

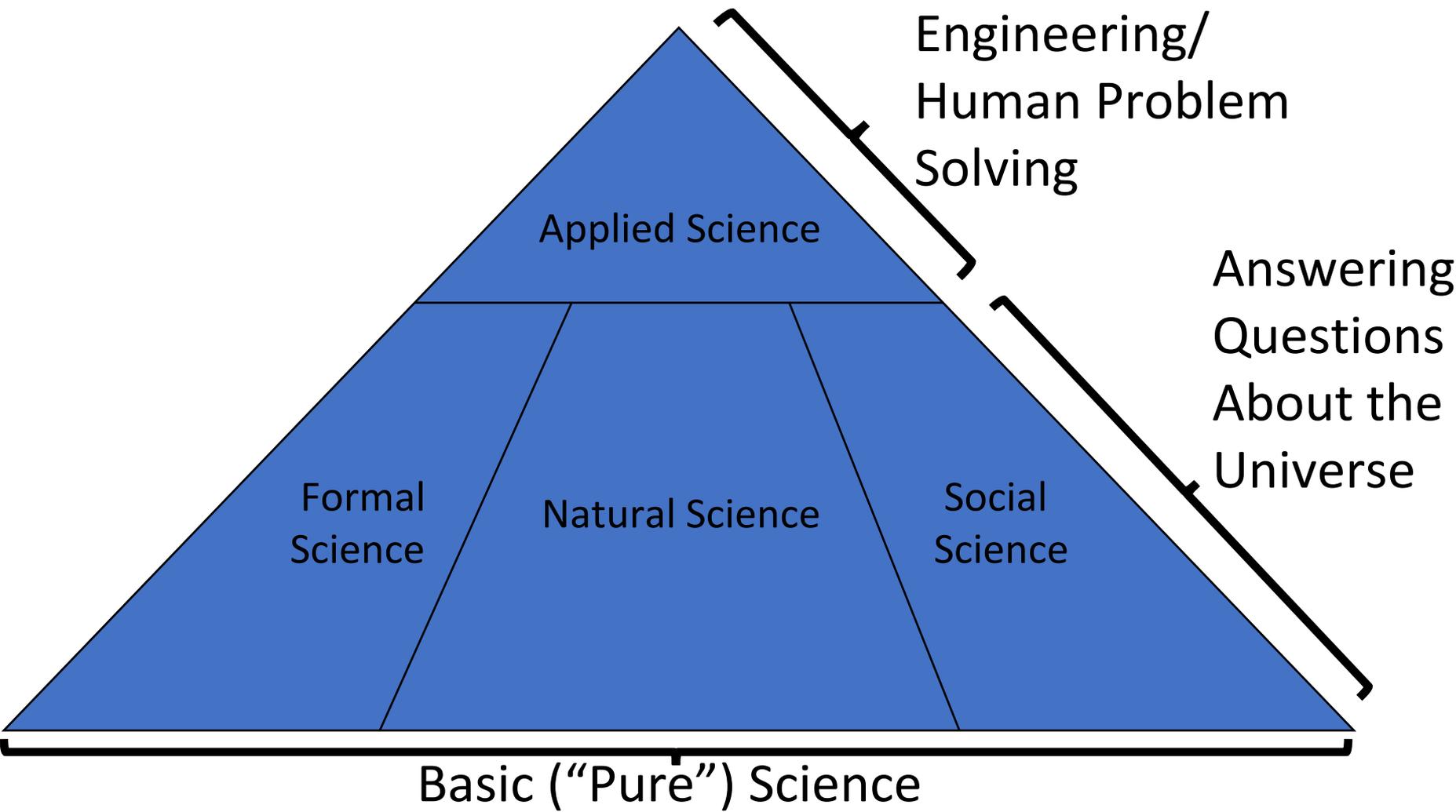


U.S. Department of the Interior  
Bureau of Land Management

# Grand Staircase-Escalante N.M.: Science in a BLM “Outdoor Laboratory”

Alan L. Titus PhD  
Paria River District  
Paleontologist





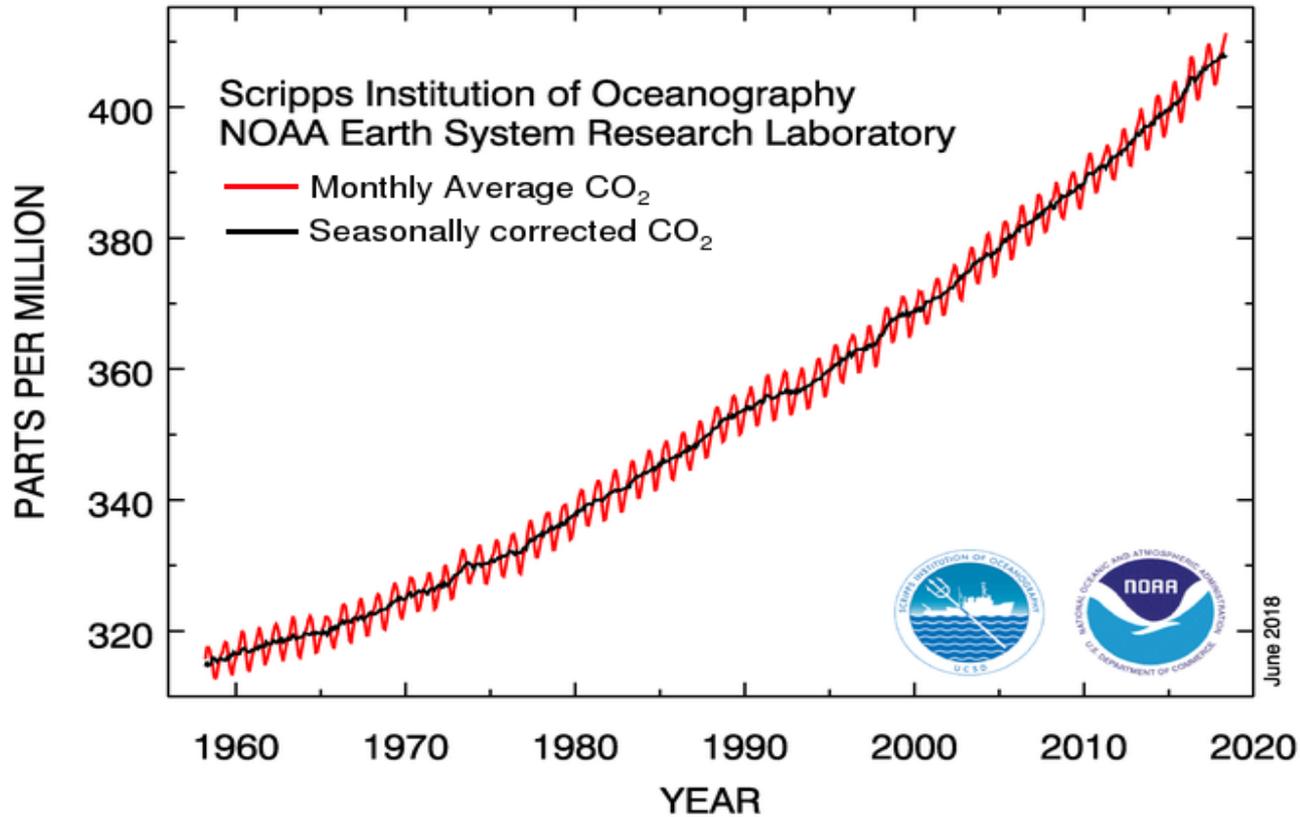


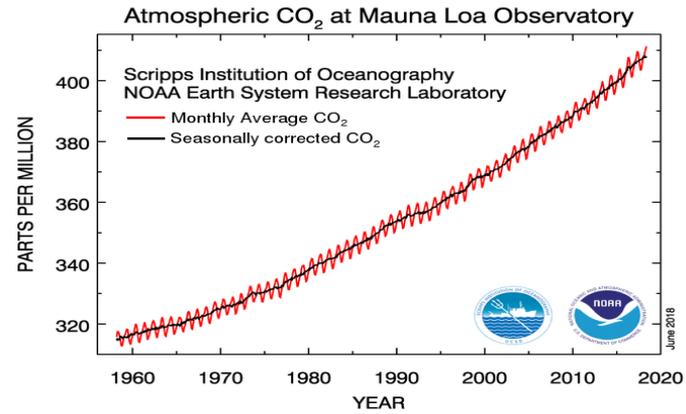
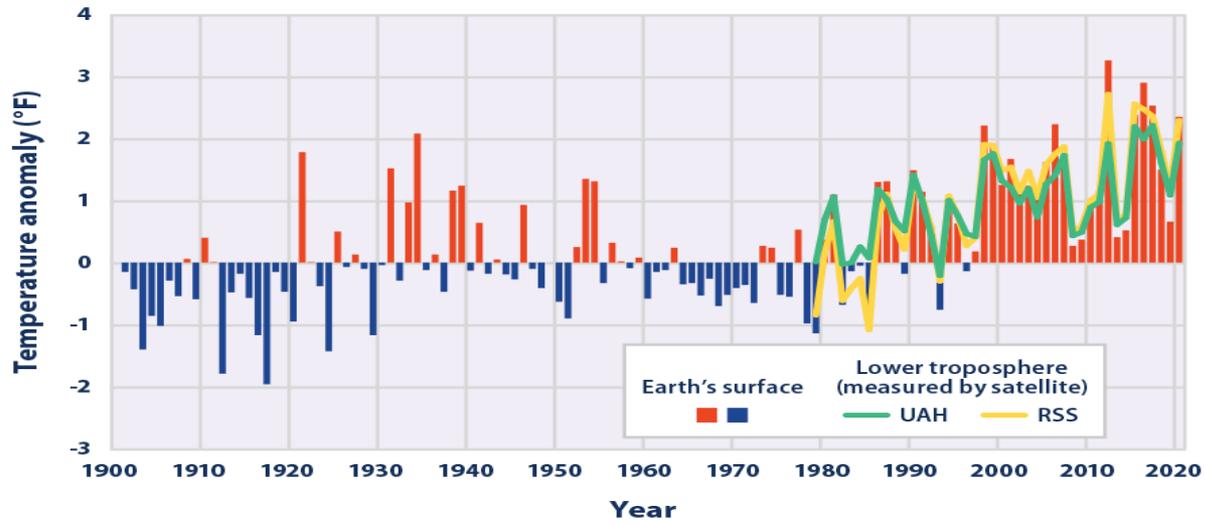
“Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe.”-Wikipedia





## Atmospheric CO<sub>2</sub> at Mauna Loa Observatory







# Benefits of Science

- Informed decisions based on rational arguments
- Maximize desired outcomes
- Foster understanding/appreciation of how the natural world works
- Inspire future generations
- Improve human experience/quality of life
- Understanding origins/place in the world
- Spinoff benefits to the arts and humanities (e.g. Jurassic World)
- Synergistic effect toward future science



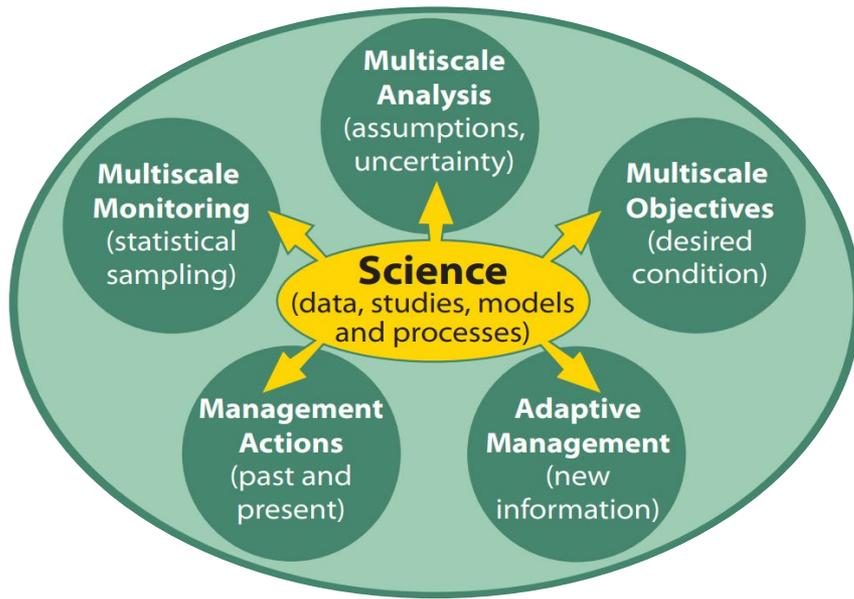
Science does not make decisions or mandate solutions to problems, which are based on human values... it only observes, models, and informs.

- Should be unfettered by political, financial, or ideological constraints.





