The RECOVER Post-fire Planning Project

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This morning's agenda

Introductions

Overview of the RECOVER Project

- Vision and goals

Technical Demonstration of the Prototype RECOVER Decision Support System (DSS)

- Cloud-based RECOVER server and client web map application

RECOVER hands-on Scenario-of-Use

- Applications for fire rehabilitation efforts
- Reaction to the RECOVER DSS

Next Steps

- Final Stage 1 fire season assessment, Stage 2 operationalization proposal planning

Discussion

Overview

- RECOVER = Rehabilitation Capability Convergence for Ecosystem Recovery
- Decision Support System (DSS)
  - Support for:
    - USDOI BLM fire managers and BAER teams
    - Idaho Dept. of Lands (IDL) fire management

Objectives

Objective In partnership with the Department of Interior's Bureau of Land Management (BLM) and Idaho Department of Lands (IDL), we will build and evaluate a prototype RECOVER decision support system. RECOVER will be an automatically deployable, site-specific multi-criteria decision aid that brings together in a single application the information necessary for Burned Area Emergency Response (BAER) teams to plan reseeding strategies and monitor ecosystem recovery in the aftermath of savanna wildfires.

RECOVER will use state-of-the-art cloud-based data management technologies to improve performance, reduce cost, and provide site-specific flexibility for each fire. Customized RECOVER instances will be automatically deployed in the Amazon EC2 Cloud when a fire is detected. RECOVER's decision products will be dynamically assembled from an existing network of data resources. RECOVER will automatically generate and refresh derived fire severity, fire intensity, and other products throughout the burn so that when the fire is contained, BAER teams will have at hand a complete and ready-to-use RECOVER system customized for the target wildfire. Since BAER remediation plans must be completed within 14 days of a wildfire's containment, RECOVER has the potential to significantly improve the decision-making process.

Goals

- To improve landscape rehabilitation following wildfire by improving the decision *process*
  - More/better data…data all in one place →
  - More/better information →
  - Better informed decisions

Acknowledgements

- Operational End-User Partners

RECOVER

Rehabilitation Capability Convergence for Ecosystem Recovery

A NASA/DOI National Wildland Fires Applied Sciences Project

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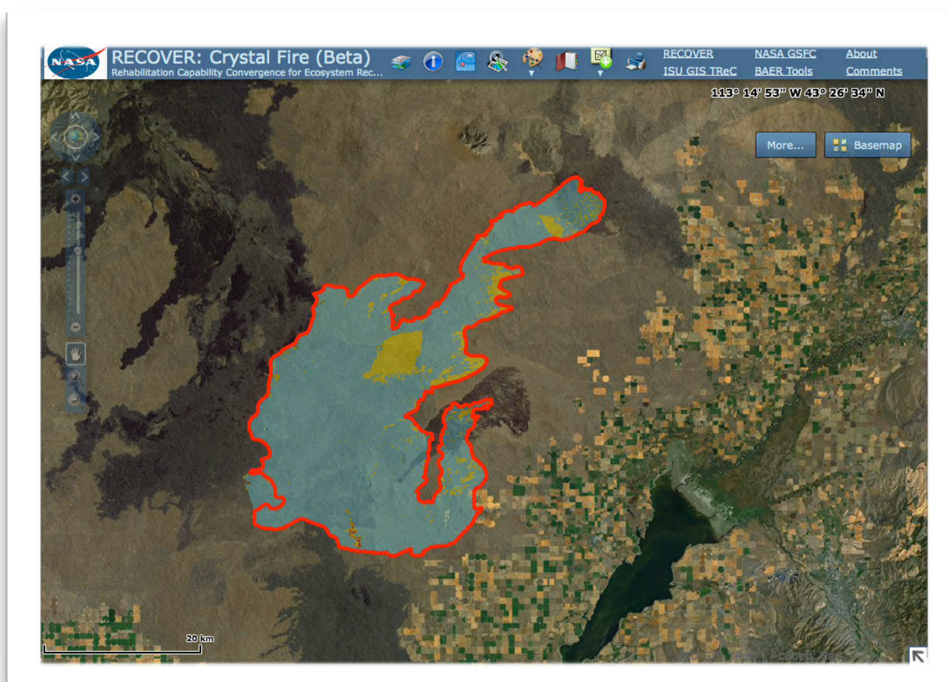
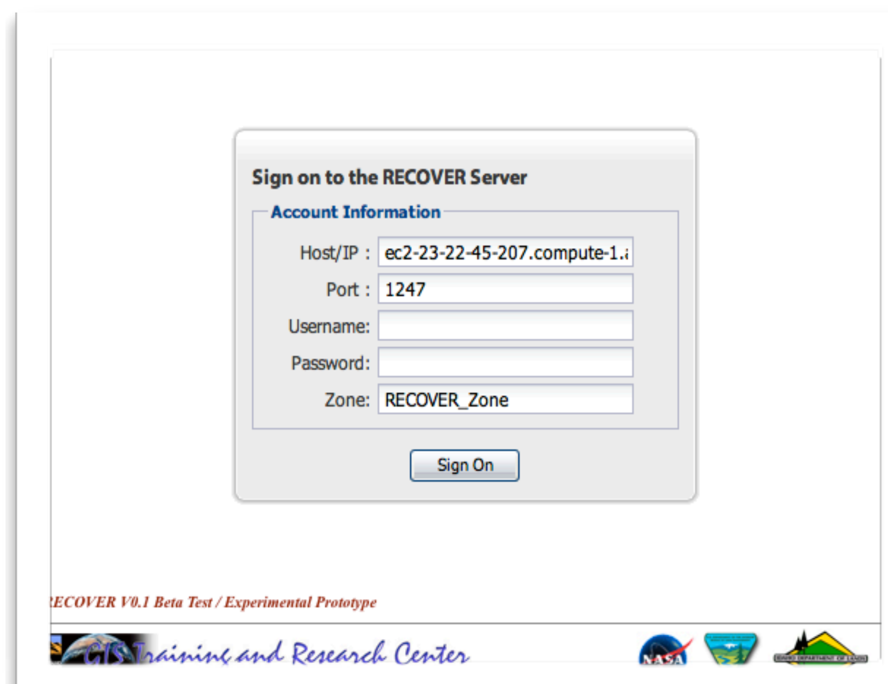
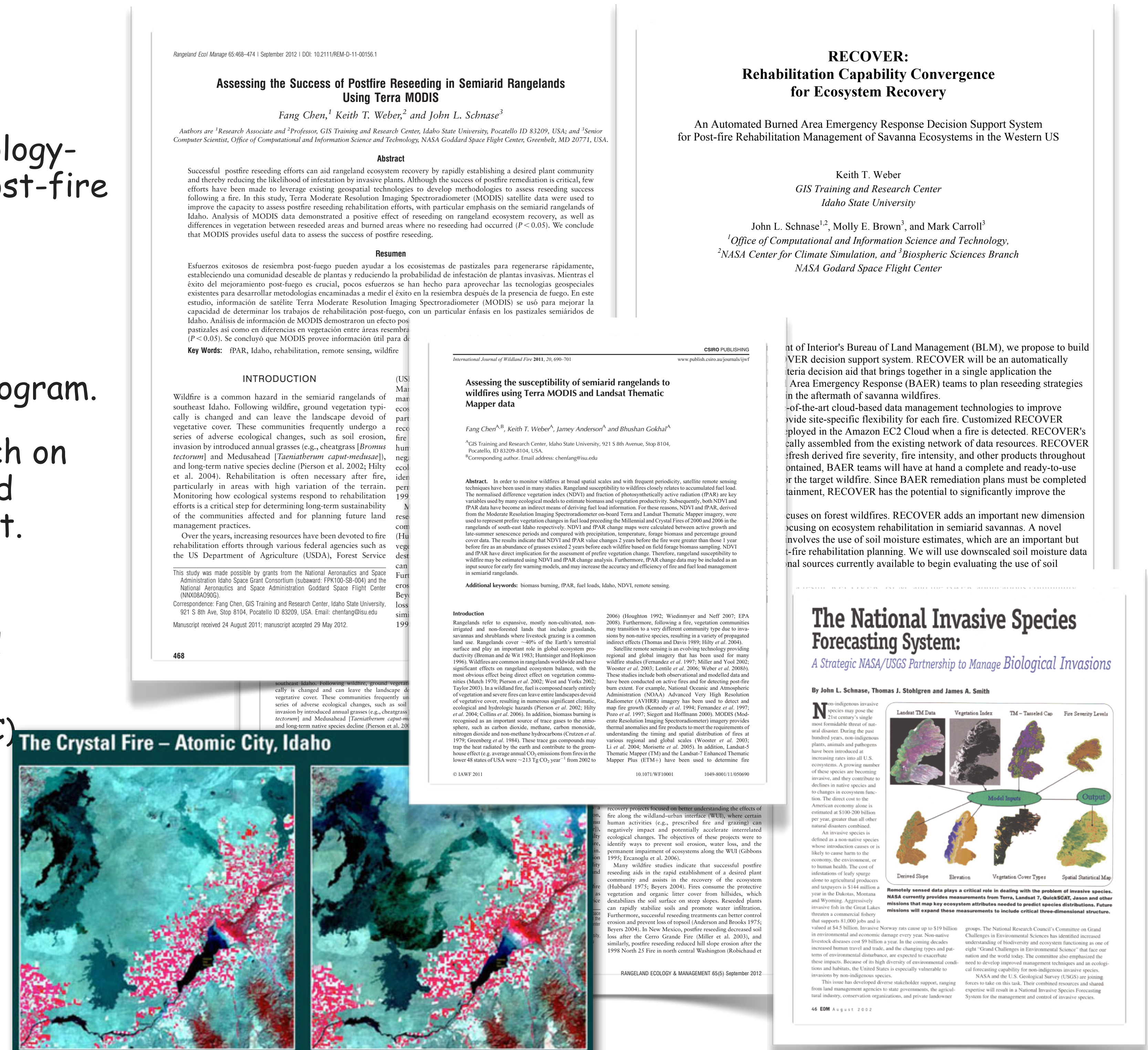




