The Hagerman Paleoecology and Tephrochronology Project

Kari A. Prassack, Hagerman Fossil Beds National Monument/NPS Laura Walkup and Elmira Wan, Tephrochronology Project, USGS Bill Hart, Miami University IDigBio Digital Data in Paleontological Research Workshop March 27-28, 2017



Olduvai Gorge, Tanzania, Early Pleistocene—Hominins, Oldowan and Acheulean stone tools, and cut marked bones (and a lot of fossil flora and fauna)



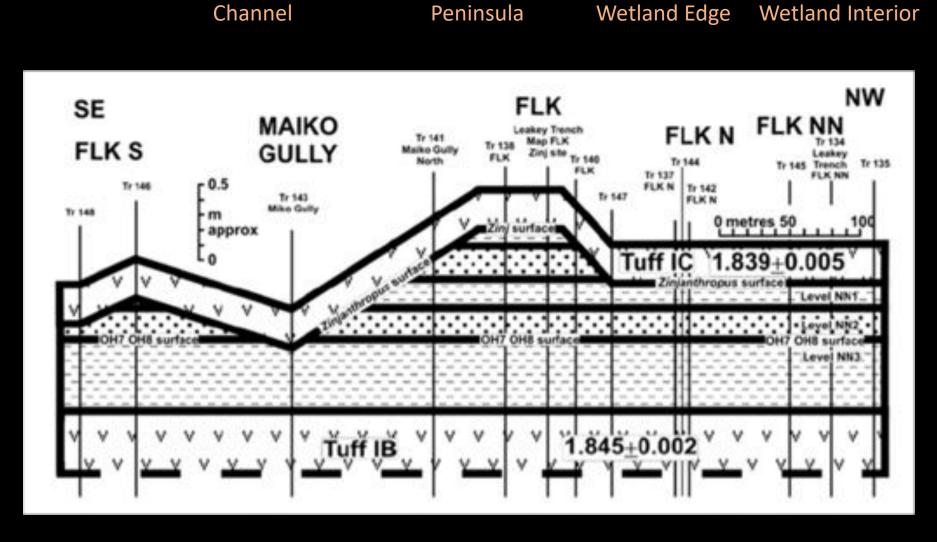
Olduvai Landscape Paleoanthropology Project Olduvai Geochronology and Archaeology Project OGAP Olduvai Vertebrate Paleontology Project Comprehensive Olduvai Database Initiative

OLAPP

OVPP

CODI

Olduvai Gorge, Tanzania—Hominin land use across time and space

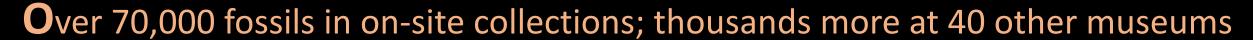


Hagerman Fossil Beds National Monument

Early-middle Pliocene, Blancan Land Mammal Age (4.2-3.0 Ma)

