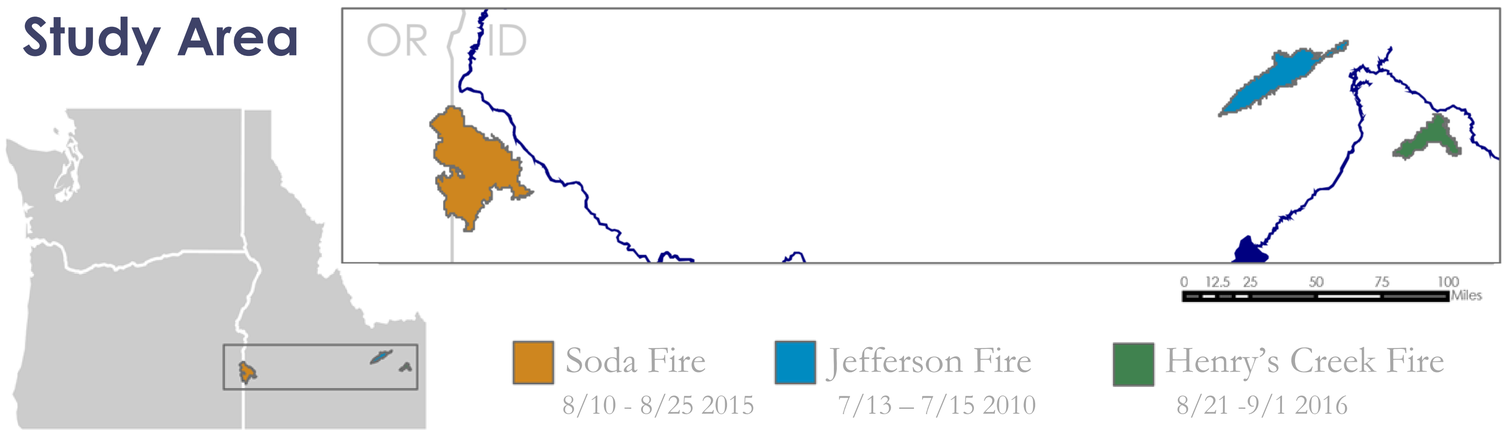
Characterizing Vegetation Type at Pre- and Post- Wildfire Periods Using NASA Earth Observations

Objectives

- **Apply** a model developed as part of the summer 2017 term analyzing the Crystal fire to the Jefferson, Henry's Creek, and Soda fires
- **Identify** correlations between climatic/biophysical conditions and ecosystem recovery
- **Develop** useful tools for land management agencies to quantify recovery and support decisions evaluating recovery methods

