

Montana's Trust Lands Management System:

Replacing a Data Management Highway, While Keeping the Users Moving

July 31, 2019



The Panelists

- **Dan Rogers**
Forest Management Bureau Chief
Montana Department of Natural Resources & Conservation
- **John Henry Burns, PE**
Engagement Manager
Sitka Technology Group
- **Emma Dixon**
Product Owner
Sitka Technology Group

What do you have?

What do you want?

How do we get what you want?

What do we have?

- 15 year old system
- Several major upgrades
- Some improved functionality
- Out of date tech stack (.NET)
- Continued inability to track activity
- Lackluster spatial framework
- Significant need for workarounds.

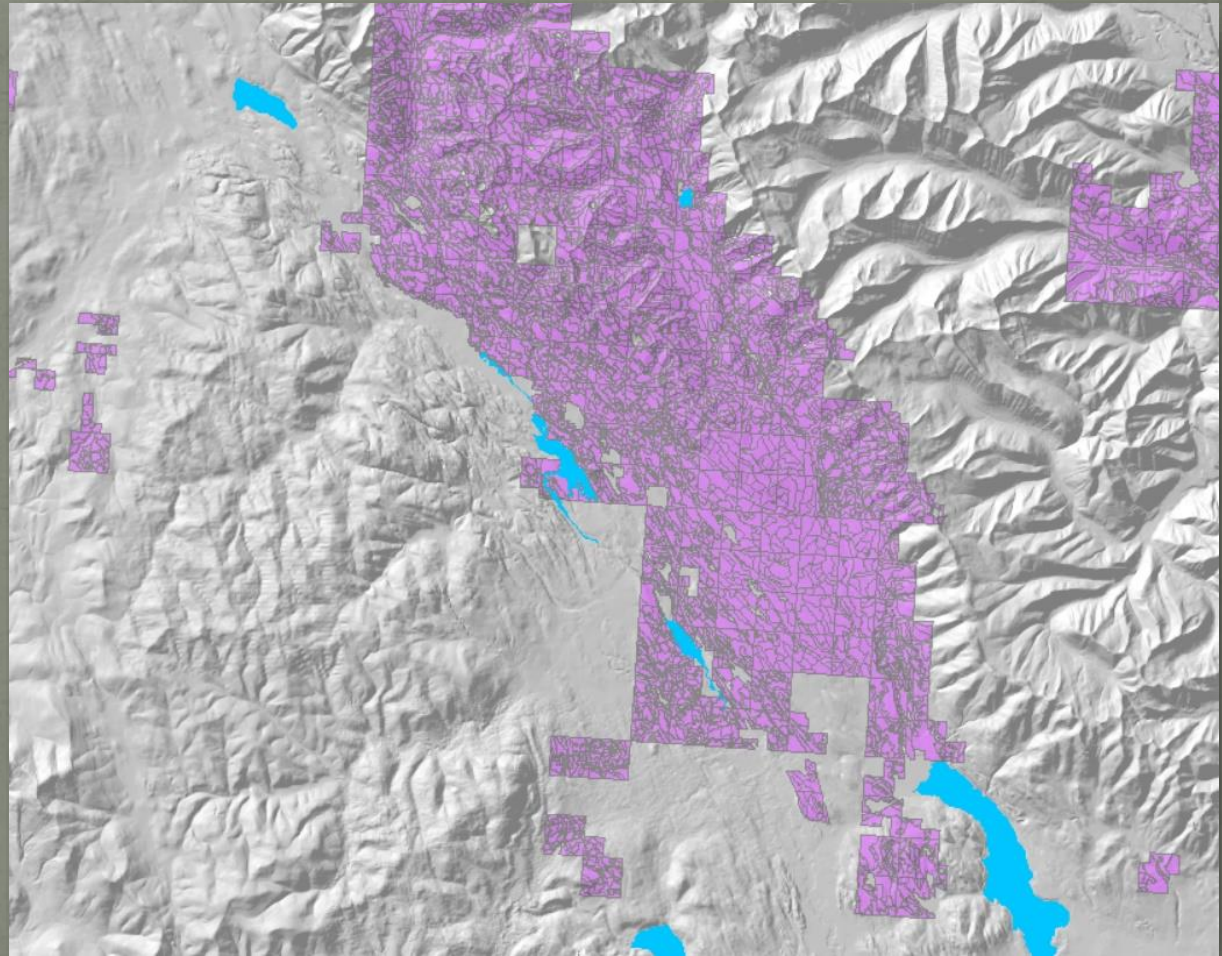
Trust Lands Forest Inventory

- ~ **800,000** acres managed programmatically
- ~ **745,000** acres commercial forest land
- ~ **25,000** miles of road
- ~ **53,000** miles int. & perennial streams

