Harnessing NASA Satellite Remote Sensing in Support of Large-Scale Conservation Management on BLM Lands

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Assessment, Inventory and Monitoring (AIM)

• AIM was developed to allow land managers to gather data in a consistent and efficient manner, to be used at the field office, regional and national level

• Goals
  (1) the development and application of a consistent set of core methods for measuring ecosystem indicators;
  (2) development and implementation of a statistically valid—and defensible—sampling framework;
  (3) application and integration of remote sensing technologies;
  (4) electronic data capture and management; an
  (5) structured implementation based on the particular management objectives and local ecosystems relevant to a project.

• Problems: spatially/temporally sparse: point data, rare repeat measurements
AIM Indicators

• Currently, thousands of points across BLM land; 4,000 additional points/year going forward

• Cover: Bare ground, foliar cover, vegetation composition, invasive plant species, species of management concern (sagebrush)

• Structure: Vegetation height, proportion of soil surface in intercanopy gaps
Planned Approach

- **Satellite Data:**
  - MODIS NBAR, BRDF Parameters (structure)
  - Landsat OLI reflectance

- **Auxiliary Data**
  - DEM (inc. slope, aspect), Soil Texture (%sand/silt/clay), Climate (Max/Min Temp, MAP)

**AIM**
- Field data
- Machine learning method

**Google Earth Engine**
- Satellite images
- Build expression
- Predicted distribution map
- Cross validation

**Export for Defensible Decision Making**
Planned 1st Generation Product for Managers (not just BLM: NPS, USFS, Reclamation)

Approach designed in collaboration with BLM in first meeting

- Draw/import polygon
- Enough AIM Points?
- Choose geographical data
- Machine Learning Approach
- Produce Map
- Produce Uncertainty Map (both through time)

Not a static product or set of relationships

Theoretically, this tool isn’t limited to just AIM data

Export: Maps, input data, Info required to reproduce analysis
Gravy

• Reduce continuous fields to ecosystem states
  • Ecosystem states are used by rangeland ecologists and land managers to understand and model

• Produce landscape metrics
  • Patch fragmentation/isolation/proximity
  • Patch size distribution/density
  • Patch shape complexity
  • Structural connectivity