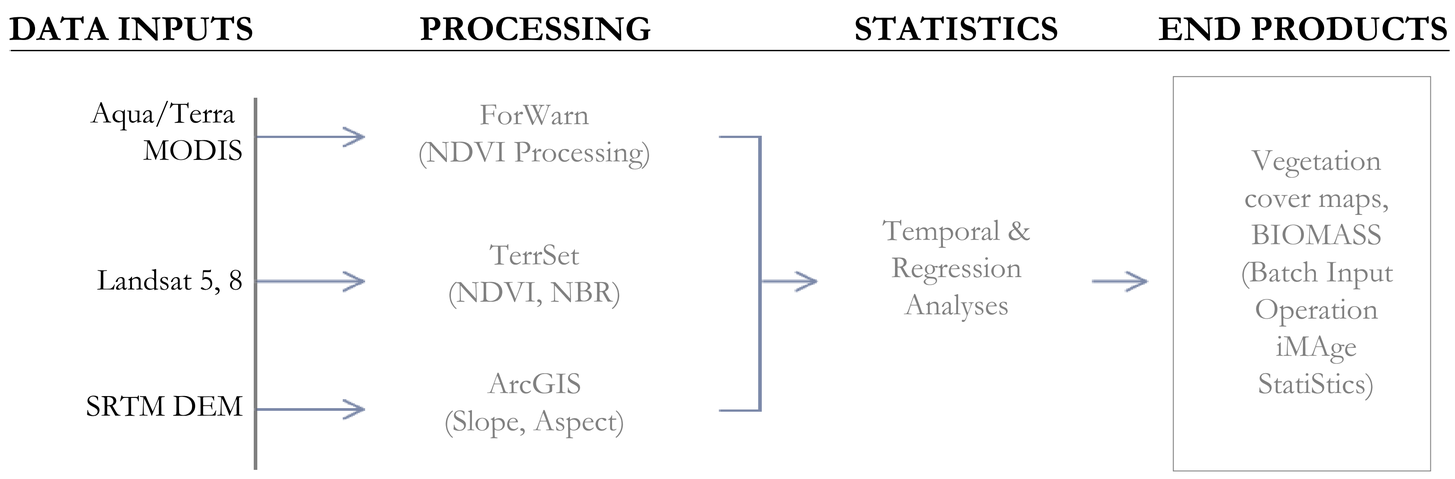
Study Area



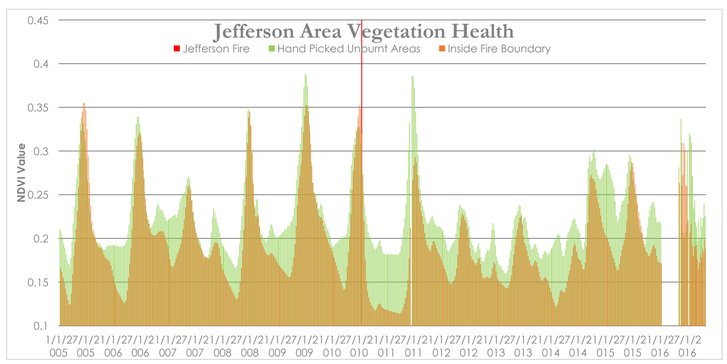
Abstract

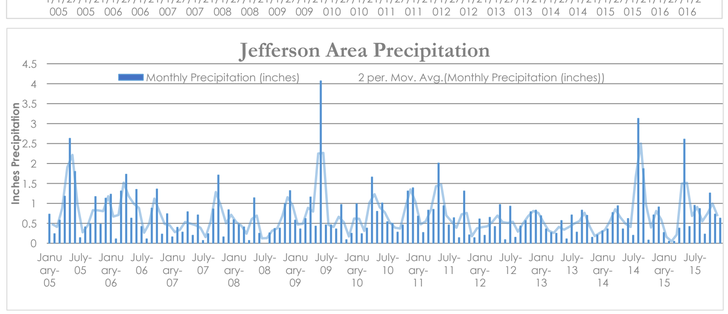
Wildfire is a key driver of ecosystem change in sagebrush steppe ecosystems. Fire-related disturbances can facilitate the propagation of invasive vegetation threatening native wildlife and shaping a fire regime that is increasingly hazardous to adjacent urban communities. Applying the methodology created during the previous DEVELOP term that characterized the 2006 Crystal Fire , we worked to identify correlations between climatic and biophysical conditions and effective recovery of sagebrush-steppe across multiple recent fires (Jefferson, Henry's Creek, and Soda) in southern Idaho. Our research integrated imagery from NASA's Landsat 5 Thematic Mapper (TM) and Landsat 8 Operational Land Imager (OLI). In addition, ForWarn spatial phenology products derived from the Terra and Aqua satellite's Moderate Resolution Imaging Spectroradiometer (MODIS) sensor were used to investigate temporal variation. We used pre- and post-wildfire trends in normalized difference vegetation index (NDVI) and differenced normalized burn ratio (dNBR) values as metrics for recovery in a multiple regression analysis paired with historic climate and fire data. With a refined understanding of how disturbance alters long-term land cover change and future fire regimes of semiarid landscapes, land management agencies will be better equipped to protect plant and animal species from habitat loss and minimize the threat posed to urban areas.