# BLM SCIENCE POLICY

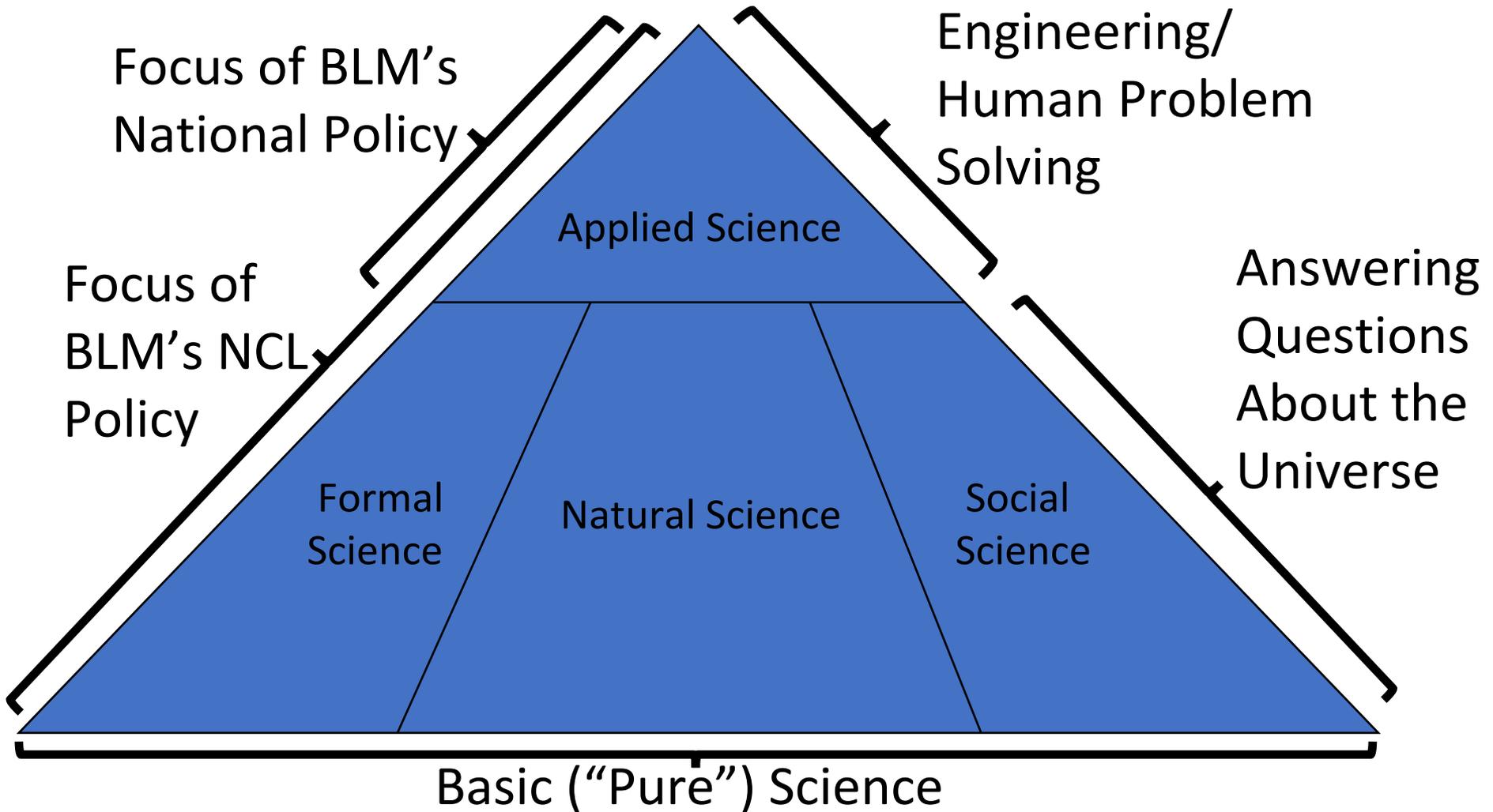


VS.

“1) scientific investigation of natural, social, and cultural resources referred to in each unit’s enabling language”

-Advancing Science in the BLM:  
An Implementation Strategy,  
2015

-NLCS Science Strategy, 2007





“The NLCS (=NCL) science strategy responds to the legal mandate in the enabling legislation and proclamations to promote and foster **both basic and applied science** by presenting a plan to facilitate scientific understanding of the BLM’s NLCS units.”

-NLCS Science Strategy, 2007



# Pros/Cons of Basic Science

- Pros
- Synergistic partnerships with other research institutions
  - Basis for most public interpretation of natural resources
  - Excellent source of positive PR.
  - Many researchers come with outside support

- Cons
- Hard to prioritize “it’s *all* important!”
  - More esoteric work is easy target for critics “what’s the point?”