Steep-sided bluffs exposing up to 600 feet of fossil-rich deposits

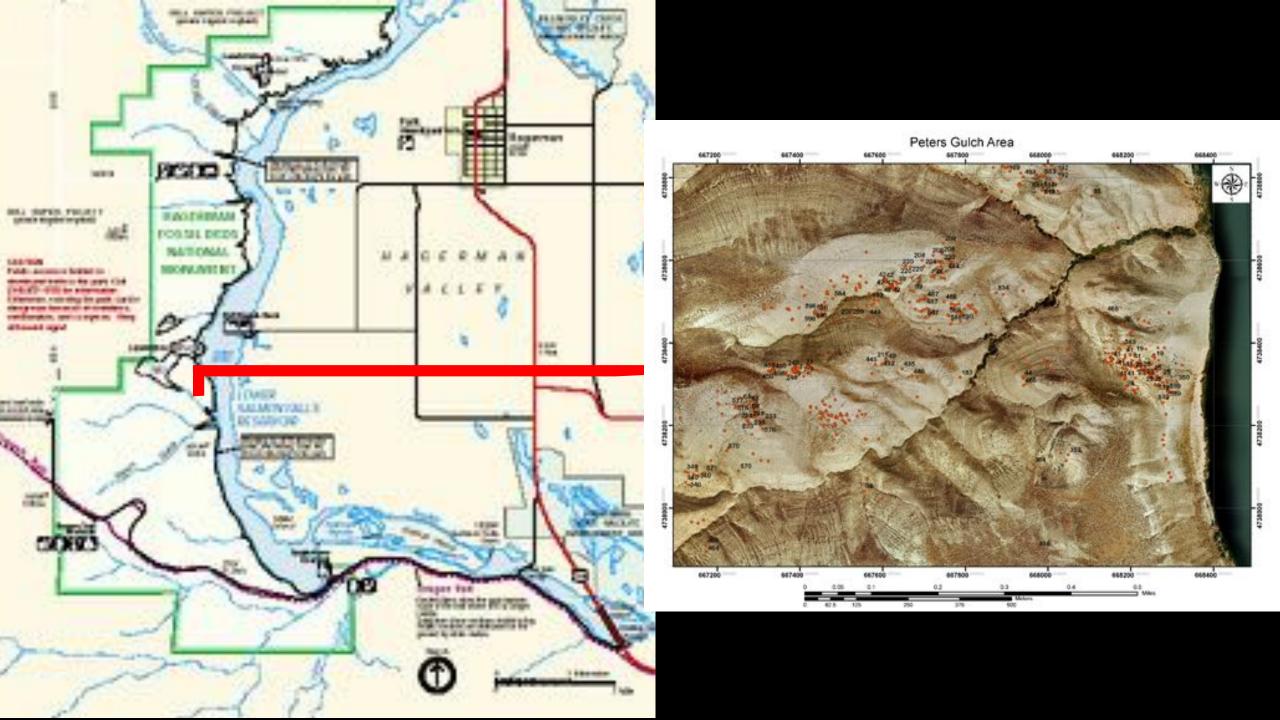
Sites spread put across Monuments 4,349 acres extent











INITIAL ISSUES

- Data collected to be archived/not research ready
- Data points represent collection events, not localities (redundancy and overlap)
- Attributes tables devoid of useful site/taxonomic information
- Collections database (ICMS/NPS) not integrable with GIS platform



OLD ASSUMPTIONS

No subsequent or synsedimentary faulting on the Monument

Our topography was flat and homogenous across time and space

No differential rates of deposition/erosion

Elevation of isolated ash outcrops extrapolated across Monuments extent



MITIGATION STEPS

Park paleontologist gets some much needed GIS training

Sample, source, and date additional ash layers

Trace ash layers across the Monument

Focus on relative dating of 5 "Important" Fossil Localities



Horse Quarry: numerous papers, largest accumulation of Equus simplicidens

Bear: Youngest Agriotherium for North America (Samuels et al., 2009, JVP)

Otter: Oldest example of *Lontra* by several million years (Prassack, 2016, JVP)

Dog: New species of *Canis* for the Monument (unpublished)

Peccary: UMMP site, still productive and most southerly major locality at park





PRELIMINARY RESULTS

Laterally discontinuous ashes, but some ARE traceable to an extent

Ashes seem to be largely locally derived, but Horse Quarry from the Cascades

Multiple, small-offset, high angle faults ARE present; complicates stratigraphy

Otter site is at least as old as recently cited by Prassack, 2016 (whew!)