Trust Lands Forest Inventory

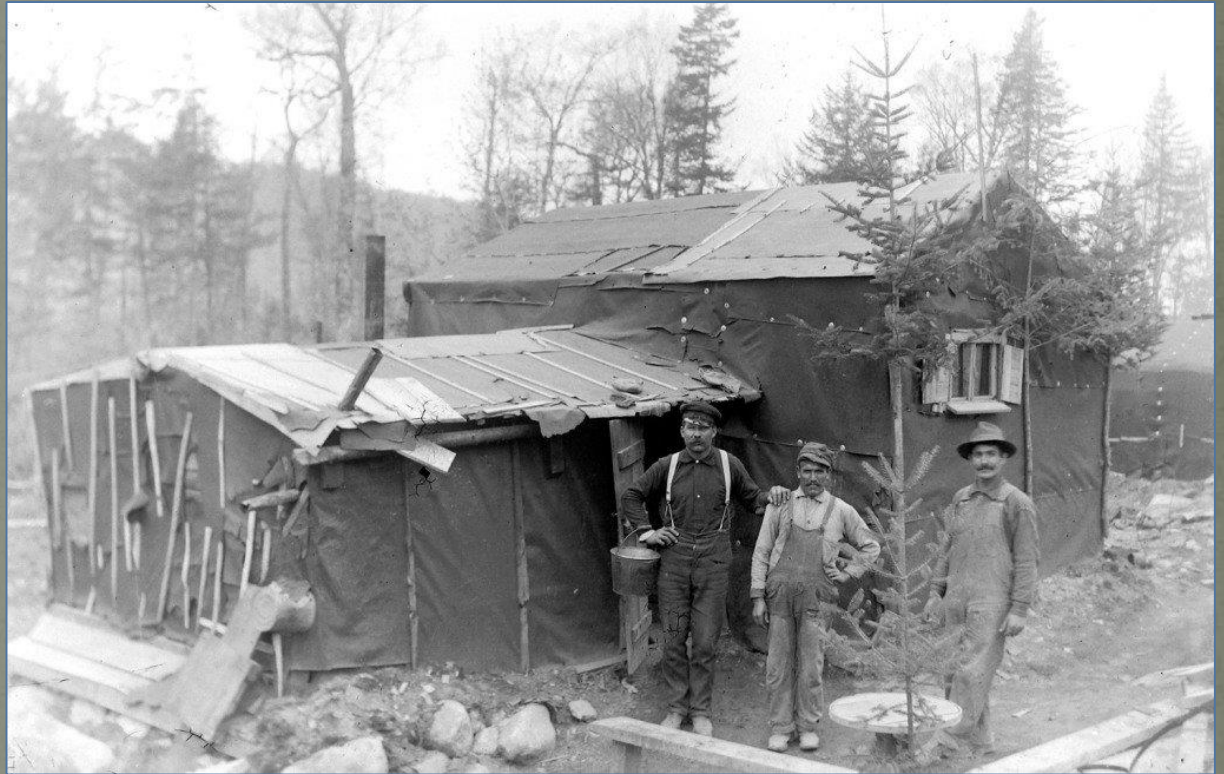
Stand Level Inventory

- 35,000 SLI polygons
- 5-500 acres



What's the Problem?

- Reliability
- Real-time
- Data confidence
- QA/QC
- Functionality
- User interface
- Integration
- Subject matter expertise