# Pros/Cons of Applied Science

- Pros
- Can be useful for decision makers immediate needs
  - Easy to prioritize, based on issues
  - Easy to “sell” to management
  - Easy to define the scope of research

- Cons
- Generally done on a pay to play basis with contractors
  - Can feel like wasted effort if decisions made politically



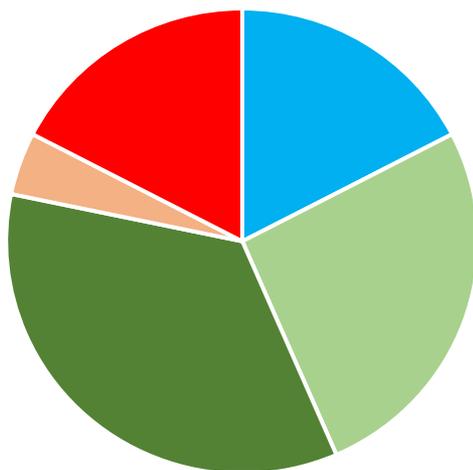
# GSENM's OUTDOOR LABORATORY

- **“It also serves as an outdoor laboratory on the frontier of scientific research that continues to regularly reveal important insights into our planet and our past.” Proclamation 10286**
- 260-million-year sedimentary bedrock record with especially rich and significant Cretaceous strata/fossils.
- Located within the Colorado Plateau Ecoregion
- Vast expanse of land covering five major vegetation zones, and over 260 soil types
  - encompasses most found on the Colorado Plateau
- Diverse flora/fauna (especially insects)
- Minimum of 12,000 years of documented human history



# SCIENCE IN GSENM-2002

BASIC N=24



- Geology
- Biology
- Paleontology
- Cultural
- Archeology

APPLIED N=3

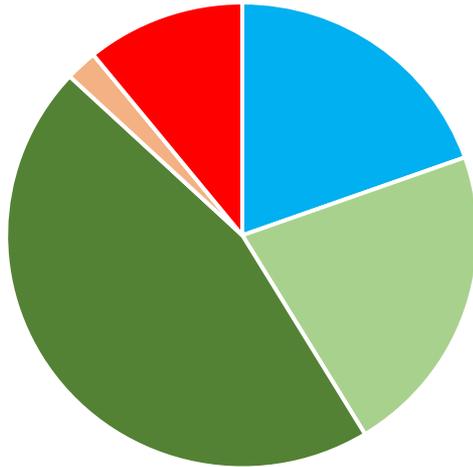


- Geology
- Biology
- Paleontology
- Cultural
- Archeology



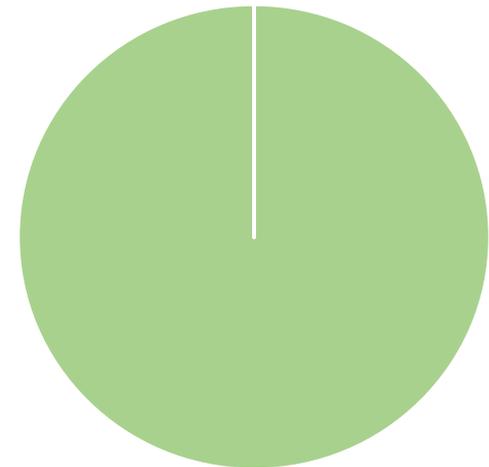
# SCIENCE IN GSENM-2019

BASIC N=45



- Geology
- Biology
- Paleontology
- Cultural
- Archeology

APPLIED N=3



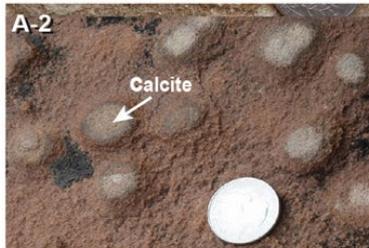
- Geology
- Biology
- Paleontology
- Cultural
- Archeology



