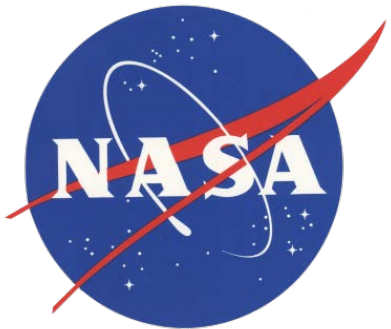


Use and Benefits of NASA's RECOVER for Post-fire Decision Support

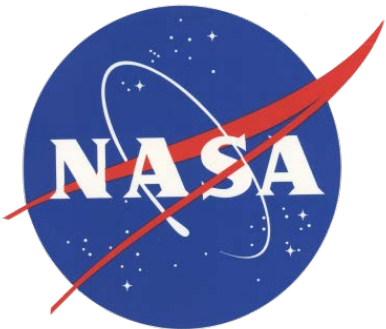


Keith Weber¹, William Toombs¹, John Schnase², Tesa Stegner³, Eric Lindquist⁴, and Frances Lippitt⁴

1 – ISU GIS TReC, 2 – NASA Goddard Space Flight Center, 3 – ISU Department of Economics,
4 – BSU LPRG

What is RECOVER?

- Customer-driven, Customer-centric*
- Decision Support System (DSS)
 - Rapid assembly of site-specific data
 - Delivered in customized GIS analysis environment
 - Wildfire focus



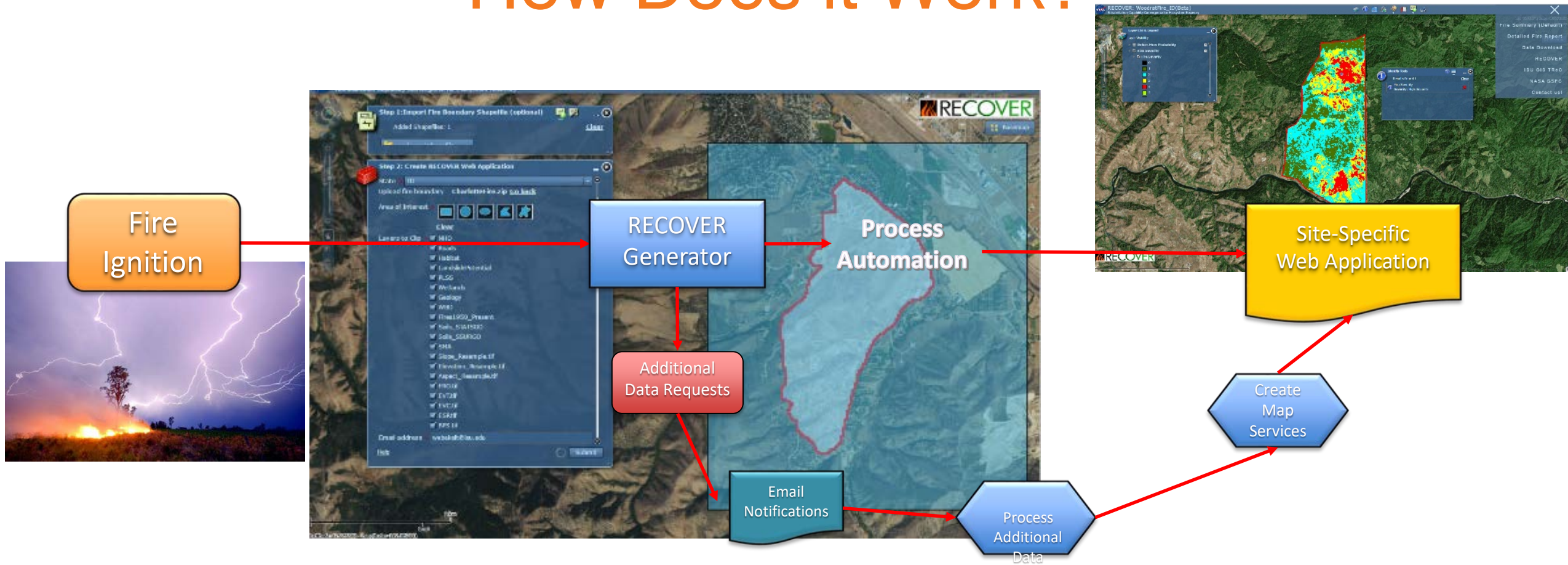
* Our “customer” is currently, any agency/organization managing wildfires (BLM, NPS, USFS, etc.)

Data Architecture

- RECOVER covers the Western US
- Esri ArcGIS
 - Vector data in a geodatabase
 - Raster data (Geo-TIFF)
 - Automated Map Services (python)



How Does it Work?