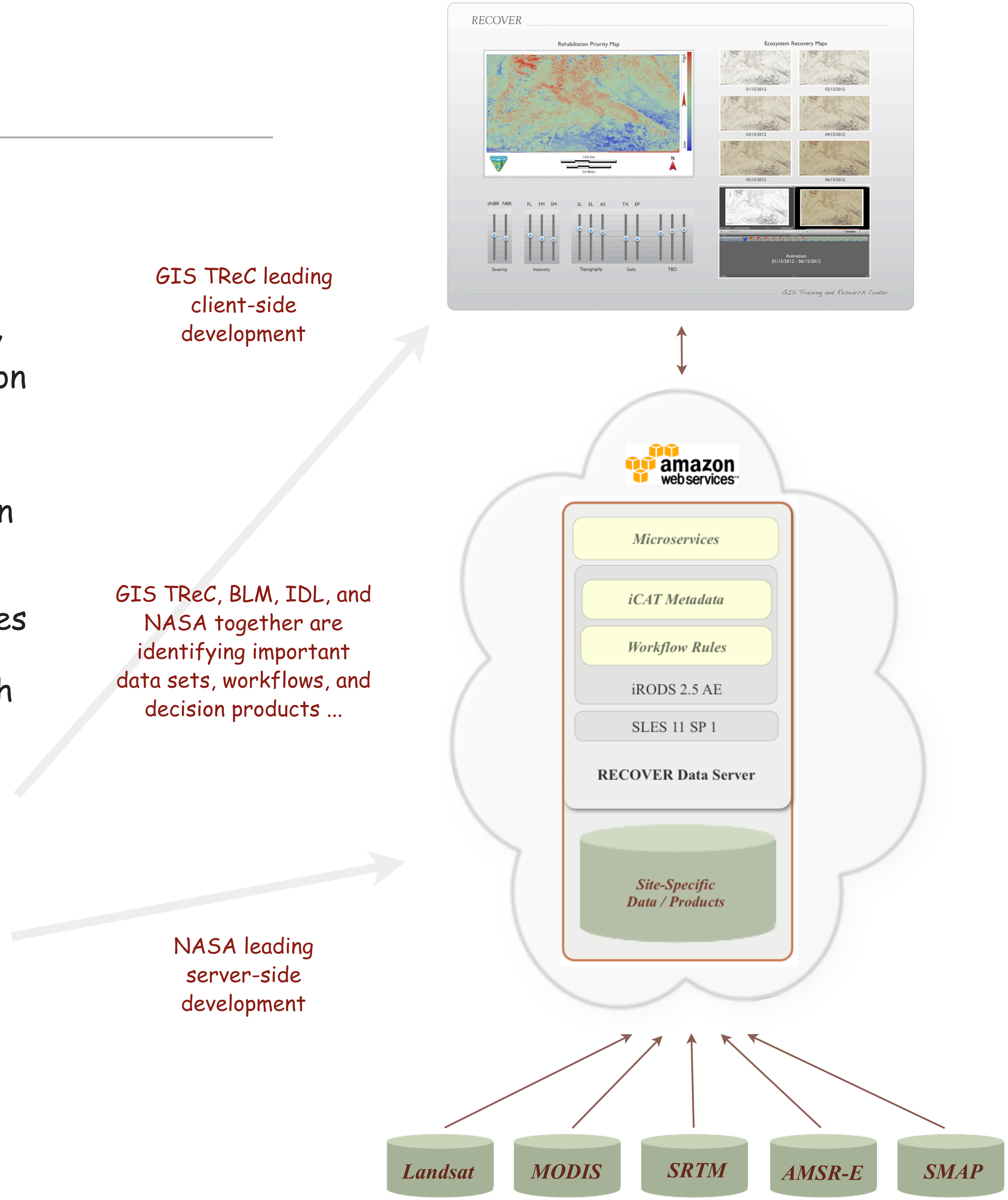
The RECOVER Project

- Goal is to build an automated (or technology-enabled) decision support system for post-fire rehabilitation planning.
- Focus is on savanna ecosystems of the Western US.
- Funded by NASA's Applied Sciences Program.
- Outgrowth of NASA-sponsored research on post-fire assessment and monitoring and decision support application development.
- Interagency Collaboration:
  - Idaho State University's GIS Training and Research Center (GIS TReC)
  - NASA Goddard Space Flight Center (GSFC)
  - DOI Bureau of Land Management (BLM)
  - Idaho Department of Lands (IDL).
- Stage 1 - Feasibility Study.
- Stage 2 - Operational Deployment.



The RECOVER System

- RECOVER brings together in a single application the information necessary for BAER team post-fire rehabilitation decision-making and long-term ecosystem recovery monitoring.
- RECOVER is a web mapping application and multi-criteria decision aid that integrates information about fire severity and intensity with other types of data to help BAER teams plan reseeding strategies in the aftermath of savanna wildfires.
- Major system components:
  1. <u>RECOVER Clients</u> - Desktop and mobile interfaces that are able to connect to the RECOVER Server.
  2. <u>RECOVER Server</u> - A cloud-based data management system that automatically aggregates site-specific data from a distributed collection of relevant web-accessible resources.



The RECOVER System

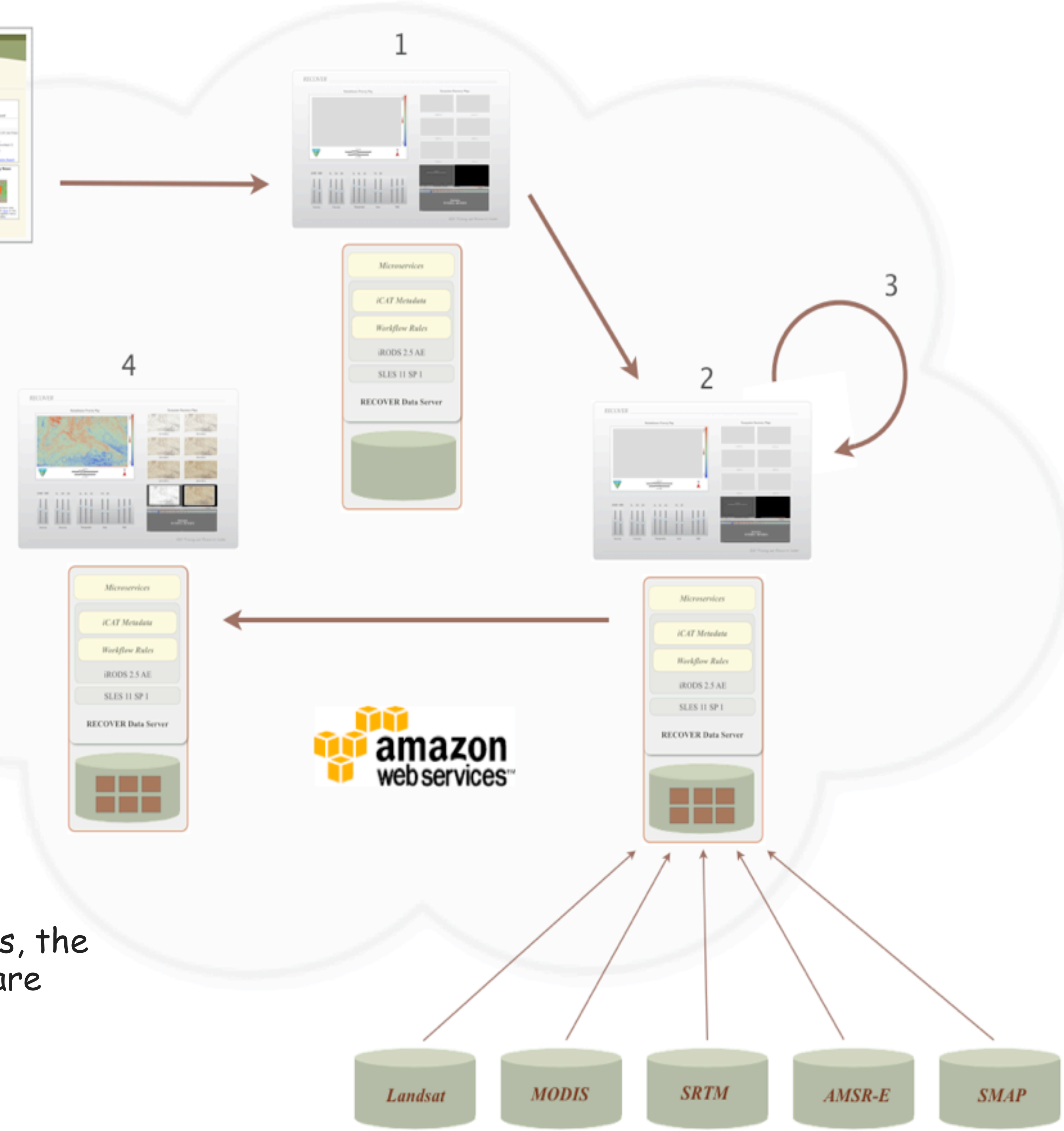
The typical RECOVER use scenario goes as follows:

1. A request containing the wildfire name and spatial extent is sent to the RECOVER Server.

2. The RECOVER server connects through web services to various data resources and automatically collects tailored, site-specific data and derived products.

3. These staged, aggregated products are refreshed as needed to maintain coverage and currency throughout the burn.

4. When the fire is contained, all the data layers, the RECOVER Server, and the RECOVER Clients are immediately ready for use by BAER Teams ...