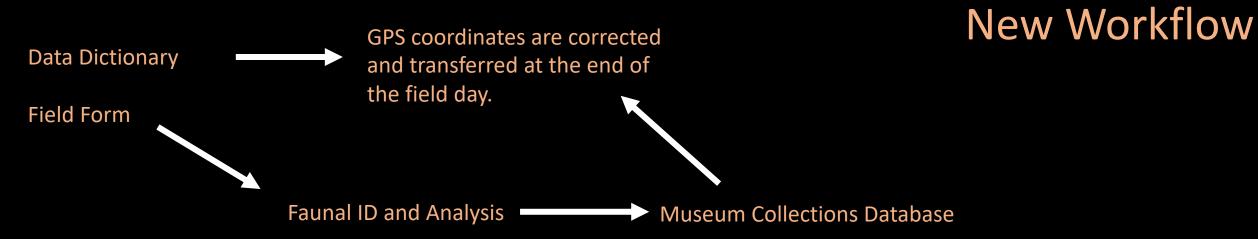
Current

Ground-truthing localities (combine collection points into fossil bearing areas)

Clean and standardize collections database

Create research-based ArcMap with full attribute tables of localities





GIS Attribute Table and Collections Database are LIVING DATABASE



Data Sharing

Presenting and Publishing

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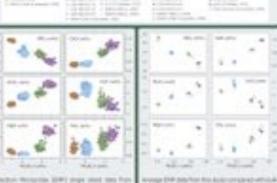
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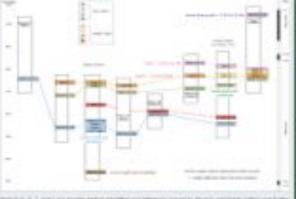
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Results, Conclusions, and Future Work

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Future Plans/Goals

Continue field mapping, section measurements, and tephra collection

Trace element analysis to differentiate between Cascades (subduction) and Yellowstone (intraplate) planned for summer 2017

Isotopic analysis (Sr, Nd, Pb)

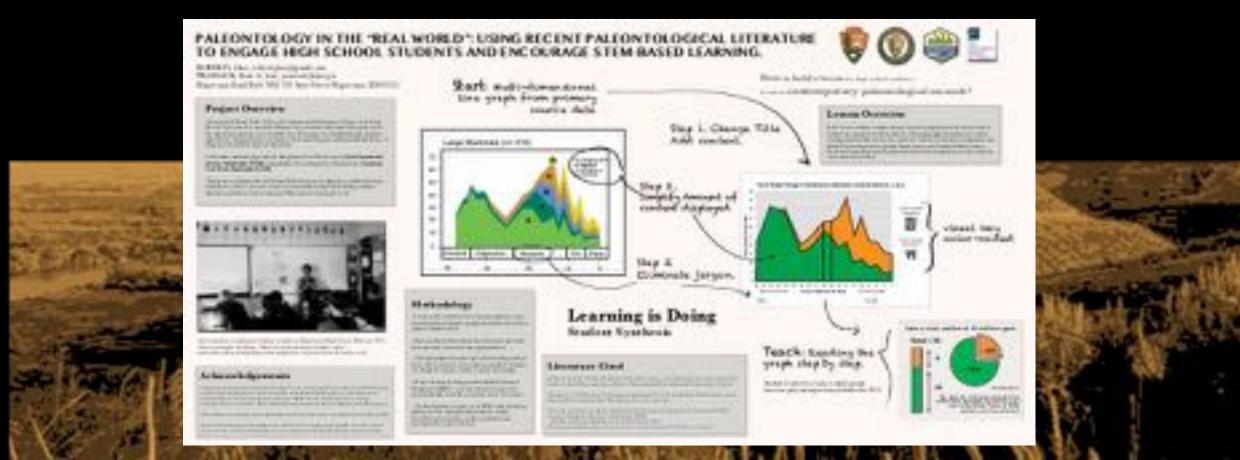
Radiometric dating (Ar40/Ar39)
Integrating the ash and fossil locality data in GIS



Data Sharing

Education outreach (curriculum using real data)

Geoscientists in the Park Program Jardine et al. 2012, Palaeo3 www.nps.gov/hafo/learn/education/classrooms/curriculummaterials.htm



Acknowledgements

IDigBio for this great workshop opportunity!
Laura Walkup and Elmira Wang, USGS Teprostratigraphy Project
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Geoscientist-in-the Park Program