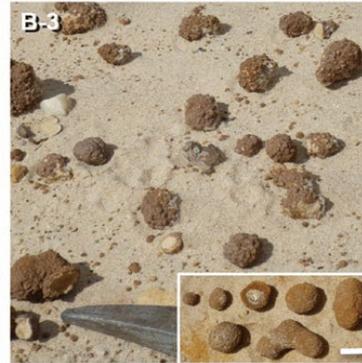
# Monument Science Headliners

## Martian Blueberries

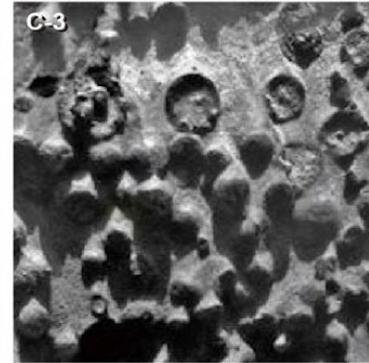
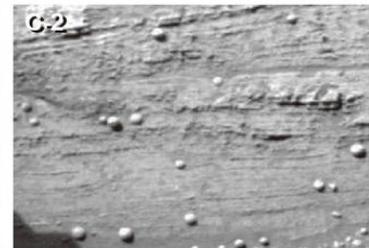
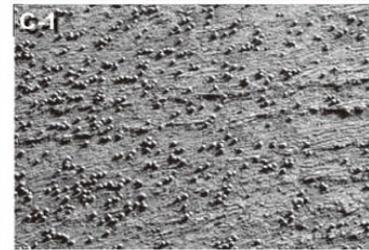
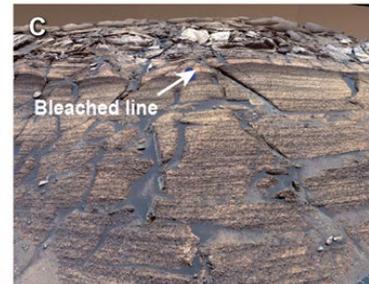
**USA Utah**



