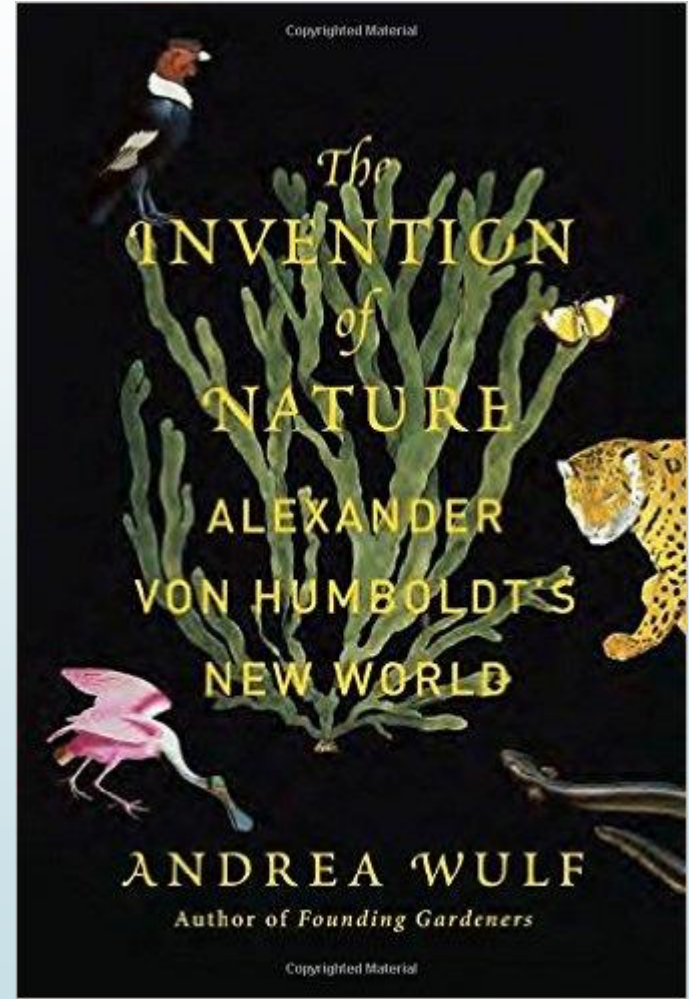
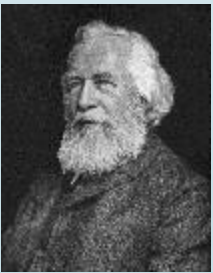
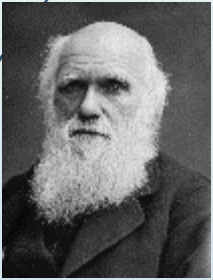


Vulnerability of Michigan Wildlife to Climate Change

Christopher L. Hoving

October 7, 2016

Michigan SAF Meeting, Gaylord, Michigan





*Geographie der Pflanzen in den Tropen-Ländern;
ein Naturgemälde der Anden.*

gegründet auf Beobachtungen und Messungen welche von dem Genie nordlicher bis zum Genie südlicher Breite angestellt wurden und in den Jahren 1799 bis 1803.

ALEXANDER VON HUMBOLDT und A. G. BONPLAND.

