Assessing Drought and Fire Conditions, Trends, and Susceptibility to Inform State Mitigation Efforts and Bolster Monitoring Protocol in North Central Idaho

Abstract

The frequency and intensity of drought and wildfires continue to increase, resulting in more difficult and costly mitigation and recovery efforts. The Palouse ecoregion, historically a native grassland, has largely been converted to an agricultural epicenter. Understanding soil health, drought susceptibility/conditions, and fire susceptibility in this unique ecosystem is critical to improving land management practices. The NASA DEVELOP team partnered with the Idaho Office of Emergency Management, Idaho Department of Water Resources, and Idaho Department of Lands (IDL) to gather information using NASA Earth observations to update Idaho drought and fire mitigation plans. The team utilized Landsat 8 and Terra observations to improve the predictive power of IDL's existing fire risk model. In addition, the team created a tutorial workflow allowing partner organizations to adjust the model as further data becomes available.

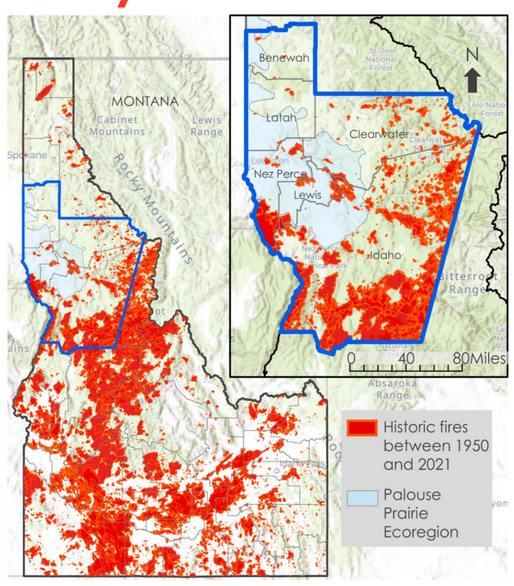
Objectives

Drought Indicator Analysis
Determine efficacy of drought indicators EDDI & ESI by comparing to established vegetative health indicators NDMI & NDVI

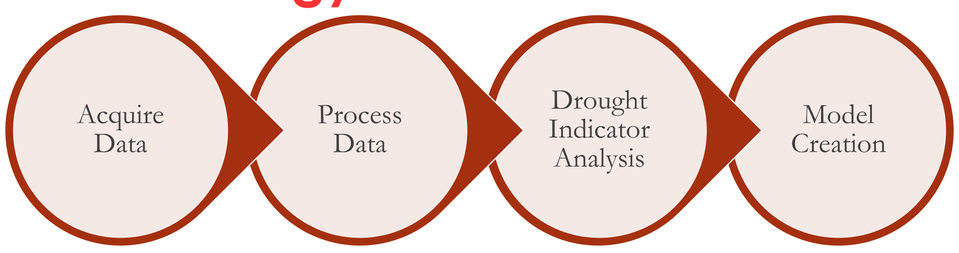
Drought & Fire Susceptibility Analysis
Create a model and maps to visualize susceptibility