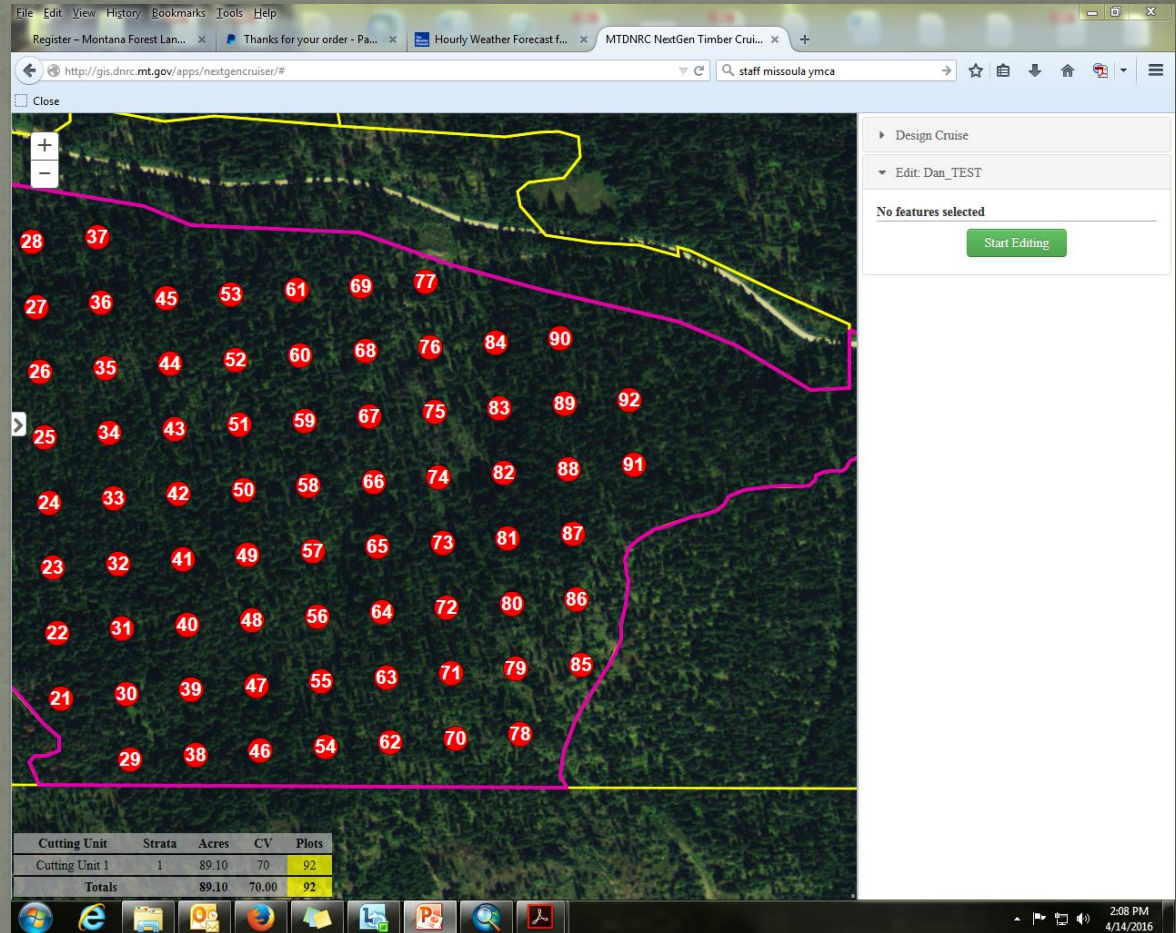


Primary Data Goals

- Precisely define
- Easily integrate
- Effectively consume

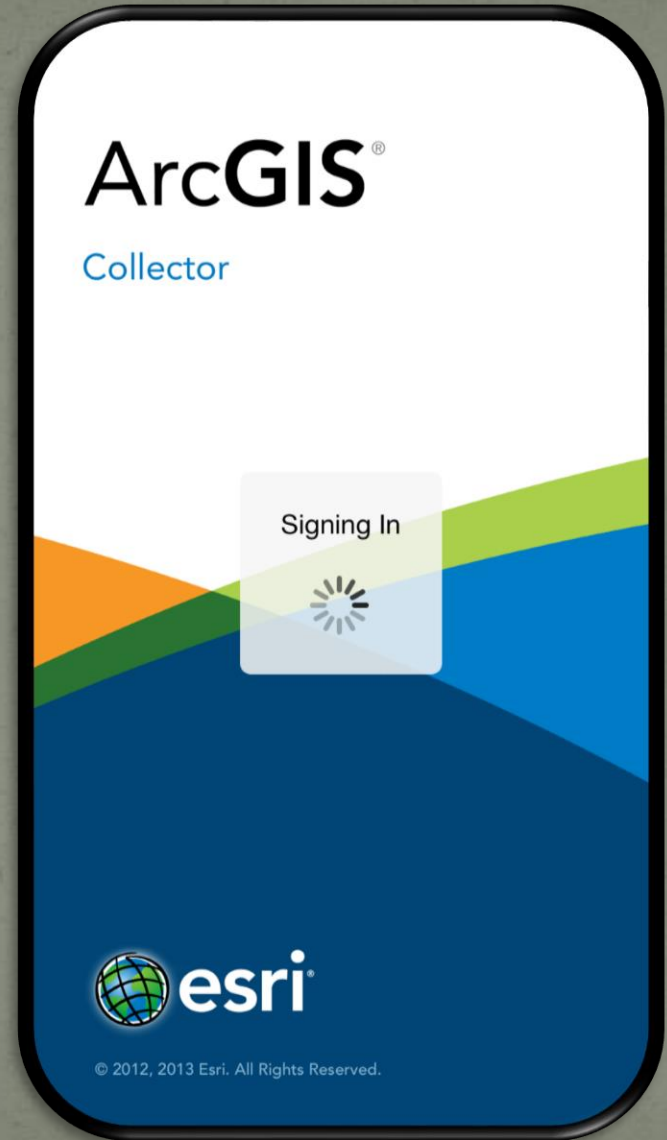
ArcGIS Online Migration...?

- DNRC has changing how we approach acquiring, managing, and consuming data.



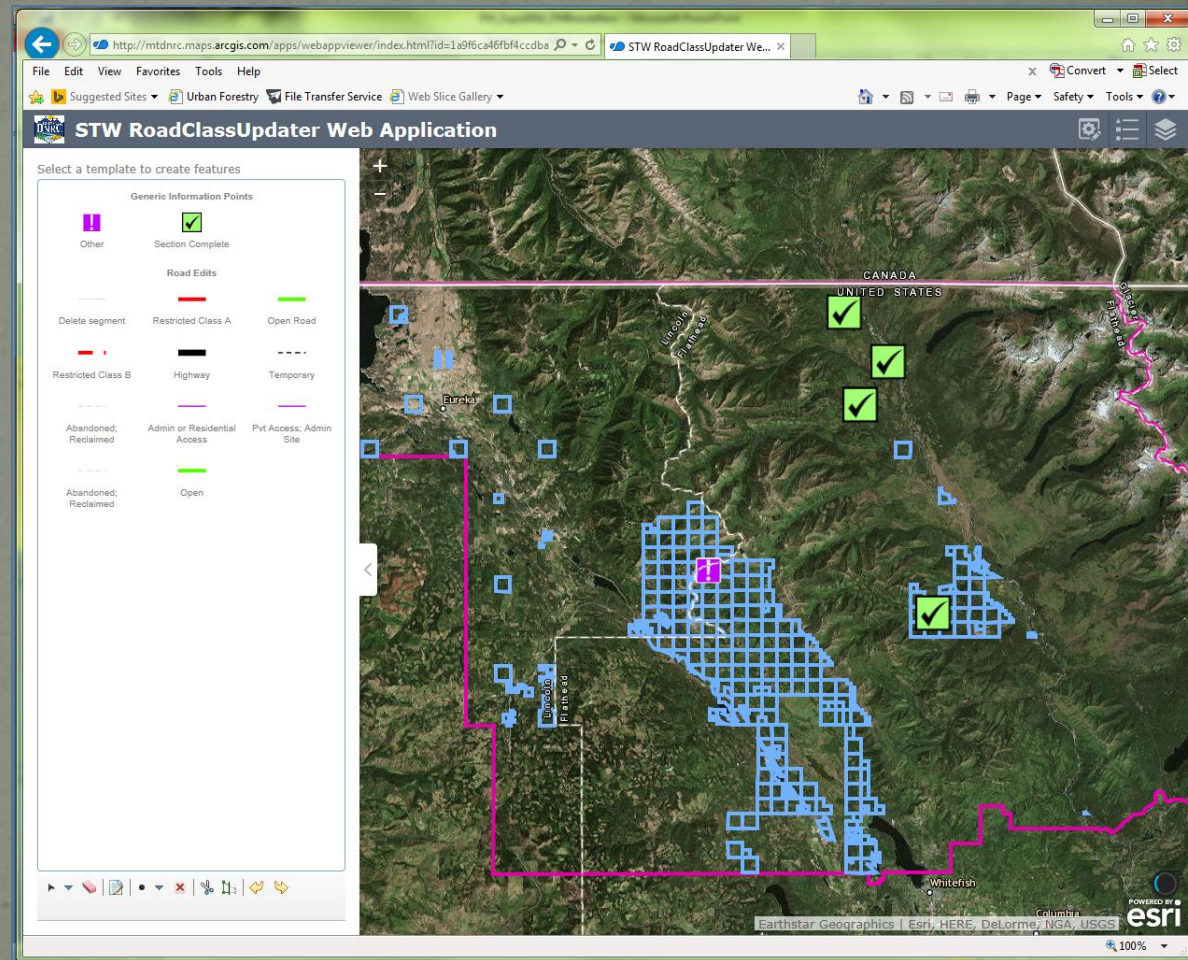
New Platform

- ArcGIS Online and ESRI Collector mobile app are the foundation.