The RECOVER Server

- Uses iRODS data grid software to manage site-specific data and metadata.

  iRODS = Integrated Rule-Oriented Data System

Background

- Open source data grid software system.
- Developed by the Data Intensive Cyber Environments (DICE) group, University of North Carolina.
- Historic roots in data grids, digital libraries, persistent archives, and real-time data systems R&D, and SRB.

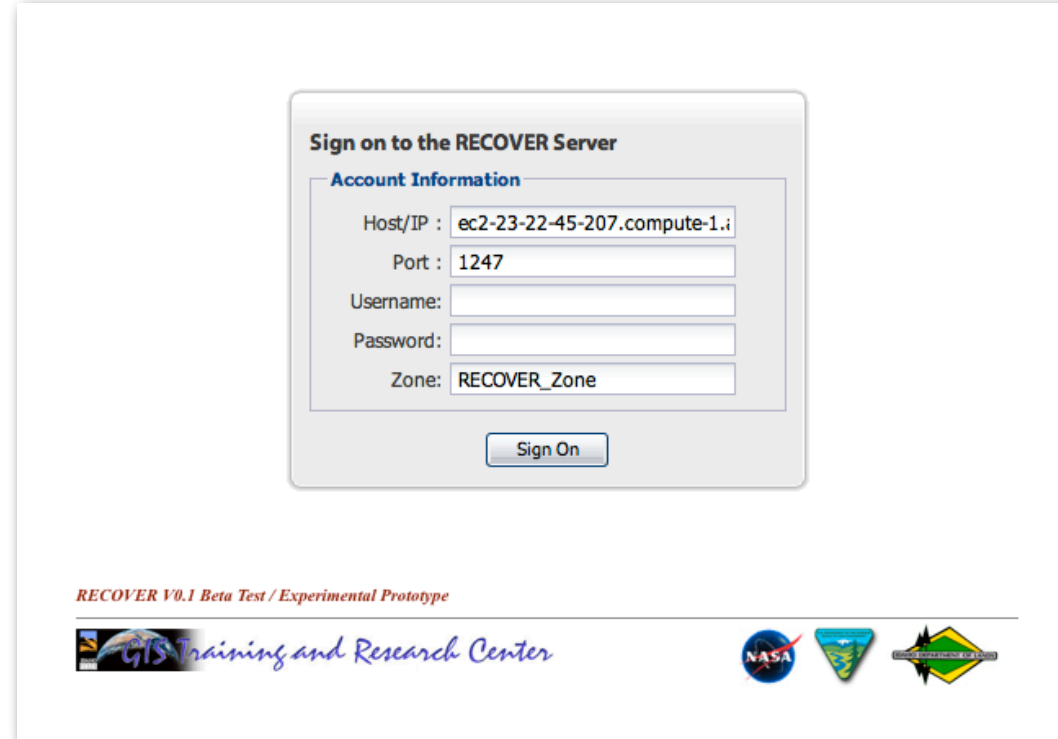
Features

- Targets large repositories, large data objects, digital preservation, and integrated complex processing.
- Supports server-side workflows implemented by chaining execution rules together based on data policies.
- Enables scalability and extensibility.

Major Concepts

- Policies => iRODS rules.
- Mechanisms => iRODS microservices.

With iRODS metadata providing the information necessary to perform these mappings ....



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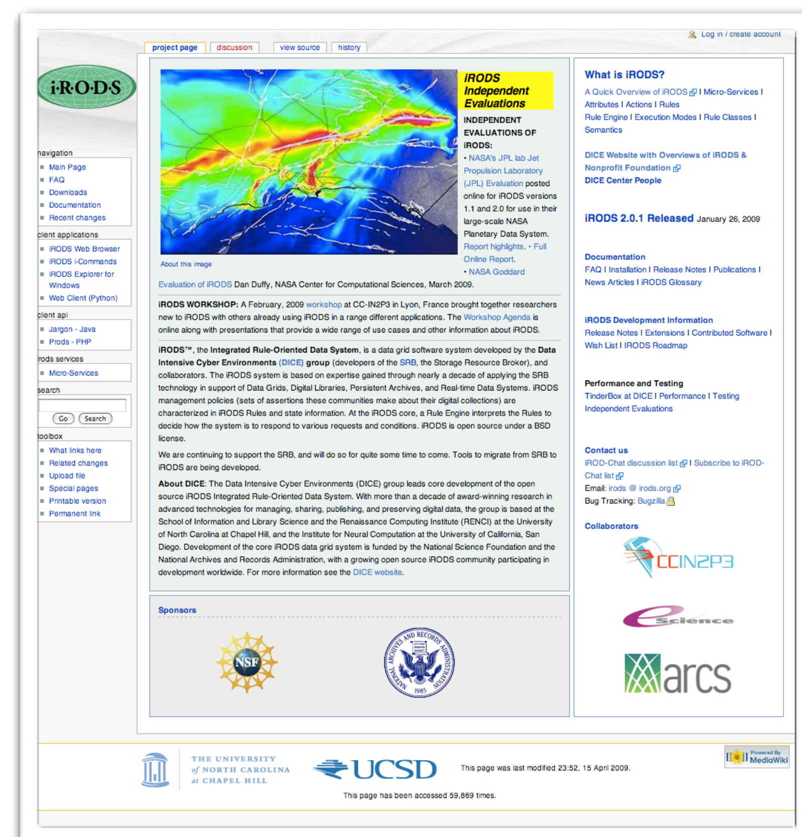
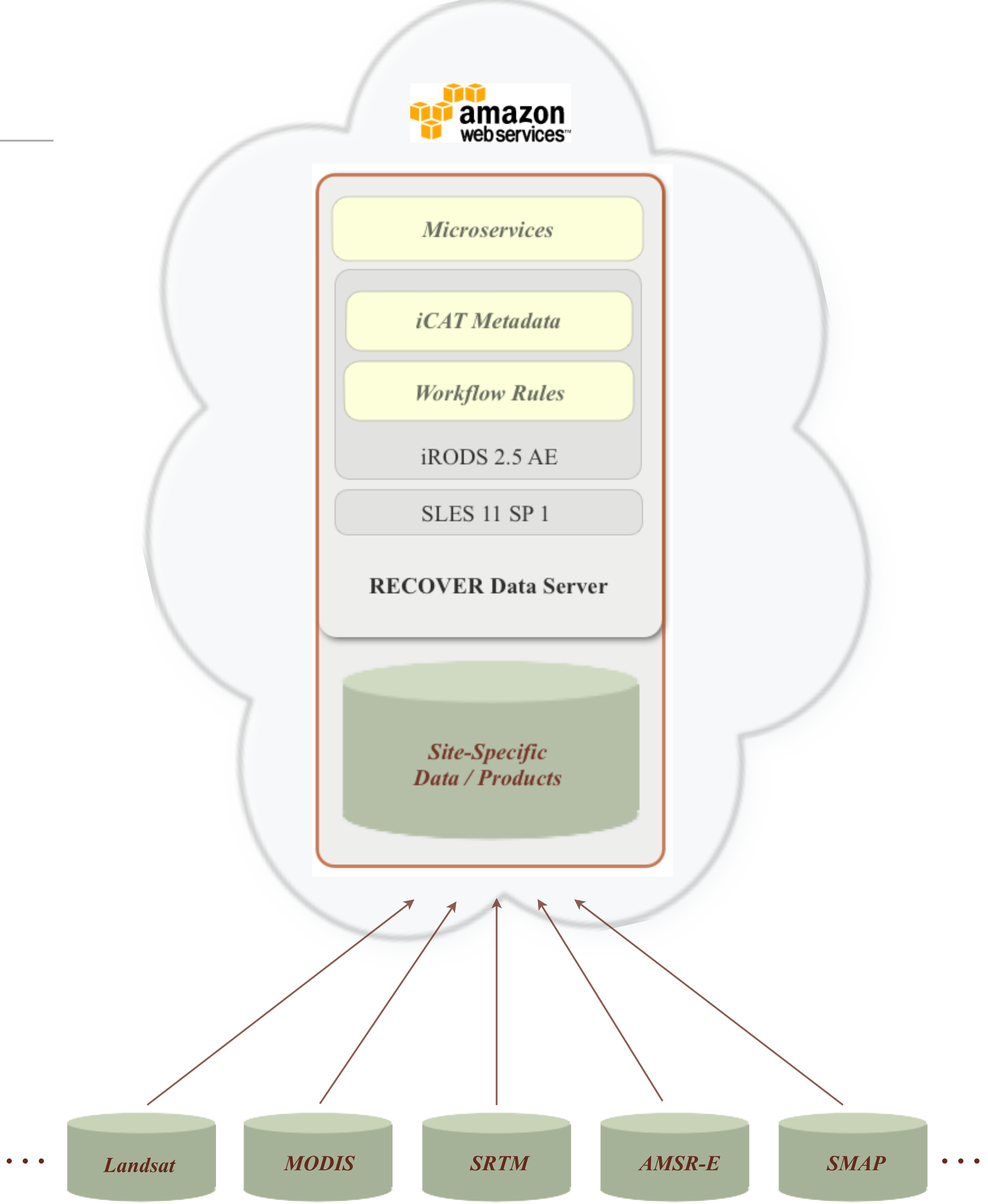


