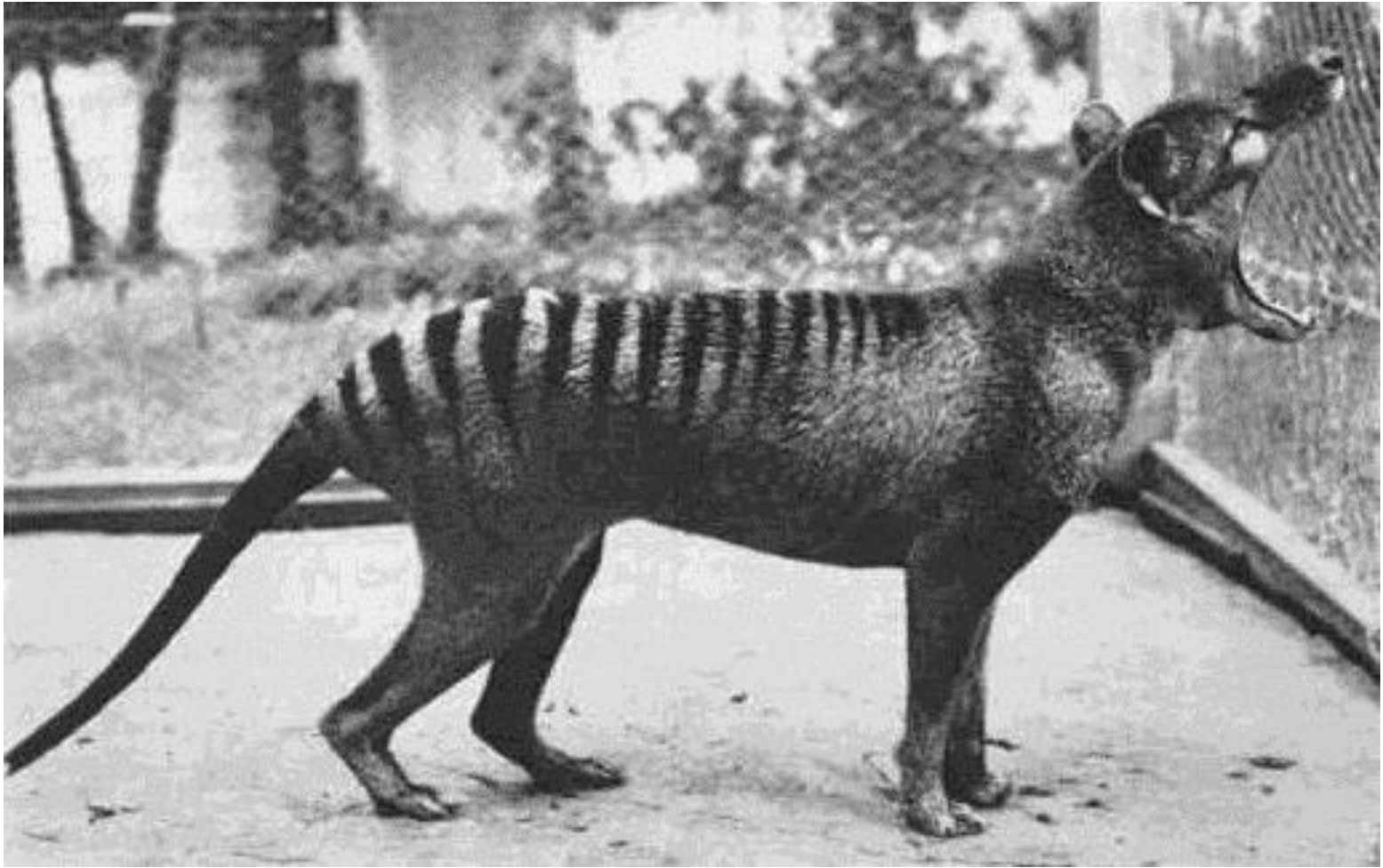


Thylacine Cloning Project 1999 - 2005

- ERA OF RESISTANCE



Benjamin – The Last Thylacine (1936)