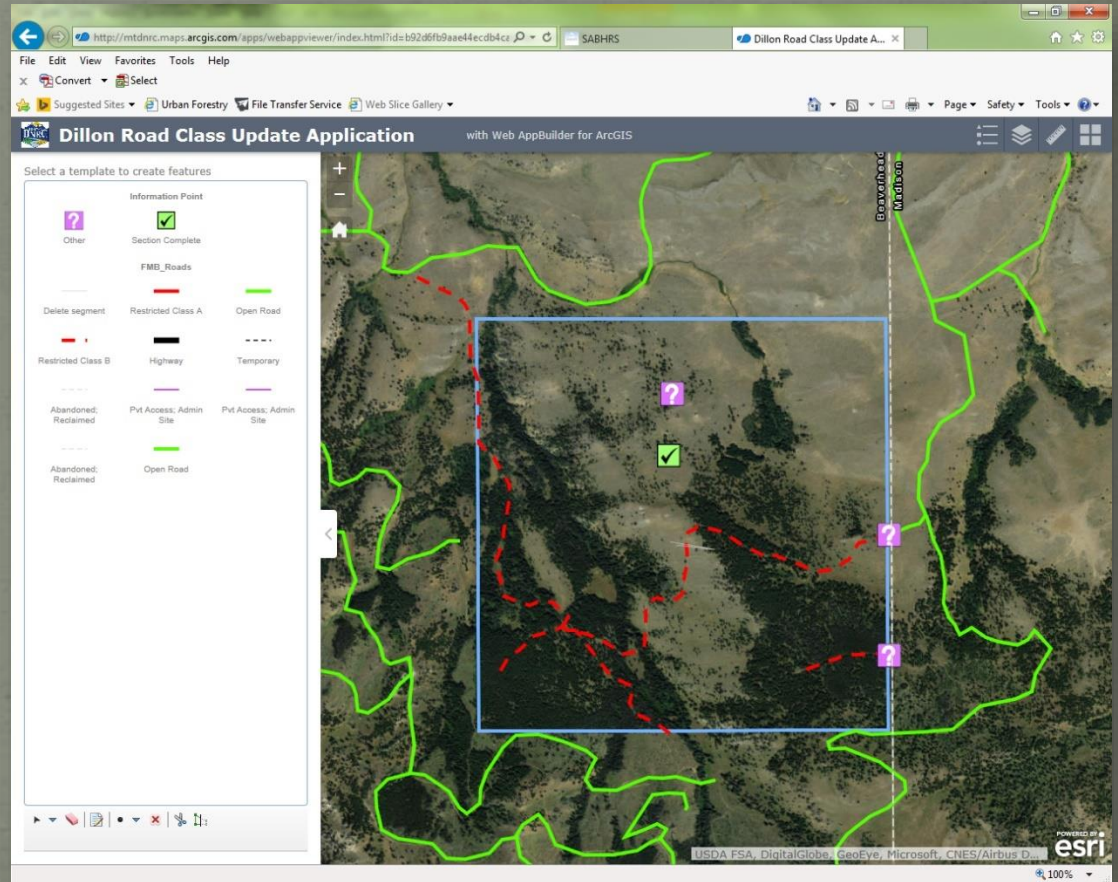
ArcGIS Desktop ➔ ArcSDE

- Local or enterprise data management system to a “DATA-CLOUD” system.



ArcGIS Desktop ➔ ArcSDE

- Precisely define
- Easily integrate
- Effectively consume
- **OFFLINE**



Findings

- 19,000 customer records.
- 18,000 tracts of land.
- 56,000 separate contracts in total.
- 31,000 receipt entries/year, 30,000 invoices/year, \$100 million.
- 2.5 million spatial records.
- TLMS currently serves four (4) TLMD Bureaus, FD, WRD, CRRD, through Financial services.
- TLMD has initiated development of and migration of program level land management data to ESRI – AGOL (ArcGIS Online)/Collector/Survey123 platform.

What do you want?

RFI – Spring 2016

- The new information system must have the ability to enable **auditing for all changes and transactions** related to the data housed in the database. This includes **historical audit data** to be able to pinpoint when a specific value was changed. This feature should be **configurable** so that DNRC can choose which changes and transactions are audited. Also it would be preferred if this auditing functionality had a **notification component**, so when sensitive data is changed specific personnel are notified.

RFI – Spring 2016 – cont'd

- Create & assign roles to users
- Customized User Interface
- Advanced Query functionality
- Digital signatures
- Access and integrate external data
- Print and attachment functionality
- Onboard help
- Spatial framework
- Public portal (both generic and client-based)



IT Systems Development Best Management Practices for State Trust Lands

May 2017

Background

As an incident of statehood, most states west of the Mississippi River received grants of federal land to assist in the funding of public education facilities and other governmental programs. Known as school lands, trust lands or grant lands, these properties were scattered throughout the various states.

The grants by which the states were given the public lands are solemn trusts. These trusts provide that proceeds from sale or use of the land be applied specifically to education and other various purposes. Thus, these lands may not be used without compensation to the state. These lands are managed by state agencies called land offices, land commissions or land boards - collectively identified as commission. Five are headed by statewide elected officials. Most commissioners also manage lands under navigable waterways to protect resources and produce revenue. Some land commissioners also act as the fire prevention and control agency for their state.