The RECOVER Server

- Is deployed in the Amazon Elastic Compute Cloud (EC2).
- Assembles and manages a variety of data:

<u>Step 1: Core Data Sets (Automatically Assembled)</u>
Normalized Burn Ratio (NBR)
Normalized Difference Vegetation Index (NDVI)
Fraction of Photosynthetically Active Radiation (fPAR)
Net Primary Production (NPP)
Topography Aspect (TA)
Topography Elevation (TE)
Topography Slope (TS)
Soil Texture (ST)
Soil K Factor (SKF)
Biophysical Setting (BPS)
Geology (GEO)
Existing Vegetation Cover (EVC)
Existing Vegetation Type (EVT)
Environmental Type Potential (ETP)

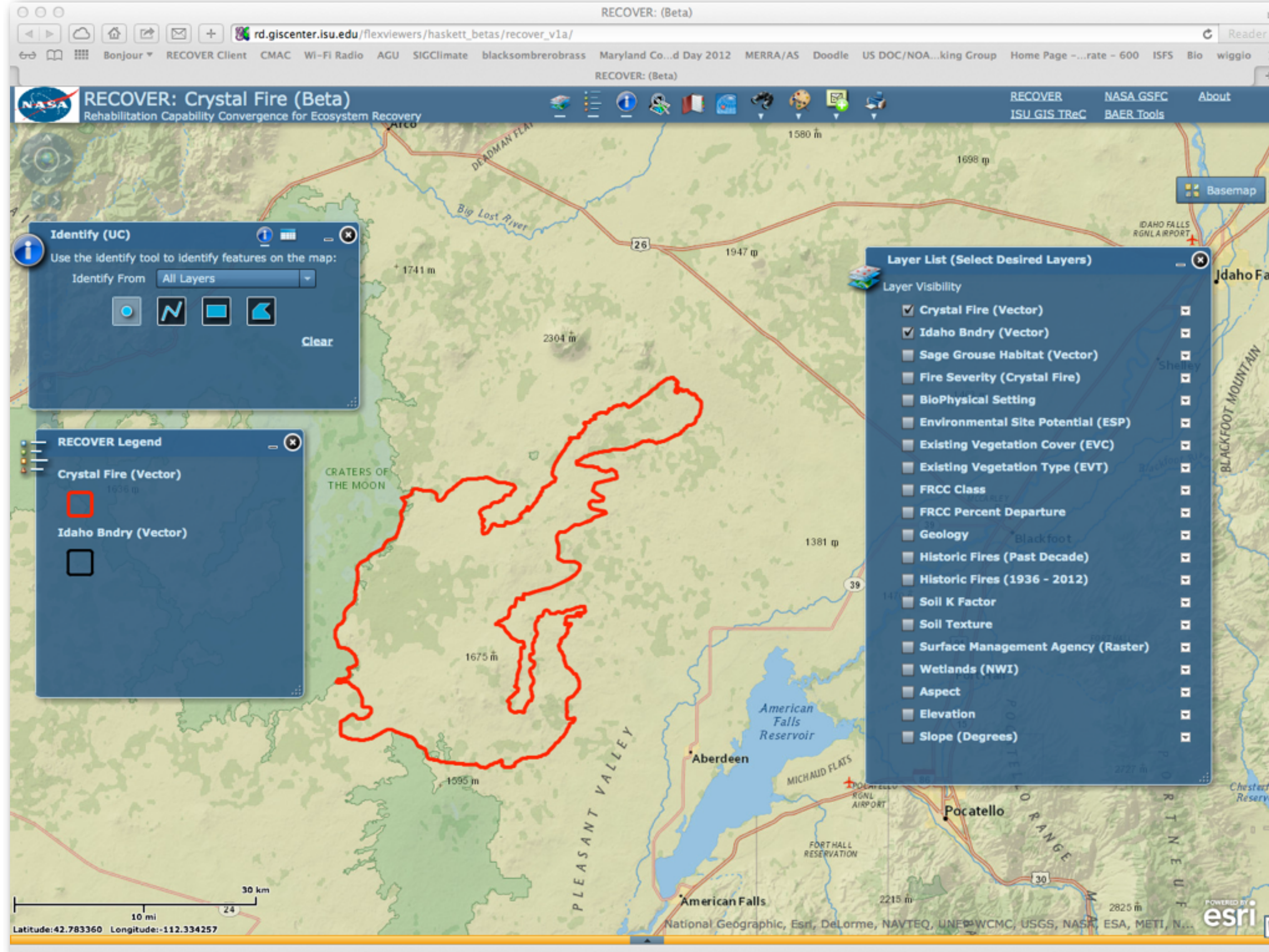
<u>Step 2: Derived / Ancillary (Collected and Added Manually)</u>
Difference in Normalized Burn Ratio (dNBR)
Fire Severity (FS)
Fire Intensity (FI)
Fire Regime Condition Class (FRCC)
FRCC Percent Departure (dFRCC)
Historic Fires 1936-2012 (H0)
Historic Fires 2002-2012 (H1)