GIS Layers

- By default each RECOVER web map contains...
 - 26 base layers automatically clipped to fire extent
 - Fire-specific reports

Naming convention of RECOVER Base Layer data

The following list describes the RECOVER base layers available to our partners along with the standard naming convention applied to the web services hosted at ISU's GIS TReC (please note the exact name including capitalization and the use of underscores).

Geology	
Habitat	
LandslidePotential	
NHD	
PLSS	
Roads	
SMA	
Soils_SSURGO	
Soils_STATSGO	
Soils_STATSGO_KFactor	
WatershedsWBD	
Wetlands	
	
	
	
	
	
	

Past fire datasets

- HistoricFires
- HistoricFires_PastDecade
- FRG_FireRegimeGroup

Vegetation datasets

- BPS_BioPhysicalSetting
- ESP_EnvironmentalSitePotential
- EVC_ExistingVegetationCover
- EVT_ExistingVegetationType

Topography datasets

- Elevation
- Aspect
- Hillshade
- Slope_degree
- Slope_percent
- SlopesGTE30deg

* The spatial reference system for these data is USA Contiguous Albers Equal Area Conic USGS version, NAD83, WKID: 102039

Fire-specific Reports

Soda Fire - Summary Report

Administration Agency	Acres
BLM	227,635
BOR	196
PVT	42,824
ST	12,741
<i>Total Acres</i>	<i>283,396</i>

Soda Fire - Detailed Report

Admin. Unit Name	Area Symbol	Map Unit Symbol	Acres
Bureau of Land Management	ID665		
	ID675		

BrB
GaB
NaB
NaC
QcB
QcD
QcE
VaD
VaE
1
100
11
112
121

Ecological Site/Plant Association and Vegetation (ID)

Owyhee County Area, Idaho

[Composition of forest understory vegetation is based on canopy cover. Composition of rangeland vegetation is based on dry weight]

Map symbol and soil name	Ecological site or plant association	Common trees	Forest understory or rangeland characteristic vegetation	Composition	
				Forest	Range
<i>Pct</i>					
1: Acrelane	LOAMY 11-13 ARTRT/PSSPS (R025XY043ID)	---	bluebunch wheatgrass basin big sagebrush antelope bitterbrush other shrubs other perennial forbs other perennial grasses	--- --- --- --- --- ---	50 20 5 5 5 5
Rock outcrop	---	---	---	---	---