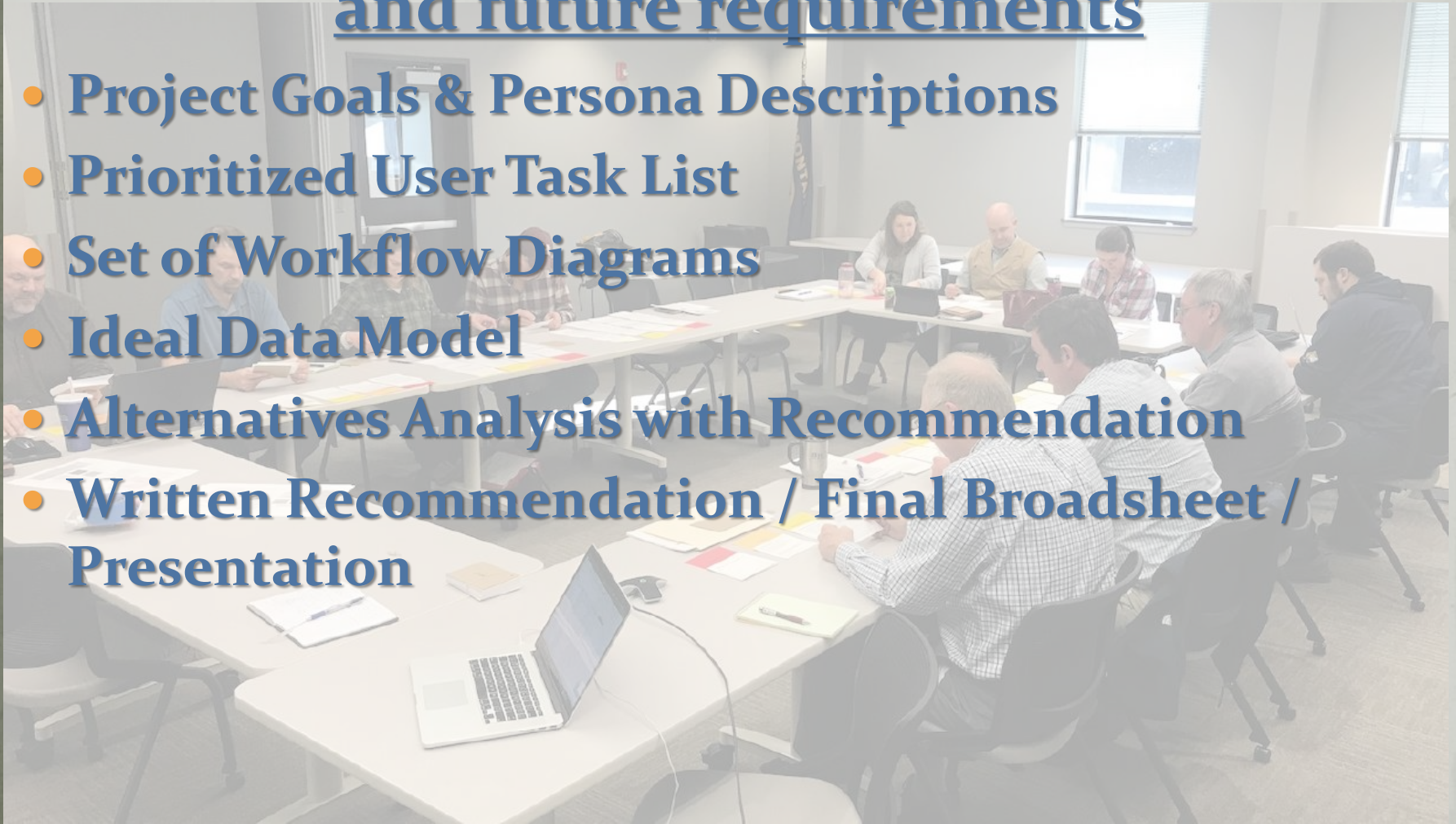
For 60 years, most of these states west of the Mississippi River have relied on the Western State Land Commissioners Association (WSLCA) to bring them together. Twenty-one of these states are part of WSLCA, and in total they oversee the administration of over 440 million acres of public and school trust land assets. These states have benefitted from having the opportunity to join together and solve joint problems. While every state is different, they often deal with similar issues.

The member states are unique state agencies that must generate revenue for their beneficiaries, keep track of their assets, and manage their leases and contracts. In this way, they act like a business and have business-like needs. Various Information Technology (IT) Business Systems are used across the states to perform this Asset Management function.

Business Analysis

Current business processes and future requirements

- Project Goals & Persona Descriptions
- Prioritized User Task List
- Set of Workflow Diagrams
- Ideal Data Model
- Alternatives Analysis with Recommendation
- Written Recommendation / Final Broadsheet / Presentation



In Today's Terms...

- Comprehensive
- Correctness
- Accuracy
- Timeliness
- Availability



Important Byproducts...

- Redefining roles and expectations with our DNRC OIT Shop.
- Outsourcing where we lack capacity.
- Remain nimble.



TLMS 2.0 – Heartwood

- 4 Phase, 4 year project
- \$2.5 million price tag - \$500k for “proof of concept”
- Phase 1 – MVP was completed in June 2019
 - Forest Management & Infrastructure
- Phase 2 – Initiated in July 2019
 - Real Estate Lands Inventory and Financial Services
- Phase 3 & 4 will involve remaining MMB, AGMB and remaining REMB

Early takeaways...

- Must be willing to fully engage
- Establish those roles/expectations both client/contractor
- Discuss and preload heavy decisions (Cloud)
- Agile works!
- Marathon not a sprint
- Under promise – over deliver

About Sitka

Founded in 2008, Sitka develops knowledge infrastructures for conservation, restoration, and sustainable development. We specialize in supporting clients who work in medium-to-large scale environments, whether an ecosystem, watershed, or metropolitan area.

The systems we design with clients deliver three types of value:

1. Realizing **operational efficiencies**
2. **Tracking performance** against social and ecological goals
3. Turning field data into **actionable intelligence**



Some of Our Clients



Data Analysis Project



Mapping 50+ users and user types to personas, Nov 14, 2017



User task card sorting, Dec 13, 2017

Tract - an area of land within a section associated with one and only one trust; may overlap spatially with other tracts

Trust - aka grant, beneficiary, ~~an~~ receiver of a legal entity set up to receive funds and administer funds for one or more beneficiaries; generally corresponds to a fund.