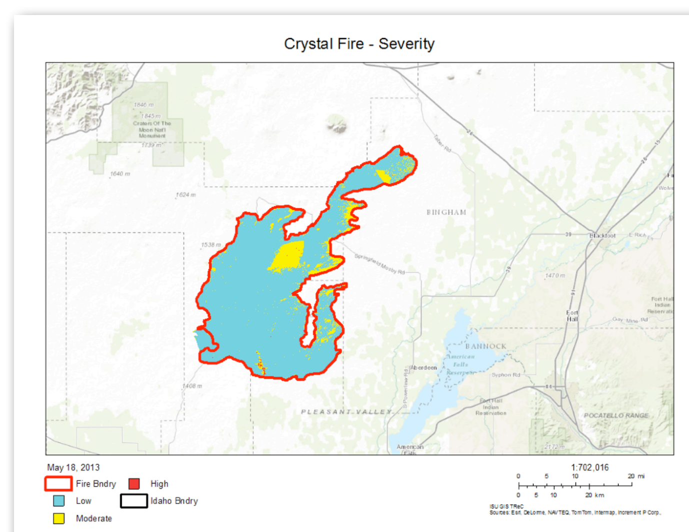


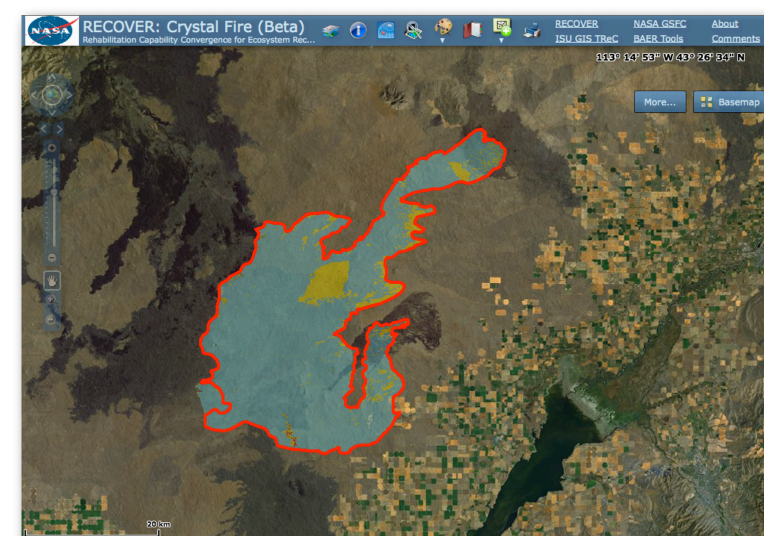
The RECOVER Client

- Adobe Flex Web Mapping Application
  - Connects to the RECOVER Server through a web services interface.
  - Allows site-specific data layers to be viewed and interrogated in a variety of ways.
  - Accommodates a wide range of base layers.
  - Additional information to aid in analysis can be uploaded through the RECOVER Client.
  - Professional, high-quality, high-resolution maps can be easily generated.
- Mobile Clients
  - Prototype RECOVER Client designed for desktop and laptop use ...

    ... but we are beginning to work on mobile clients.