USDA Natural Resources Conservation Service

Survey Area Version: 11
Survey Area Version Date: 08/13/2012

Page 1



Layer List & Legend

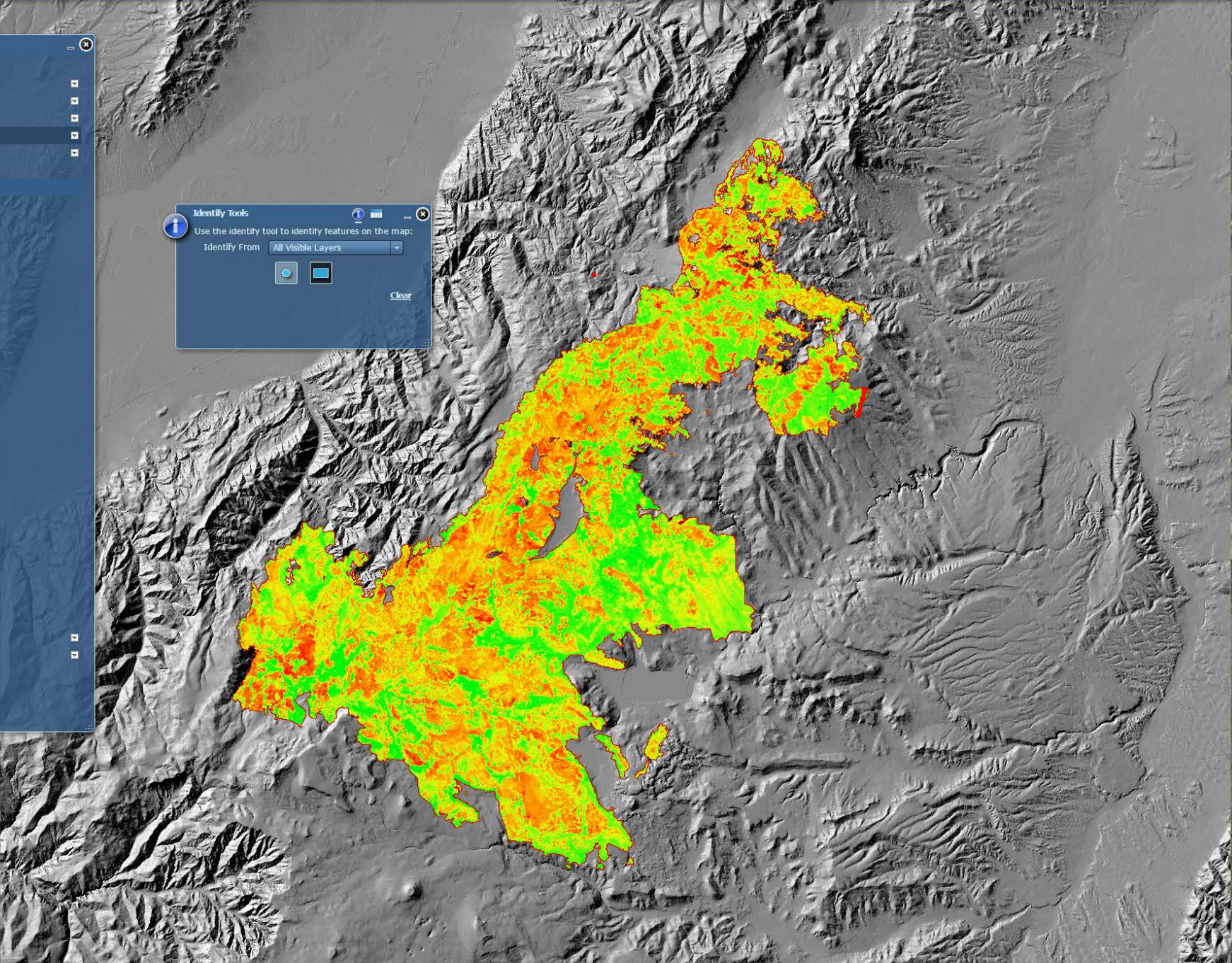
Layer Visibility

- Real Time Fire Severity
- Real Time Field Records
- Real Time Fire Line
- Fire Affected Vegetation (dNBR)
- RECOVER Baselayers
 - Fire Boundary
 - Roads
 - NHD
 - Habitat
 - Wetlands
 - PLSS
 - SMA
 - Geology
 - Watersheds WBD
 - Soils_SSURGO
 - Soils_STATSQO
 - Soils_STATSQO_Kfactor
 - Landslide Potential
 - HistoricFires
 - HistoricFires_PastDecade
 - Ecosystem Resilience and Resistance
 - FRG_FireRegimeGroup
 - BPS_BioPhysicalSetting
 - ESP_EnvironmentalSitePotential
 - EVC_ExistingVegetationCover
 - EVT_ExistingVegetationType
 - Steep_Slopes_GTE30deg
 - Elevation
 - Aspect
 - HillShade
 - Slope_degree
 - Slope_percent
 - NDVI Departure
 - Debris Flow Probability

Identify Tools

Use the identify tool to identify features on the map:

Identify From:



[Home](#) [Reports](#)

[Data Download](#)

[Disclaimer](#)

[RECOVER Website](#)

[ISU GIS TRC](#)

[NASA GSFC](#)

[Contact us!](#)



Enhancements Offered by RECOVER

- Rapid data acquisition
- Cross-organizational collaboration
- Common operational picture (geospatial context)

Socioeconomic Impact of RECOVER

- Explored the impact of earth observing satellite system imagery, using RECOVER as a case study, for post-fire decision support through semi-structured interviews with land managers and other users of RECOVER.
 - Time and costs saved
 - Value of better-informed decisions

Approach

- Semi-structured interviews with RECOVER adopters
- Identified participants through past RECOVER use
 - Workshops, webinars, and training opportunities
- Sought to identify:
 - Socioeconomic benefit to the land managers, ecosystem, and public
 - Most valuable feature(s)
 - Adoption and diffusion rate
- Descriptive statistics of RECOVER's use

Tier – 1 Users: Land Management Agencies



– Bureau of Land Management

– US Forest Service

– Idaho Department of Lands

– Utah Division of Forestry, Fire & State Lands

– Shoshone-Bannock Tribes & BIA



Tier – 2 Users: Other Agencies

- US Bureau of Reclamation
- National Oceanic and Atmospheric Administration
- Idaho Fish and Game
- Idaho Transportation Dept.
- California Department of Transportation



Results

- 100 wildland fires from 2013-18
- Nearly 6 million acres burned
- 11 western states
- 16 federal & state agencies
- 21 interviews



Results (cont'd)