Agreement - a document describing a relationship between two parties; has a few primary types:

- Lease
- Permit
- Options

parcel - discrete, non-overlapping, legally-defined area of land defined/owned by Dept. of Revenue

proponent - a potential customer ^{person or entity} proposing to use trust lands

Customer - person or entity using trust lands under an agreement aka lessee or licensee or grantee

non-trust lands - MT state lands that are not trust lands but still need to be tracked, analyzed, reported on

other lands - ~~non-trust, MT state lands~~ lands that state of MT has an interest or agreement in that are not trust lands

Coming to terms, Nov 15, 2017



SWOT Analysis, Nov 14, 2017

Goals, Objectives, and Strategies

Goals

Maximize long-term revenue for School Trusts through the sustainable management of State Trust Lands.
Improve how we engage and serve the Montana citizens that use or benefit from those lands.
Improve effectiveness & efficiency of the division, including adding decision support capability.

Objective

Develop a comprehensive vision of a future Trust Lands Management System.

Strategies

Understand the people that create and consume Trust Lands information.
Delineate and prioritize the tasks people need to perform in their daily jobs related to Trust Lands.
Capture the workflows and underlying needs of the four bureaus and others.
Evaluate existing systems and tools
Generate a high-level data model
Identify alternatives and make a recommendation

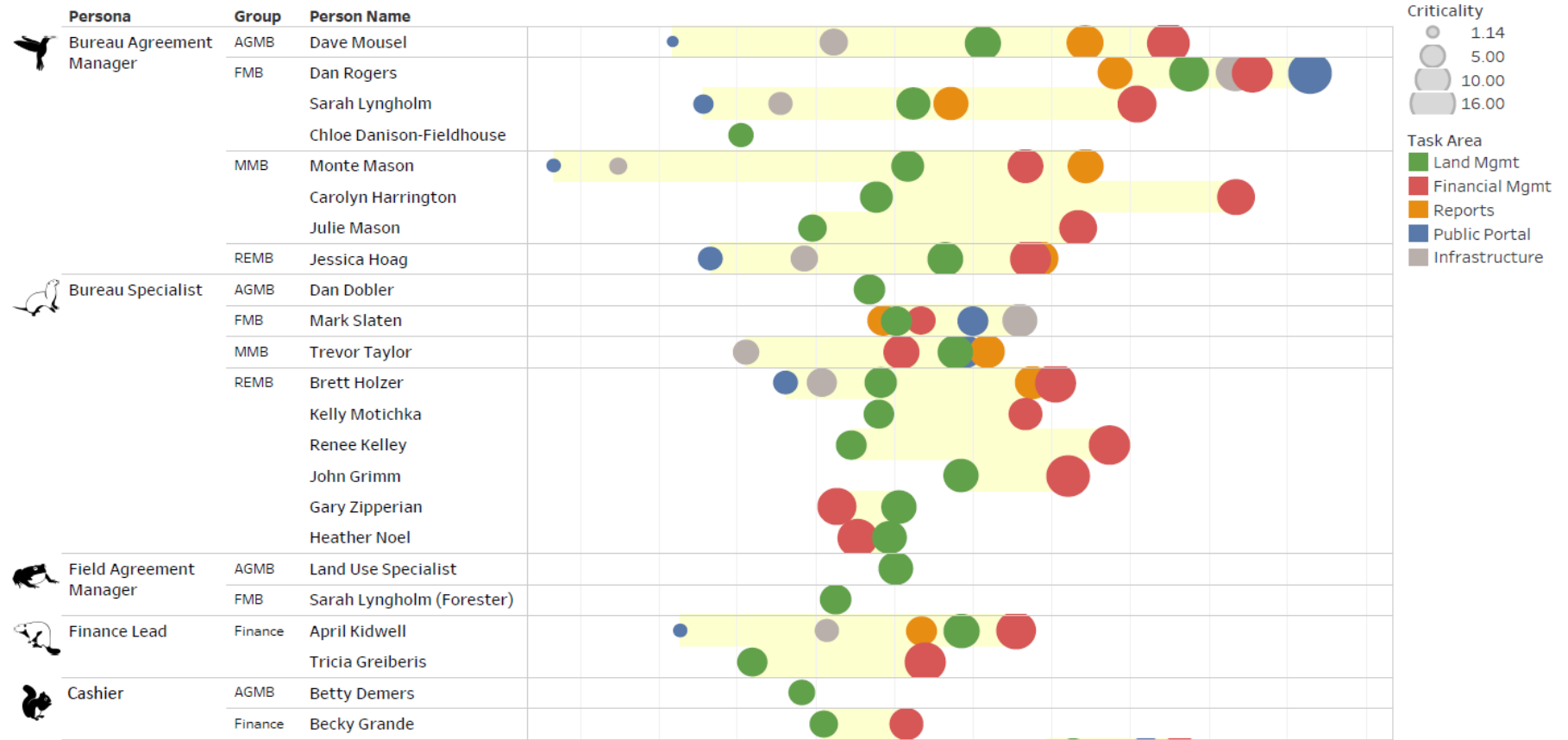
1) Understand the People

<i>Persona</i>	<i>User Types & Titles</i>	<i>Goal</i>
 Bureau Agreement Mgr.	Trust Lands Data Leads, Program Managers, Lease & License Managers, Land Transactions Manager	Manage and administer agreements with trust lands users to ensure compliance and processing of revenue.
 Bureau Specialists	AGMB: Recreational Use, Archaeologists REMB: Economists, Right of Way, Land Inventory, Comm. Dev./Lease, Land Section Supervisor MMB: Geologists, Pet. Engineers, Mineral Use, Royalty Auditors WRD: Water Rights Specialists	Ensure trust lands are managed appropriately for their given area of expertise.
 Field Agreement Manager	Unit Managers, Foresters, Land Use Managers, Trust Lands Program Managers	Run effective and efficient programs within their State Area or Unit.
 Division / Bureau Chief	Division Chief Bureau Chiefs, Area Managers	Ensure trust lands are being managed efficiently and effectively to maximize revenue for trust beneficiaries.
 Finance Lead	CFO of DNRC, Distributor of Funds	Accurately account for all revenue and expenses, ensure appropriate financial controls are in place, and efficiently distribute funds to trusts.