Wildfire Hazard ArcGIS Guide
Provide to partners for mitigation planning

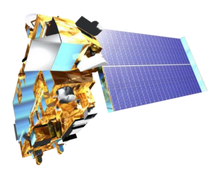
Study Area



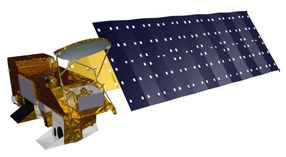
Methodology



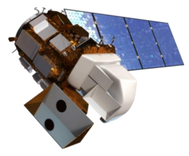
Earth Observations



Terra MODIS



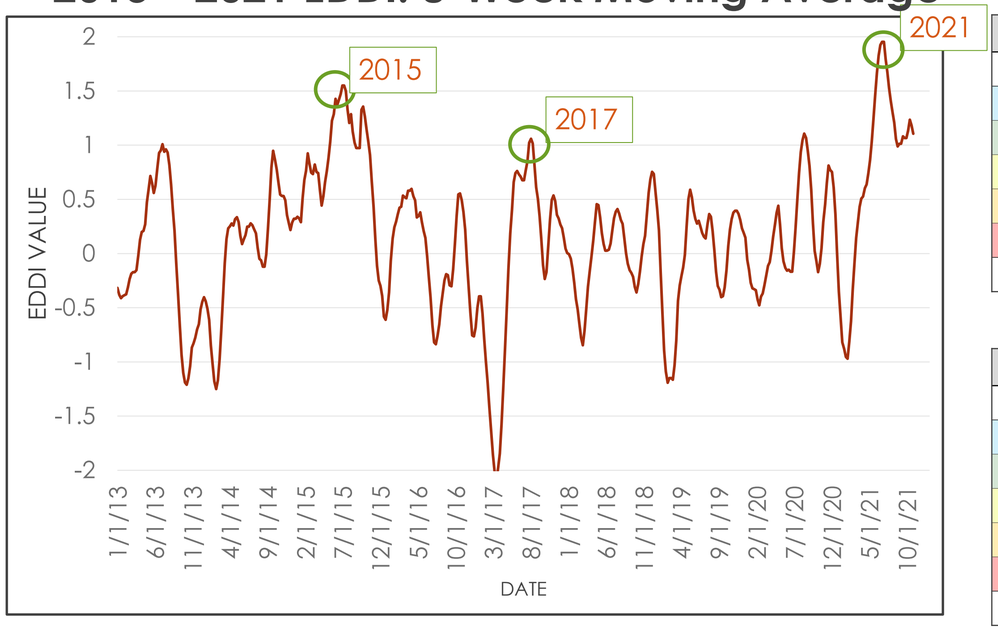
Aqua MODIS



Landsat 8 OLI

Results

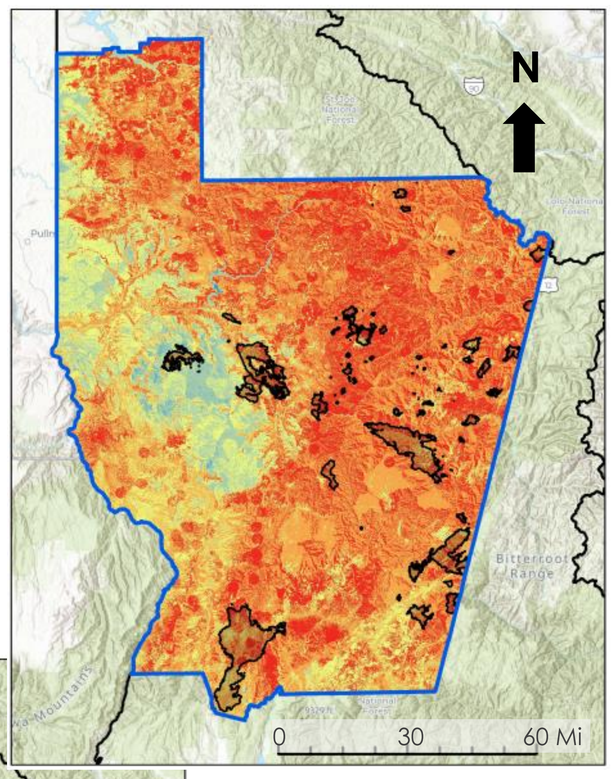
2013 – 2021 EDDI: 8-Week Moving Average

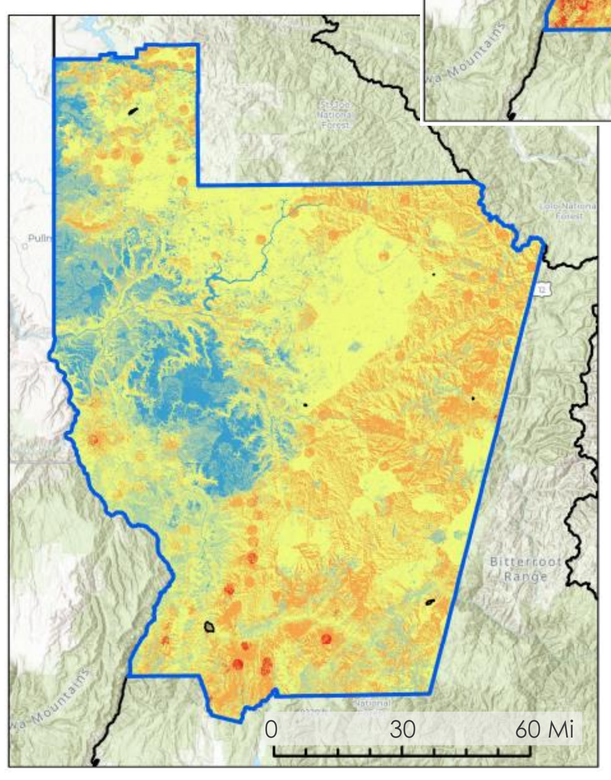


2015 EDDI Enhanced Model		
Class	Acres Burned	% of Burned Area
1	57	0.02%
2	3,341	1.03%
3	52,473	16.17%
4	160,679	49.53%
5	107,869	33.25%
	324,418	

2016 EDDI Enhanced Model		
Class	Acres Burned	% of Burned Area
1	18	0.55%
2	198	6.07%
3	2,509	77.04%
4	530	16.28%
5	2	0.06%
	3,257	

2015 EDDI Enhanced





Wildfire Hazard
- Low
- Low to Moderate
- Moderate
- Moderate to High
- High
- Study Year Fires

2016 EDDI Enhanced

Project Partners

- Idaho Office of Emergency Management
- Idaho Department of Water Resources
- Idaho Department of Lands

Conclusions

- EDDI correlated with NDVI at some lag intervals, though the relationship is complex and additional analysis is necessary.
- Spikes in EDDI values occurred during big fire seasons 2015, 2017, and 2021.
- Wildfire Hazard Model performance improved with addition of drought indicator(s) for 2015.
- EDDI-Enhanced Model outperformed ESI-Enhanced Model in dry year (2015) while ESI-Enhanced Model outperformed EDDI-Enhanced Model in wet year (2016).

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Idaho Wildfires

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