- 16 Tier-1 interviews conducted:
 - Represents about 4 million acres burned
 - Time- and cost-savings for data collection by decision makers and support staff:
 - Time saved: approximately 40hrs and up to 130hrs of staff time per fire
 - Cost saved: up to \$3K in staff time per fire
 - Value of better-informed decisions:
 - \$500K was saved on the “Henry’s Creek” fire using RECOVER DSS
 - Validated or altered decisions valued over \$1.2 million...saved over 800 hours of staff time
 - 87.5% ($n = 14$ of 16) have adopted RECOVER for long-term use

Results (cont'd)

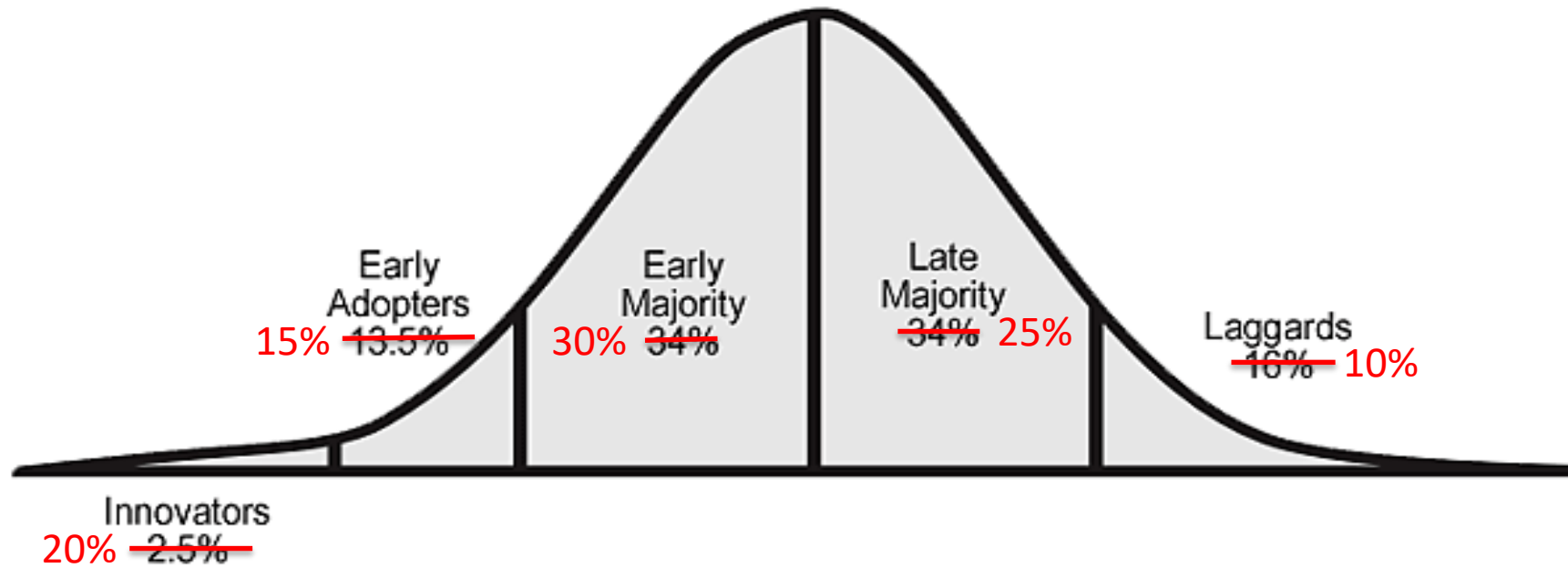
- 5 Tier-2 interviews conducted:
 - Represents over 1.5 million acres burned
 - Time- and cost-savings for data collection by decision makers and support staff:
 - Time saved: up to 40hrs of staff time per fire
 - Cost saved: up to \$1K in staff time per fire
 - Improved communications between Tier-2 users and lead Tier-1 partners
 - Debris-flow probability and dNBR are most popular feature
 - 100% ($n = 5$) have adopted RECOVER for long-term use

Results (cont'd)

- Adoption and diffusion of RECOVER:
 - 40% reported open and accessible communication with technical experts
 - Email
 - Teleconferencing
 - In-person
 - 45% reported working with either an innovator or early adopter of RECOVER during the early stages of their adoption process
 - 65% attended one or more RECOVER workshops or webinars
 - 0% reported prior neighbor adoption as an influencing factor

Results (cont'd)

Categories of Innovativeness*



*From E.M. Rogers, *Diffusion of Innovations*, 4th edition (New York: The Free Press, 1995)