2) Define and Prioritize Tasks

Task Area Affinity by Persona

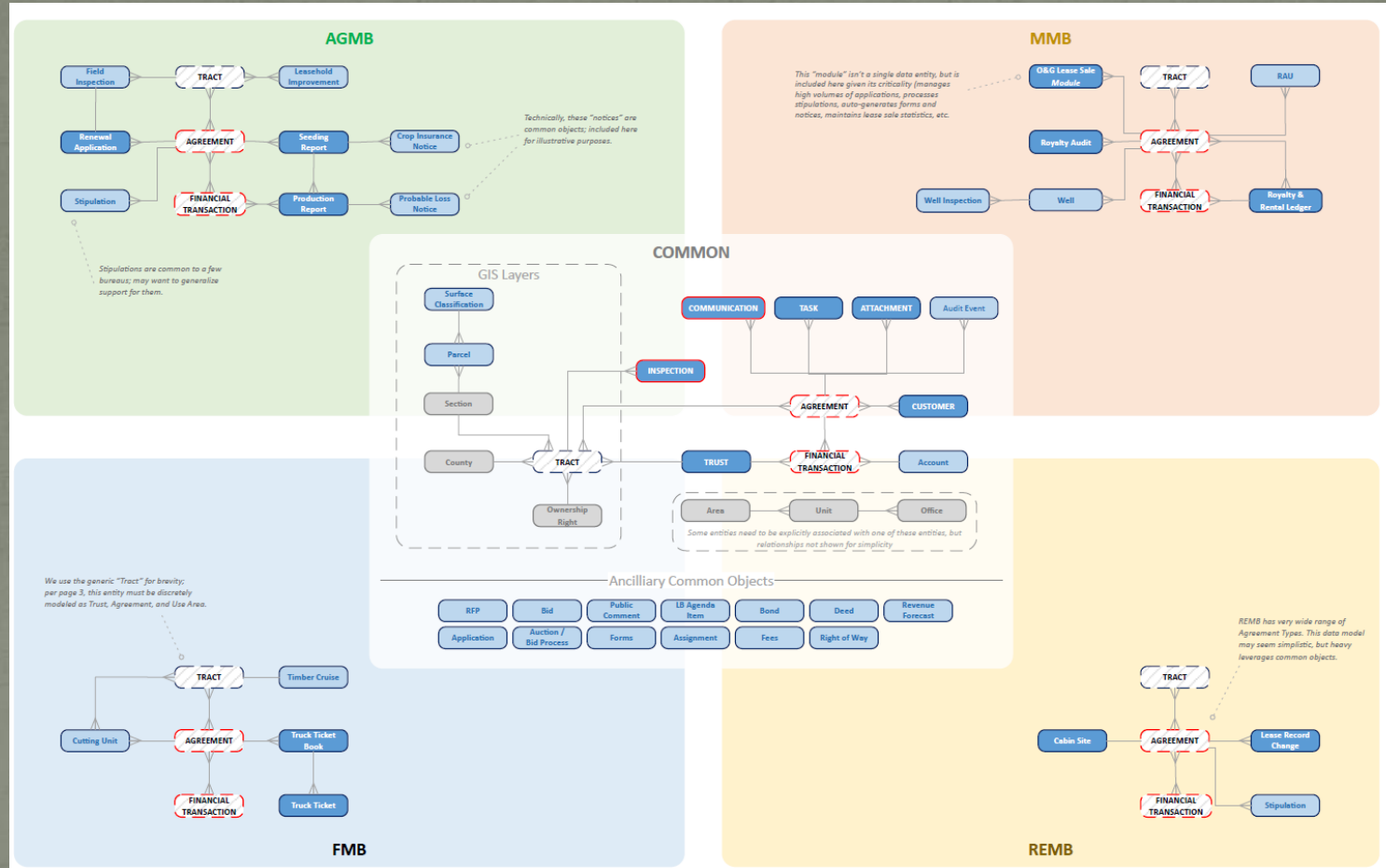
This view summarizes the relative value of the five Task Areas by Persona and Person, highlighting the distribution or range. Dot size corresponds to the average criticality score.



3) Define the Workflows

Workflow			User Tasks	Steps	Artifacts	Personas	Complexity
REMB							
R1	Residential Leases		1	7	3	4	Low
R2	Commercial Leases		1	10	4	4	Medium
R3	Licenses		2	5	1	3	Low
R4	Residential & Commercial Invoicing		4	14	8	4	High
R6	License Invoicing		4	NA	NA	4	Low
R7	Land Banking Sales		13	32	12	6	High
R8	Direct Grant Easements		1	24	11	6	High
R9	Cabin Site Sales		14	40	25	6	High
R10	Land Banking Acquisitions		9	29	14	6	High
R11	Land Exchanges		11	21	8	6	High
R12	Easement Acquisitions		1	17	4	5	Medium
R13	Cost Share and Reciprocal Access Agreements		4	21	4	4	Low
R14	Non-Trust Transactions and Inventory		1	NA	NA	NA	Medium
R15	Lease Renewal workflow		0	NA	NA	NA	Medium
R16	Improvements Assumption Workflow		1	NA	NA	NA	Medium
R17	Contracts Workflow		0	NA	NA	NA	Medium
R18	Monthly Reconciliation		0	~ 8	~ 2	2	Medium

4) Develop High Level Data Model



5) Evaluate Alternatives

Broadsheet for project Chinook – Alternatives and Recommendations

Considering the collective needs of the Trust Lands program - its personas, user tasks, workflows - led us to this set of alternatives for a future system. We also provide our recommendation, along with some rationale below.