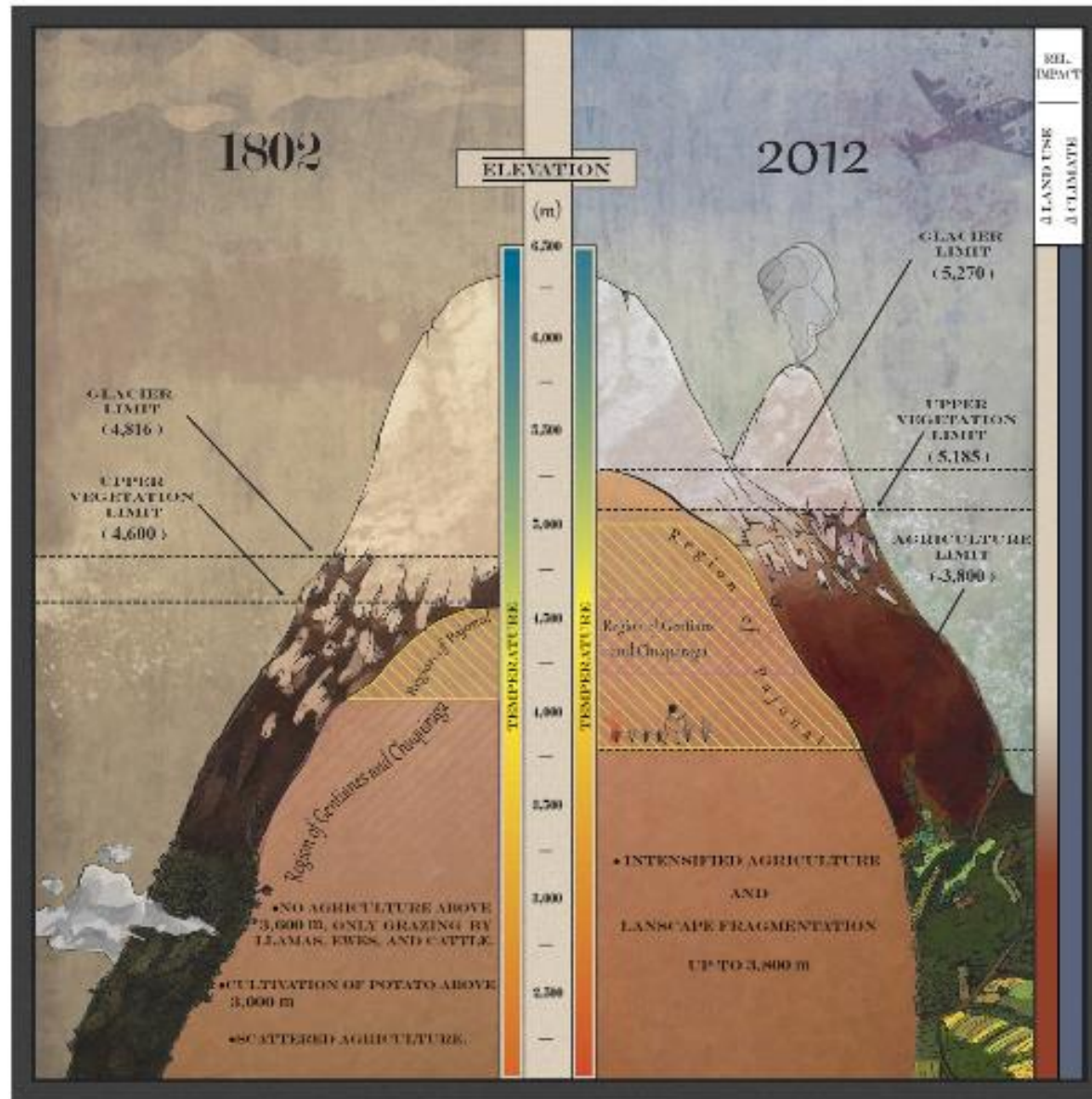


Fig. 3. An update of Humboldt's Tableau. Shown is a summary of major changes in overall vegetation limit, average glacier limit, and shifts in topmost vegetation regions on Chimborazo from 1802 to 2012. The major drivers of change, climate, and land use change are represented by the bars to the right: a constant impact of climate change—in particular, increased temperature—the stronger relative impact of land use at the lower sites, mainly through intensified agriculture, and the effect of grass harvesting and local burning. Illustration of glaciers is approximate.

Morueta-Holme, N., K. Engemann, P. Sandoval-Acuna, J.D. Jonas, R.M. Segnitz, J. Svenning. 2015. Strong upslope shifts in Chimborazo's vegetation over two centuries since Humboldt. PNAS 112: 12741-12745



Species, Populations, Individuals

- ▶ Species shift by
 - ▶ Population increase or decrease
 - ▶ Increasing populations cause more dispersal events
 - ▶ Success or failure of dispersing individuals
- ▶ How vulnerable are Michigan wildlife?
- ▶ Are there patterns or groups that are more vulnerable?



NatureServe CCVI

- ▶ Joint project of the Michigan DNR and Michigan Natural Features Inventory
- ▶ With funding by:
 - ▶ The Michigan Department of Environmental Quality (DEQ) Coastal Zone Management program
 - ▶ Michigan DNR Wildlife Division funds from State Wildlife Grants and Pittman-Robertson.



NatureServe CCVI 2.0

- ▶ Ranks species by exposure and sensitivity to climate change
- ▶ Any plant or animal species, terrestrial or aquatic
- ▶ Easy and (relatively) quick
 - ▶ Microsoft Excel spreadsheet
 - ▶ 2-5 days training, ~30 species/day



Caveats

- ▶ Preliminary assessment
- ▶ Expect surprises
- ▶ Vulnerability of migratory species problematic



Results

- ▶ 17% of game species vulnerable
- ▶ 61% of SGCN vulnerable
- ▶ Under-estimates vulnerability of migratory species
- ▶ Full report online at:

http://www.michigan.gov/documents/dnr/3564_Climate_Vulnerability_Division_Report_4.24.13_418644_7.pdf

Turkey

- ▶ CCVI – Increase Likely & Expand Range in Michigan (mid-century)
- ▶ Audubon – 87% loss of winter range by 2080 rangewide (late century)
 - ▶ Loss in SLP, Stronghold in West UP



Ruffed Grouse



- ▶ CCVI – Presumed Stable & Range Shift out of Michigan (mid-century)
- ▶ Audubon – 34% loss of winter range by 2080 range-wide (late century)
 - ▶ Extirpated from Michigan
- ▶ Zuckerman et al. – Persists as long as young aspen persists, but no population cycles

Eastern Massasauga Rattlesnake



- ▶ CCVI – Highly Vulnerable (mid century)
- ▶ Severe declines in SLP, especially SW (late century)
 - ▶ Pomara et al. 2014

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The big picture

- ▶ Species respond individually, not as communities
- ▶ Monitor, especially boreal species
- ▶ Foster diversity to keep your options open
- ▶ Focus on opportunities

Acknowledgements

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DEQ Coastal Zone Management
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Peter J. Badra
Brian J. Klatt
David Cuthrell

MICHIGAN STATE
UNIVERSITY



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Questions and Contact

Christopher Hoving
hovingc@michigan.gov