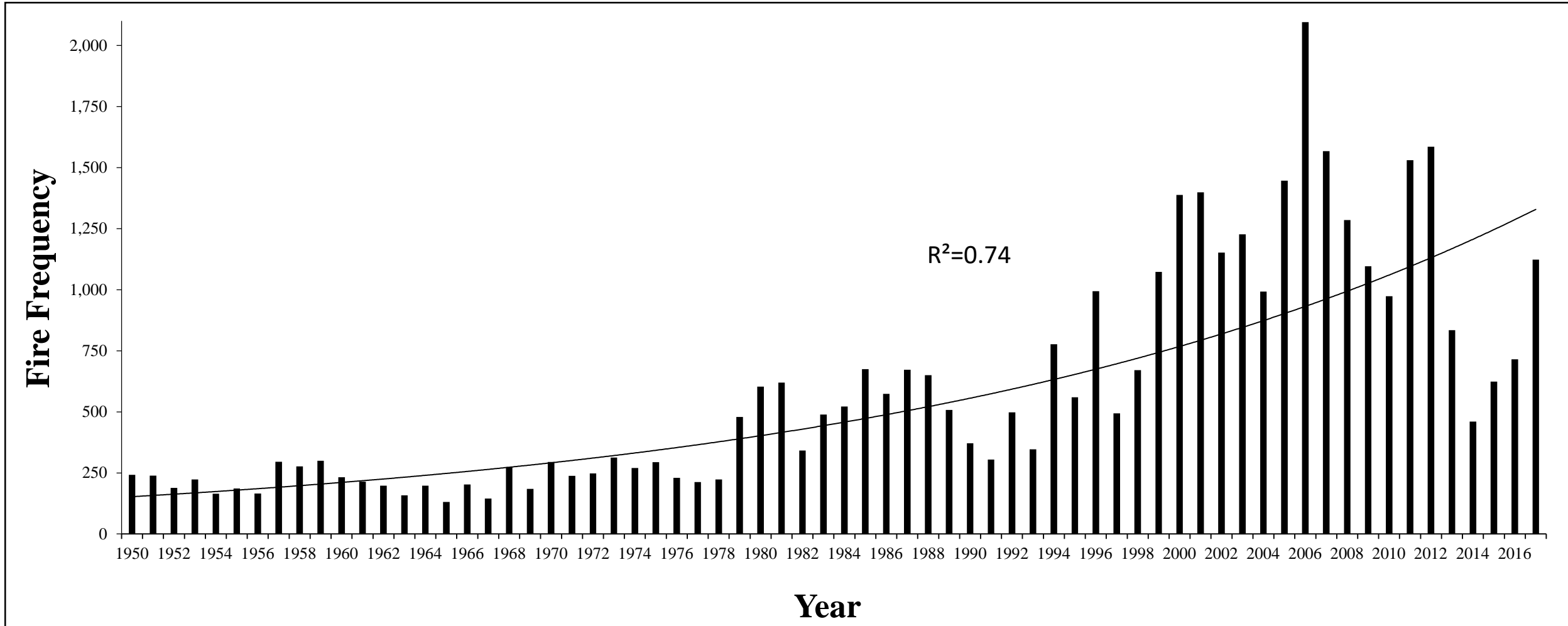
Results (cont'd)

- Usage of RECOVER:
 - Current maintenance cost:
\$70,000/annually
 - 2017: 519,891 total hits/ 27,563 total visits
 - 78 visits per day
 - \$2.53 per visit
 - 2018: 194,030 total hits/ 36,445 total visits
 - 149 visits per day
 - \$1.92 per visit
 - 2018: 39 fires/\$70K = \$1795 per fire
 - 2.4 million acres – \$.03 per acre

**TAKE HOME
MESSAGE:**

HIGH VALUE!!

Take Home



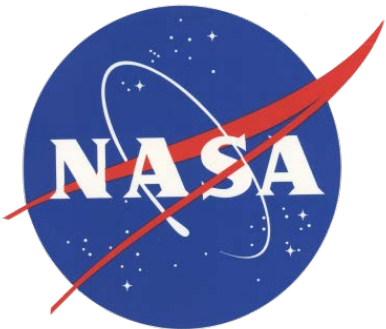
Take Home (cont'd)

- High socioeconomic value
 - Land management agencies
 - Ecosystem
 - Public land users
- Very high adoption rate
- Top-down, bottom-up, & lateral diffusion
 - ALSO, outside-in... (public opinion can drive the process)
- Still in the early stages of adoption & diffusion



Questions?

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RECOVER is a NASA Applied Sciences sponsored project. K. T. Weber (PI), J. Schnase (Co-PI) and M. Carroll (Co-PI), Goddard Space Flight Center