Alternative	Pros	Cons	Certainty of Implementation	Resp. to Workflows	Resp. to Must Haves	Ability and Ease of OIT Maintenance?	Resp. to High-Level Recommendations
1 Status Quo <i>Live with what you have, but continue with fixes and minor enhancements such as creating a set of cross-bureau or division-level reports that don't exist today.</i>	+ Minimal "new" costs + Minimal change to manage	– Not sustainable, significant business operation risks remain – No logging, limited audit capabilities (incurs risk) – TLMD biz knowledge in expert's heads, not systematized – No common GIS and limited coord. across bureaus	Good	Bad	Bad	Bad	
2 COTS Composition (LandFolio + MIP Fund Accting) <i>Integrate 2 COTS apps and create an OLAP environment to meet reporting needs. This is ostensibly what NM has done, using PCC's LIMS (or "MOTS")</i>	+ Maybe Lower initial investment + Some functionality and workflows are good fit	– Tied to vendor's roadmap Vendor sets license fees – Can't maintain core functionality in-house – Less efficient due to many steps + moving between tools – Likely no access at all to vendors' OLTP databases	Bad	OK	Bad	Bad	   
3 ERP w/ Customization <i>Adapt a general-purpose system like Salesforce (CRM-centric), NetSuite (Fin.-centric), or Microsoft Dynamics. This is what WY, CO, and ID have done, respectively.</i>	+ Basic functionality available to business users quickly + Large install base, able to get consultant help	– Tied to vendor's roadmap they set fees – Can't maintain core functionality in-house – Moderate to high customization costs – Likely poor fit to bureaus' needs – No access to OLTP database	<u>Customization</u> Modest: OK, Bad, Bad, Bad Extensive: Bad, OK, OK, Bad				      
4 Hybrid <i>Custom-built system for all transactions (including financial) in .NET or Java that OIT can maintain, plus licensed SaaS such as PowerBI for visualizations and decision support. For implementation, could work with all bureaus at once or work with one at a time. We recommend one at a time for transactional web app, but all at once to develop OLAP.</i>	+ Minimal license fees Maintainable in-house + Great support for phased, agile approach + Minimizes # of systems for business users to learn + Can satisfy 100% of workflows and user tasks + Resilient, scalable, flexible + Enables process re-engineering, streamlines Ops + Leverages best-in-breed BI tools & cloud benefits + Easier to integrate 3rd party apps (e.g. bar code scan)	– Higher initial cost – Time to implement – Cost containment (mitigated with Agile approach)	OK	Good	Good	Good	          
5 Full Custom <i>Custom-built system for everything. This is the route taken by a few states: Oklahoma, Texas, Utah, Nevada, and Montana (to-date).</i>	+ No license fees Maintainable in-house + Great support for phased, agile approach + Only one system for business users to learn + Can satisfy 100% of workflows and user tasks + Resilient, scalable, flexible + Streamlines operations + new capabilities	– Highest initial cost – Time to implement (longer than alt 4) – Cost containment (mitigated with Agile approach) – Hard to keep up with advances in data visualization and decision support.	OK	Good	Good	Good	          

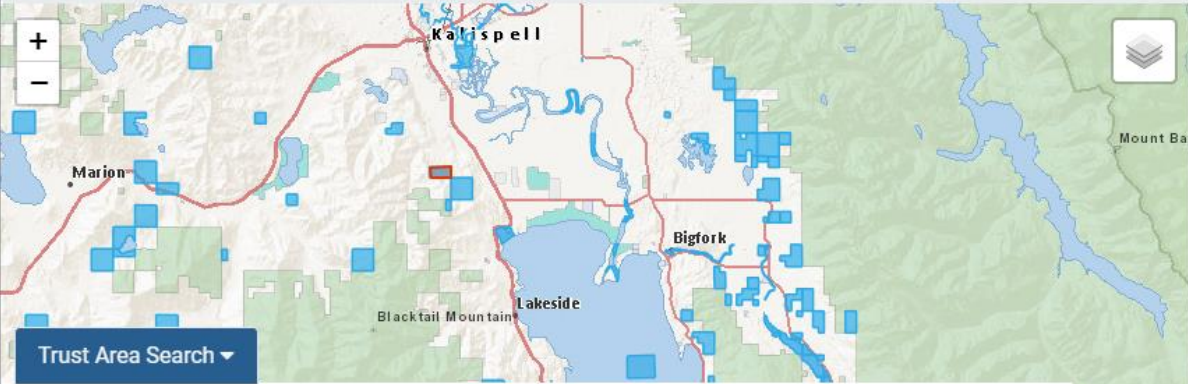
... and then get to building!



HeartwoodTrust Lands ▾Good Neighbor ▾

Welcome Alice Administrator | Sign OutManage ▾Help ▾

Trust Areas



Trust Area Search ▾

Filter Trust Areas By Map?

Export to Excel

Township, Range, Sec...	Trust	Tract ID	Number of Agreements
	All ▾		
21N 22W 7	Common Schools	30112	0
21N 23W 12	Common Schools	30134	0
21N 23W 16	Common Schools	30138	0
21N 24W 16	Common Schools	30177	13
22N 17W 28	Public Land Trust- Navig Rivers	N000002946	0

27N 21W 8 (Capitol Buildings)

Preview agreements in the trust area under each of the Trust Lands Management bureaus.

Note: currently only Forest Management Bureau agreements are supported in this application.

Forest Management

Number	Name
F80813	Kirk Doble
F80679	Glacier Line Logging
S01463	WHITES BASIN

1 - 3 of 3 items

Real Estate Management

Real Estate Management agreements are not yet available in this system.

Interactive Demo...

<https://heartwood.sitkatech.com>

Panel Q & A