**Mongolia Gobi**



**Mars Meridiani**





# Monument Science Headliners

## New Dinosaur Species





# Monument Science Headliners

Rainbows &  
Unicorns  
Taphonomy

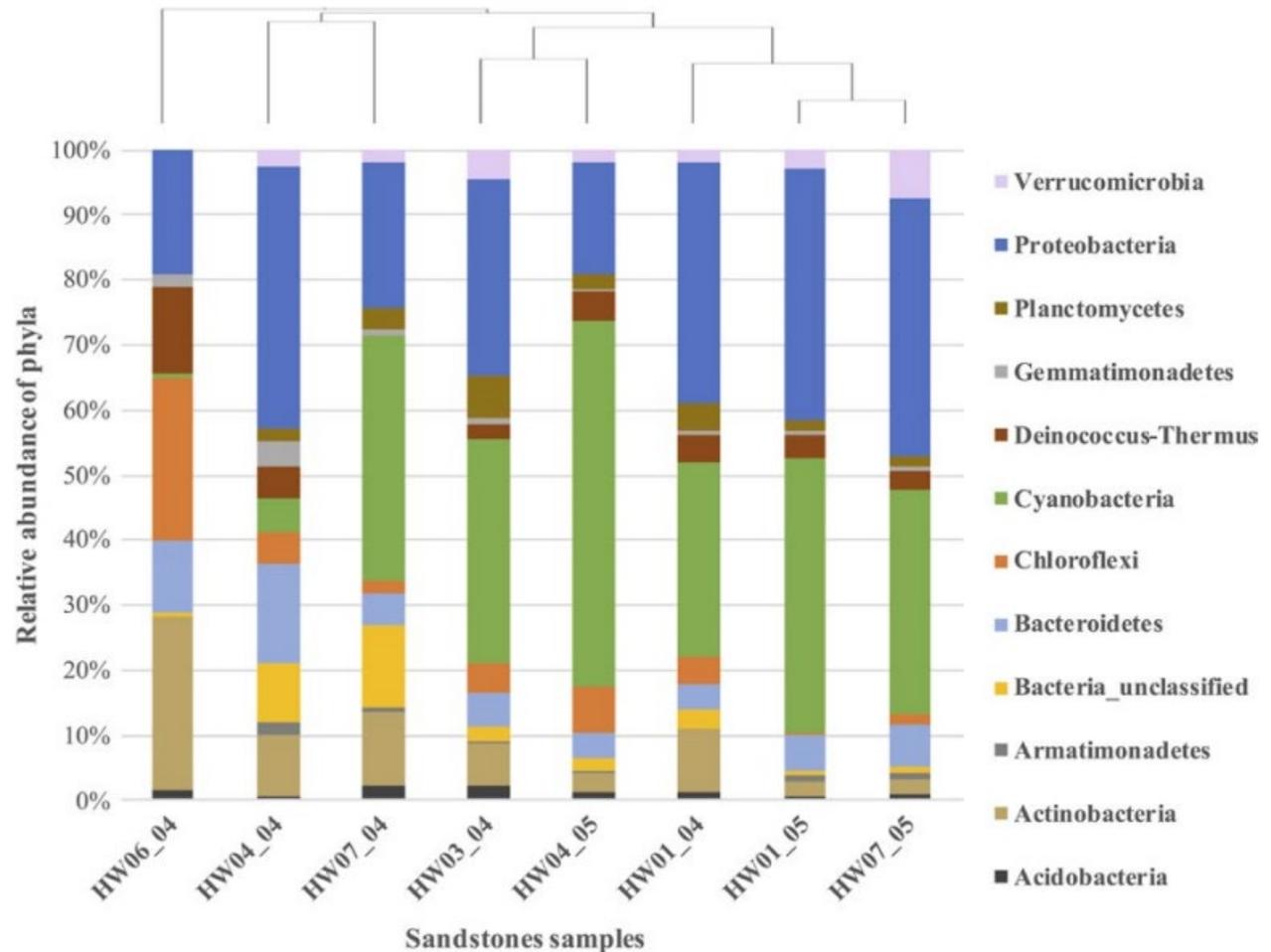




# Monument Science Projects-

## Kurtz-Clemson University

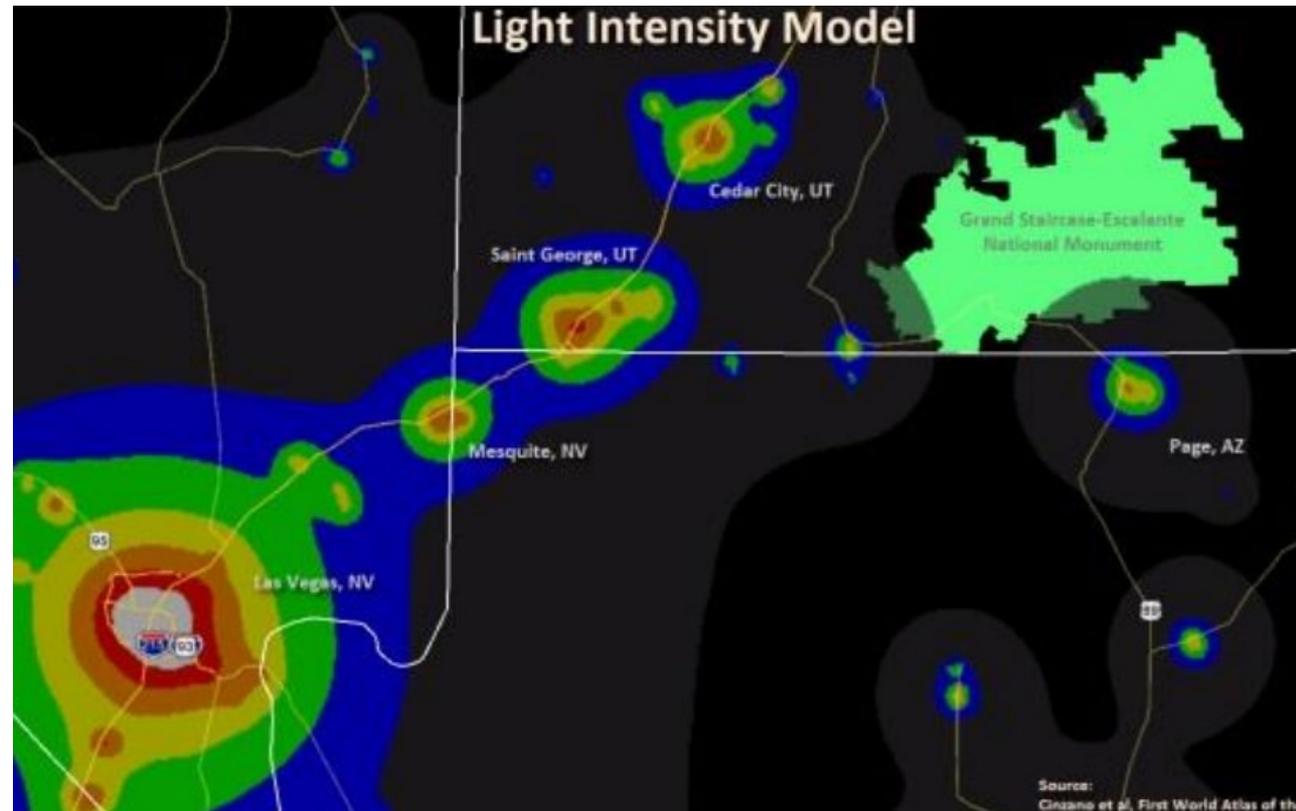
Endolithic  
Microbes-  
Rock surfaces  
host extremely  
diverse flora





# Dark Skies Inventory-Weber State Univ.

Some of the darkest skies on the Colorado Plateau





Pollen  
Coring/Dendro  
chronology-  
50 Mile  
Mountain  
Douglas Fir  
completely  
replaced by  
Pinyon pine  
starting 900  
years ago