Methodology

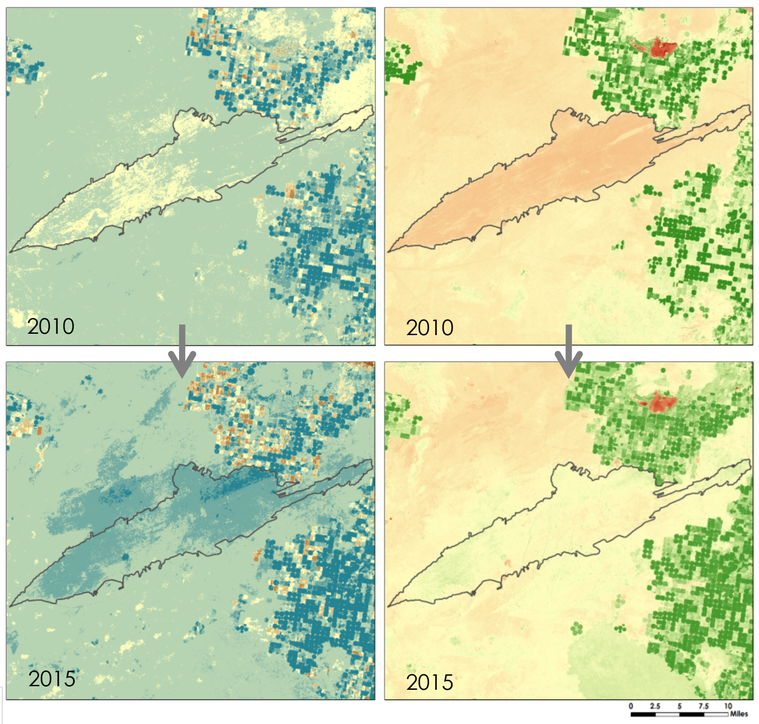


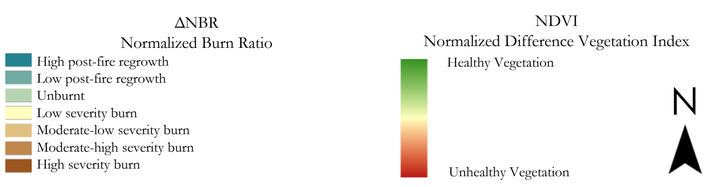
Results



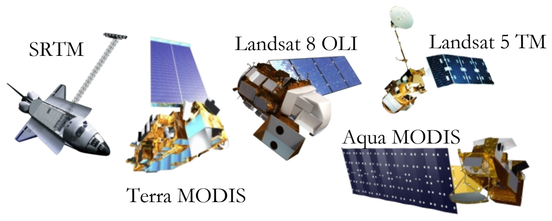


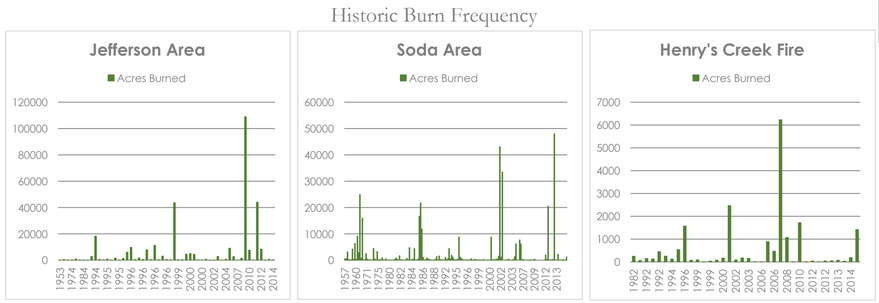
Jefferson Fire





Earth Observations





Conclusions

- Vegetation analysis methods using common ecological variables used to analyze Crystal Fire recovery are insufficient for predicting a vegetation recovery timeline.
- Full recovery from Jefferson Fire at 7 years post-fire is not apparent in the data. Recover times occur on a timescale longer than our study allows.
- Plateauing of recovery mirrors expectations described in existing literature that illustrates ecological change from sagebrush-steppe to annual grass dominated landscapes.
- Burns are becoming more frequent due to increased prevalence of annual grasses in our study areas.
- Taking into account floristic and abiotic factors makes control polygons more reliable for comparison to areas within the fire.
- Directed sampling techniques provide better representation of sagebrush-steppe than computer generated control areas.

Project Partners

Bureau of Land Management, USDA Agricultural Research Service, Idaho Department of Fish and Game, NASA RECOVER Science Team

Team Members

Brandon Crawford (Project Lead) | Dane Coats | Leah Kucera | Jake Ramthun | Ritaraj Yadav

Acknowledgements

The Southern Idaho Disasters team would like to thank our contributors for their help. Science Advisors: Keith Weber (GIS Training and Research Center at ISU); Joseph Spruce (NASA Langley Research Center) Partners: Karen Krause, BLM Natural Resource Specialist; Patrick E. Clark, USDA Range Scientist; Scott Bergen, IDFG Principal Wildlife Research Biologist; and Ryan Walker, IDFG Biologist; and the previous DEVELOP team: Austin Counts, Nicholas Olsen, Cassidy Quistorff, Caitlin Toner, and Courtney Ohr.

Idaho – Pocatello
Fall 2017

This material is based upon work supported by NASA through contract NNL16AA05C and cooperative agreement NNX14AB60A. Any mention of a commercial product, service, or activity in this material does not constitute NASA endorsement. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Aeronautics and Space Administration and partner organizations.

Southern Idaho Disasters II