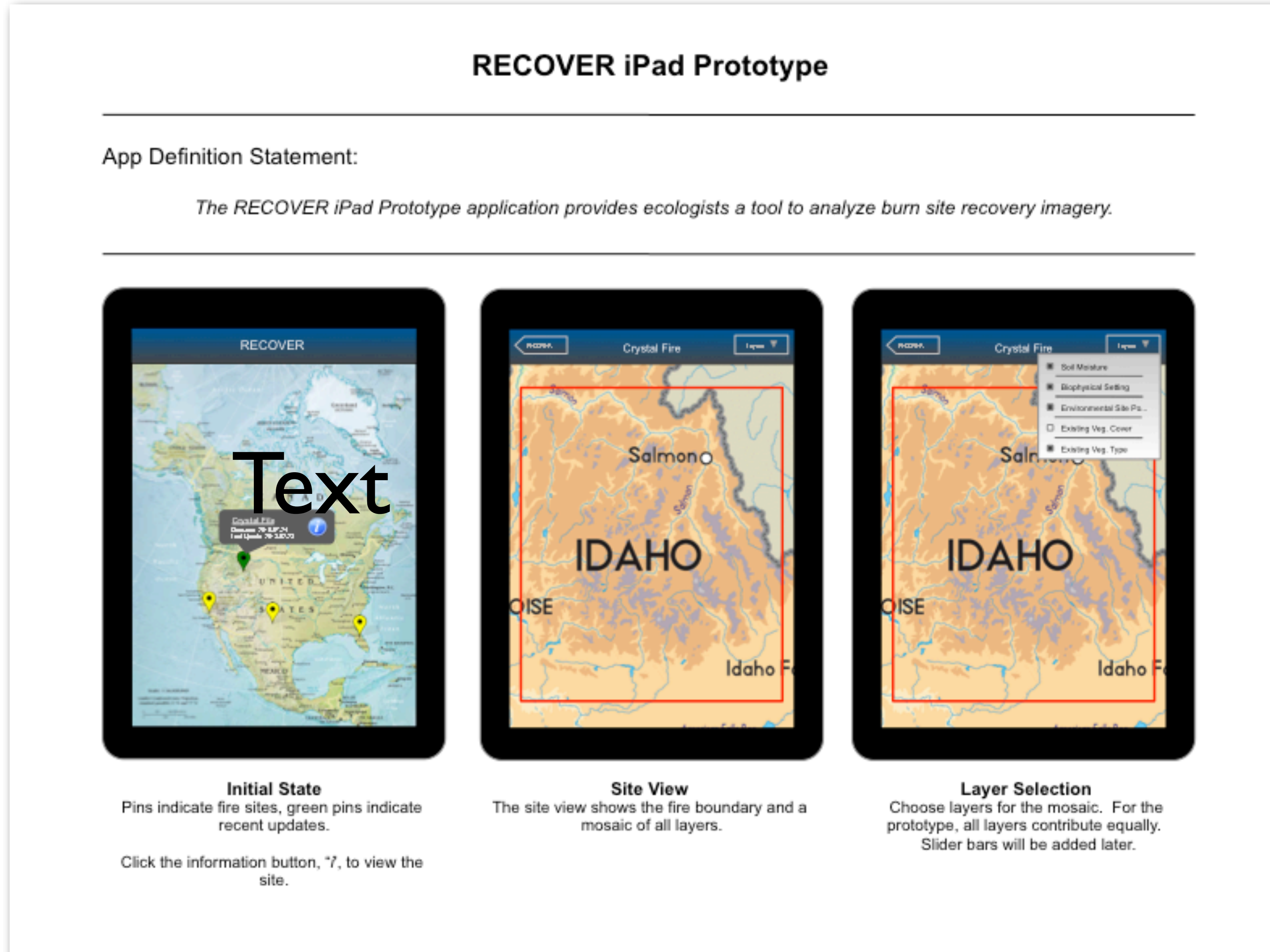




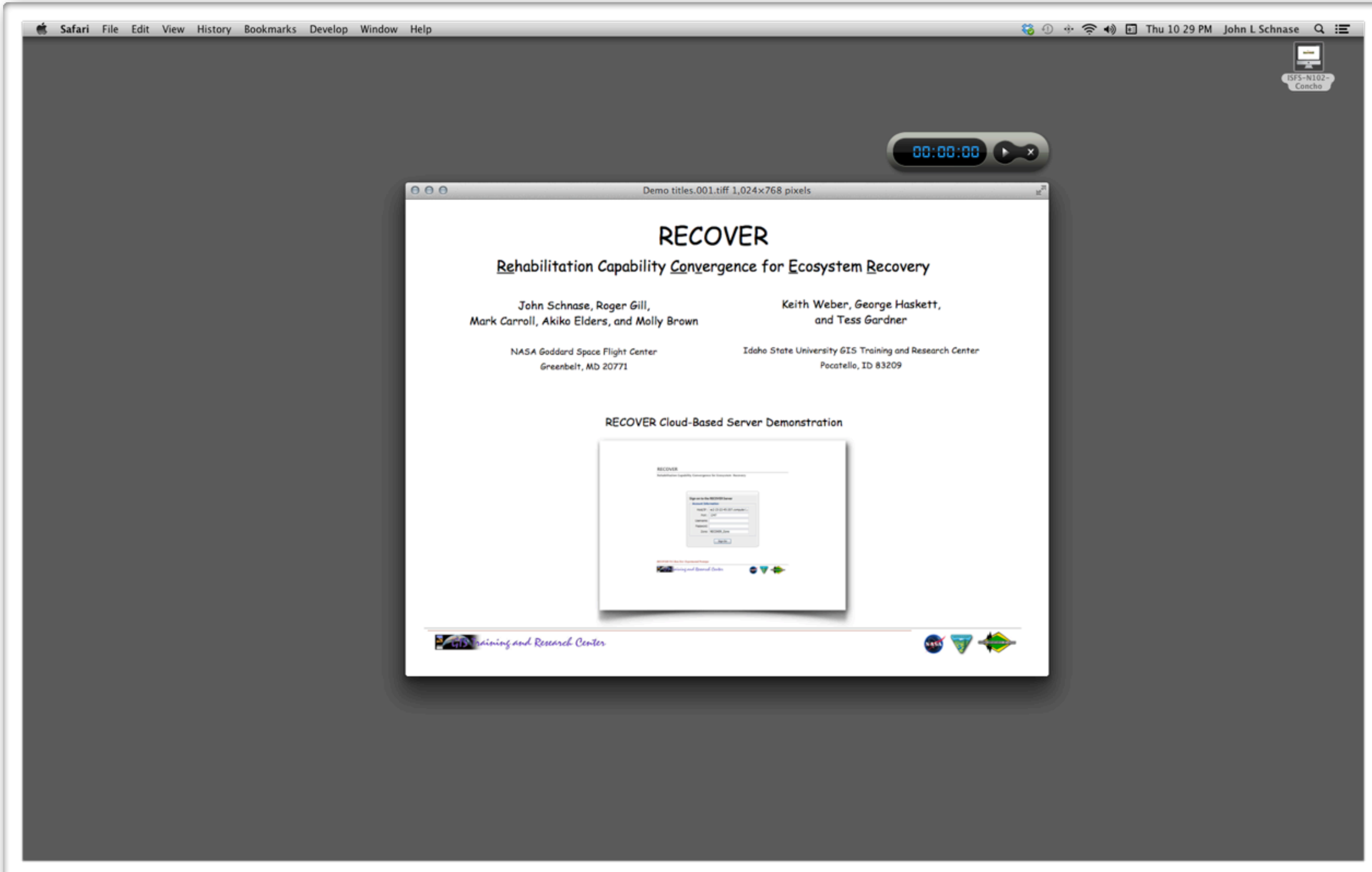


Next Steps ...

- Stage 1 - Feasibility Study
  - 1 Year (FY13) Prototype development and evaluation activity.
  - Idaho fires are being used for prototype development.
  - Want to "shadow" work on at least one fire this season to evaluate.
  - Evaluate with partners and develop proposal / teaming arrangement to develop production system.
- Stage 2 - Operational Deployment
  - 2-3 Year (starting in FY14) activity to develop full-scale system for regions of interest.
  - (NB: There's a Stage 1 down-select!)
  - Develop mobile tablet/smartphone capabilities to complement desktop interfaces.
  - Enable the RECOVER platform to consume SMAP, LDCM, Suomi NPP, Reanalysis, and Climate Model data.
  - Create a modern wildfire DSS optimized for the current suite of GIS technologies and Earth observing missions ...