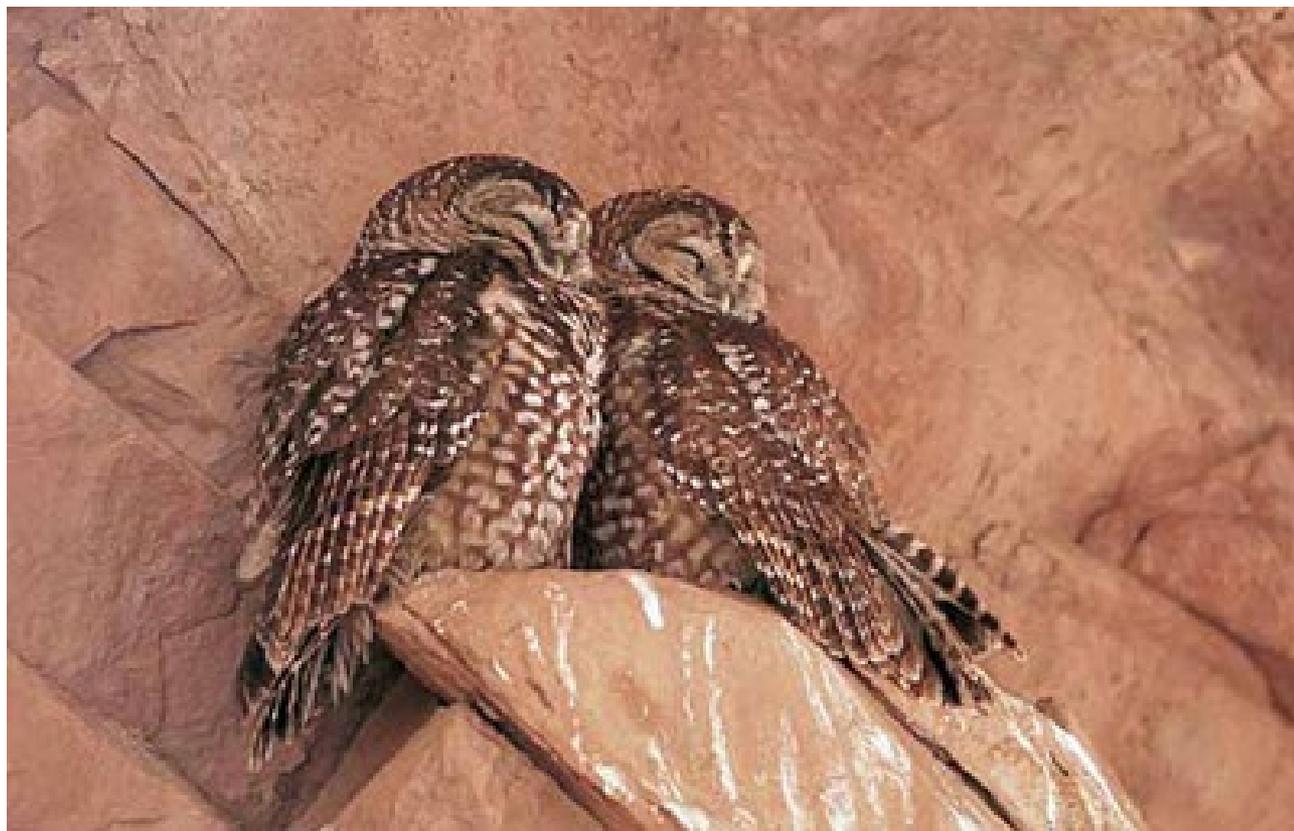
# Native Bee Studies-

660 species=17% total  
diversity of North America





Mexican Spotted  
Owl Habitat  
Modeling-suitable  
habitat in many  
remote canyons





# Penstemon Genetics

17 species including 2 endemics and hybrids





Recreation  
Baseline Study-  
Most of the  
nearly one million  
tourists are  
seeking  
“Naturalness &  
Tranquility”





# How to Build a Healthy Science Program

- Develop a Science Plan that emphasizes both basic and applied research
- Ensure staff positions are filled by experienced researchers fluent in the scientific method
- Require staff to engage with the broader research community
- Prioritize research in budget
- Maintain an effective communication plan for disseminating research results to upper management/public
- Do annual reviews on how scientific advancements can be integrated into management and public education/interpretation



# MAC HOMEWORK ASSIGNMENT

- Work on Monument Science Plan
  - Current draft (2019) is essentially a list of applied science priorities
- Needs revision to more accurately reflect NCL science directives
- **NEEDS YOUR INPUT!!**
  - You don't need to be a scientist to make meaningful contribution
  - Preliminary input by October meeting



# THANK YOU!