Case Study: Thylacine/Australia Issues

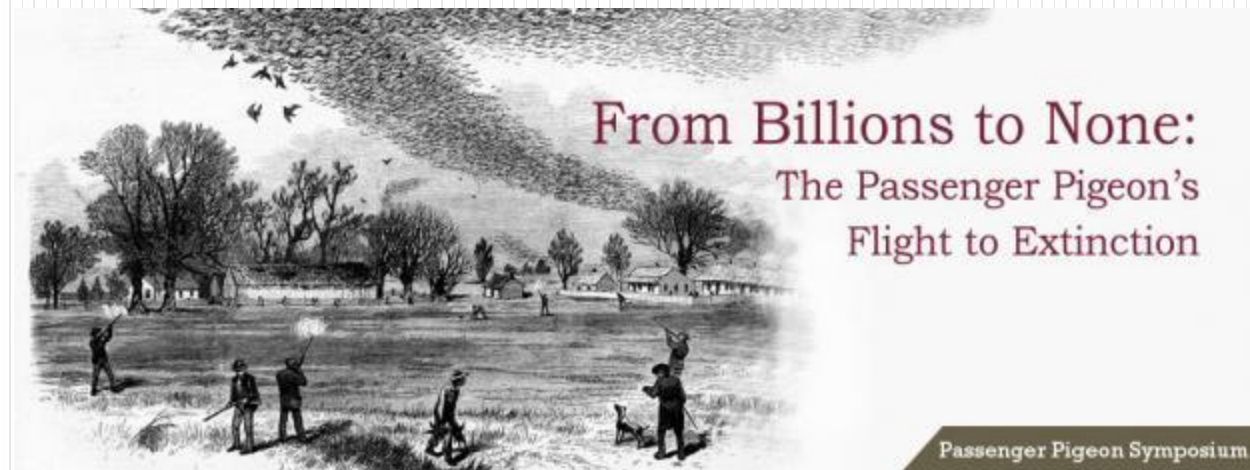
- Aboriginal culture and symbols
- Appropriation of the thylacine image to market Tasmania
- Social Construction of Animal “worth”:
 - 19th century: 1 pound per thylacine as long as its dead
 - 20th century: insurance value of the “pickled pup”?
 - 21st century: how much would you pay to pet a real live thylacine?

Issues/Arguments (Critical) that Repeat Across Cases

- Opportunity Costs and Moral Hazards
- Threats to Existing Conservation Communities and Approaches
 - Molecularization
- Risks: species-environment interactions
- Technological Fixes
- Artificial: not “real” animals
- Socialization and animal development
- Shock/Entertainment Value
- Anthropocene

The Great Passenger Pigeon Comeback (2012+)

Era of Disruption



Martha – The Last Passenger Pigeon (1914)



Bring Back the Moa

Era of Stabilization (2015+)



CONCLUSIONS and Moving Forward

Deextinction – Case Study of Science in Society

- Disruptive Technologies
 - Enable a new conservation approach?
- Boundary Drawing
- Science Communication and Popularization
- ‘Normalization’ of a new science
- Corporatization of Science (Biotechnology)?
- Specificity and Engagement? (Shumpert and Wolfe et al. , 2014).

Environmental Imaginaries (McGregor 2004)

- *Environmental imaginaries are highly contested and can be thought of as the ways in which a society collectively constructs, interprets and communicates nature.”*

Most Expect Manned Missions to Mars by 2050

<i>In next 40 years...</i>	<i>Probably/Definitely</i>		<i>DK</i>
	<i>Will happen</i>	<i>Will not happen</i>	
	<i>%</i>	<i>%</i>	<i>%</i>
Computers will be able to converse like human beings	81	18	1=100
There will be a cure for cancer	71	27	2=100
There will be artificial limbs that perform better than natural ones	66	31	3=100
Astronauts will land on Mars	63	34	2=100
Ordinary people will travel in space	53	45	2=100
An extinct animal will be brought back through cloning	51	47	2=100
We will find evidence of life elsewhere in the universe	50	45	4=100
Human beings will be cloned	48	49	3=100
Computer chips will be embedded in Americans for identification	48	50	2=100
Scientists will be able to tell thoughts from brain scans	42	55	4=100

Pew Research Center/*Smithsonian* magazine April 21-26, 2010.
 Figures may not add to 100% because of rounding.

Gatlinburg Welcome Center, Thursday, March 22, 2012

- *Oh, we didn't use any technology when we helped with the Explore the Park group [GSMN]. We just sucked all these specimens up through pipettes, put them in petri dishes and used microscopes to look at them.*
- Information Desk Employee