RECOVER Server Demo



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RECOVER Cloud-Based Server Demonstration

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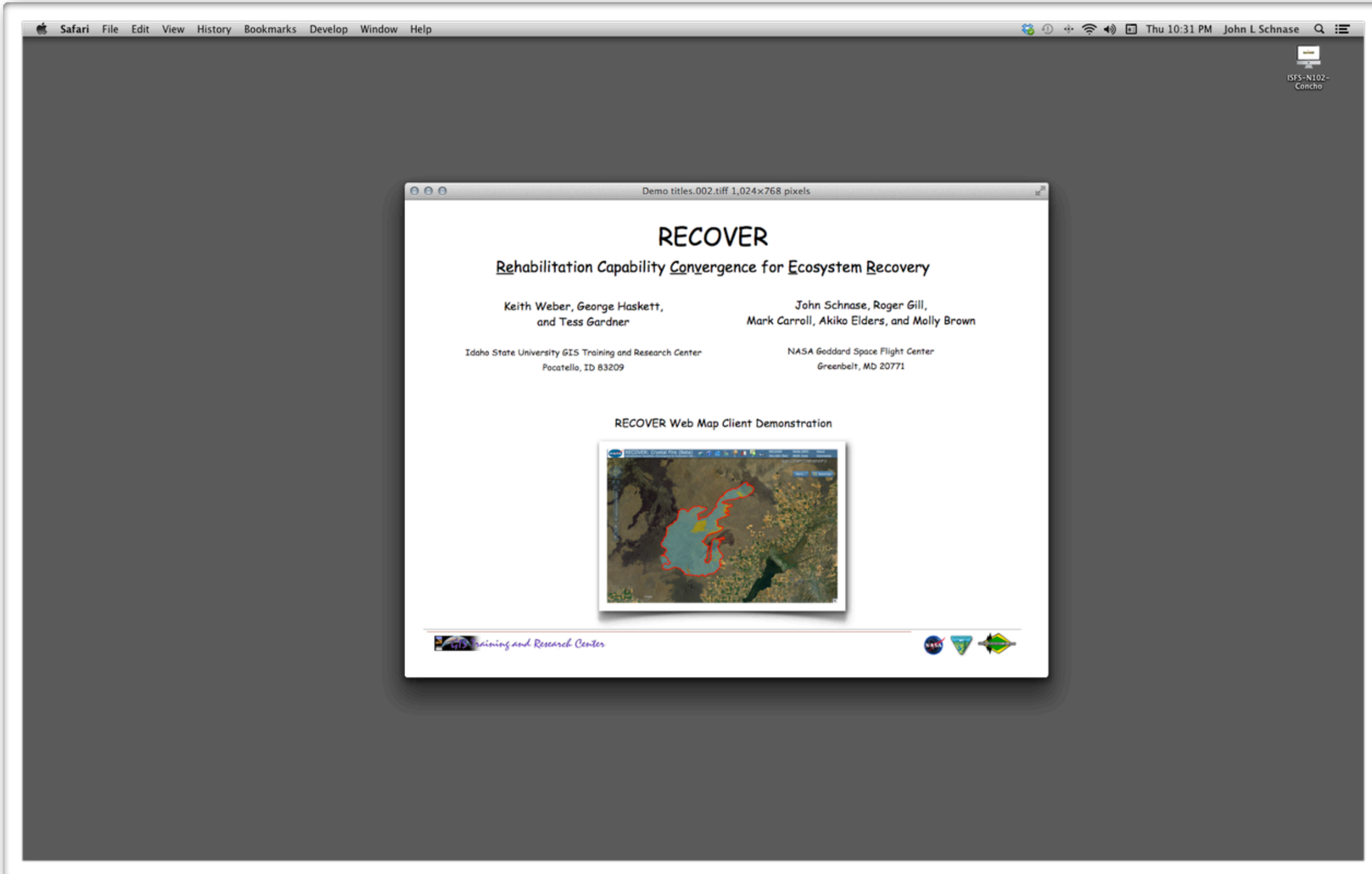
RECOVER Client Demo



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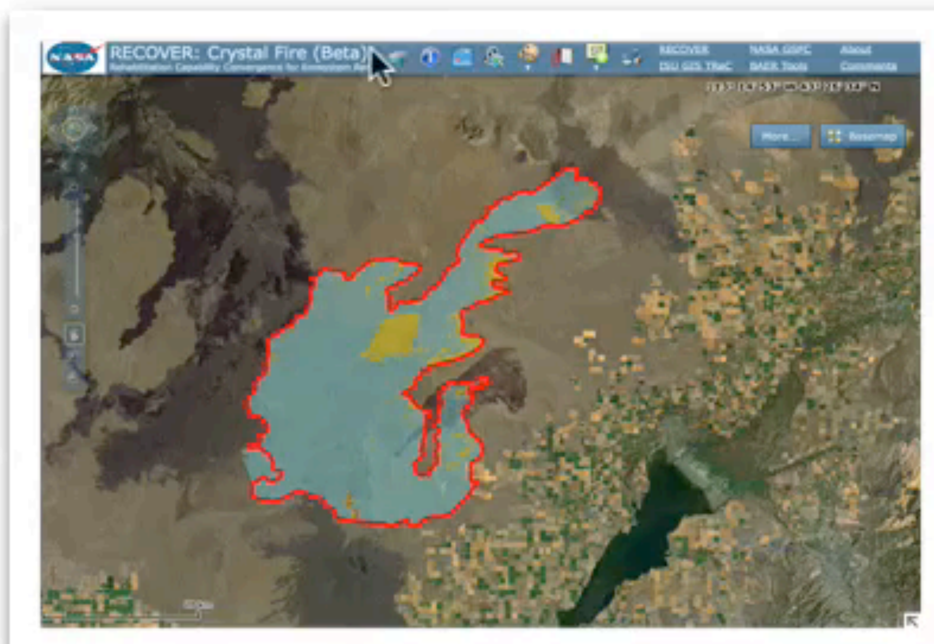
RECOVER Web Map Client Demonstration



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What we need from you ...

Take a few minutes to become familiar with the system. Then simulate using RECOVER to build a fire rehabilitation plan for a new fire.

- Can you perform all the spatial assessments you need with the current RECOVER application? If not, what is missing from the client? What is missing from the server?

Do you want to work together to put this capability into operational use?

If so, then we'll need your help to develop a Phase II proposal:

- people who can help us finish system development and evaluation,
- people who can help us evaluate the system in actual use this fire season, and
- agency support to help us meet NASA's Applied Sciences Program requirements.