

Tools to Scale Conservation & Mitigation Programs

Designing ecosystem services metrics and supporting technology solutions for scalable implementation

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Let's start at the beginning...

- Tools are a means to an end
- Before worrying about tools, gotta have:
 1. Clear, succinct program **Goals & Objectives**
 2. Solid & explicit **Science** guidance
 3. **Commitment** to repeatable & efficient operations



- Ecosystem Service programs require *more* data than the status quo
 - Capture baseline conditions
 - Measure impact / benefit
 - Track mitigation activities
 - Monitor ecosystem response (status & trend over time)
- Must provide chain of custody, replete metadata, quality controls, etc.
- Plan for growth if you're bullish about your program

System of Record

- **SoR** – the authoritative data source for a given data element or piece of information; the place where a business object is maintained: create, update, delete (CRUD)
- Can have more than one SoR, but not multiple for the same business object
- For each component of your Ecosystem Services or Performance-based program, be *uber-clear* which is SoR



	# of People CRUDing	Reporting Capability	Analysis Capability	Partner / Stakeholder Transparency
Paper or Spreadsheets	1	Manual	Minimal	No
Access	1-2	Automatable	Some	No
Database (Internal)	3+	Automatable / Flexible	Good (Staff Only)	No
Database (Web)	3+	Automatable / Flexible / Scalable	Great (Leveraged / Scalable)	Yes

A few stories of scalability from the job site

1. iPad data collection + fully automated metrics generation:

Columbia Basin Habitat Monitoring Program

2. Drone monitoring + image processing for automated change detection:

Remote Sensing of Reed Canarygrass

3. Simple web app with online mapping to scale consultation process:

Disturbance Proposals & Debit Calculator for Montana Sage Grouse Habitat

4. Transparent results for partners & stakeholders:

Lake Tahoe Info's Dynamic Dashboards

1. Columbia Basin Habitat Monitoring Program

Challenge

- BiOp-mandated, status & trend monitoring of ESA-listed fish habitat
- Required **22 field crews** from dozens of **agencies, tribes, private firms** to collect data from more than **350 sites** in **11 watersheds** across **3 states** using a synchronized set of methods

Solution

- Web platform for coordinated data collection and analysis: chammonitoring.org
- Site eval before visit, landowner coordination
- iPad minis in field auto-sync over wifi to cloud
- Auto-gen metrics: some simple math, others results of model-runs
- Workflow / Task-based



1. Columbia Basin Habitat Monitoring Program

Results

- Better visibility & coordination, and tighter control
- Cost savings of \$19,000 per watershed per year



1. Columbia Basin Habitat Monitoring Program

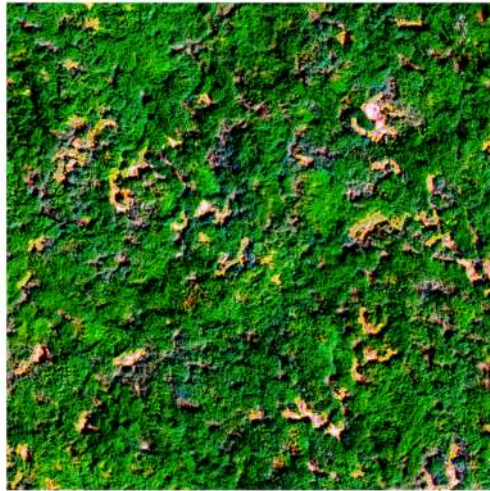
Benefits of Scaled Tools

- **Cost** ↓ by streamlining coordination across hundreds of users & automating model runs & metrics generation
- **Quality / Confidence** ↑ by integrating QC workflows & metrics generation & providing full chain of custody – from field capture to published results
- **Control** ↑ by providing transparent, real-time status of season's progress & allowing scientists & managers to control when data is published



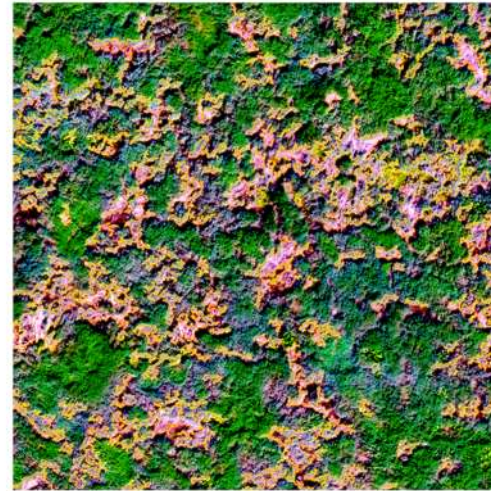
2. Remote Sensing of Invasive Species in Columbia Estuary

- Two large tidal wetland properties infested with Reed Canarygrass
- Flew UAS over control and treatment sites, derived **2.5 cm² resolution ortho-mosaic**
- Image processing software calibrated, segmented, filtered, and **measured** interstitial regions (regions in yellow below). Dozens of statistics for 61 control & 151 treatment regions



①

Figure 1: Segmented Control



②

Figure 2: Segmented Treatment

2. Remote Sensing of Invasive Species in Columbia Estuary

Tools that Scale

Results

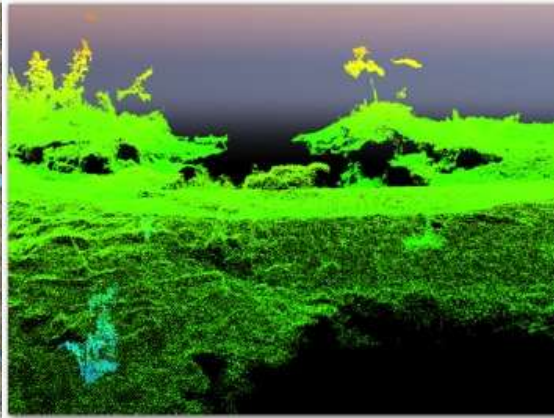
Example Products from UAS monitoring



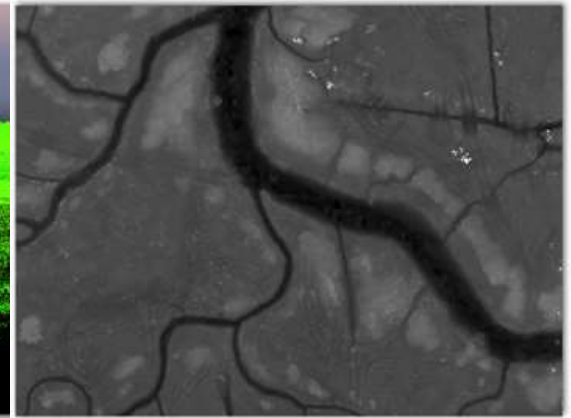
1. Ortho-mosaic



2. Point Cloud



3. Digital Surface Model



Examples from a recent flight with Columbia Land Trust in February 2016

2. Remote Sensing of Invasive Species in Columbia Estuary



Benefit of Scaled Tools

- **Cost** ↓ by flying a site in 1-2 hours vs. walking / boating it in 1-2 days & eliminating data entry / transcription step
- **Quality / Confidence** ↑ by eliminating user error when measuring and calculating metrics, & having ultra-high resolution for primary assets
- **Capabilities** ↑ by enabling re-flights for automated change detection, & re-using info products for unanticipated future analysis & calculations

3. *Habitat Impact Proposals & Debit Calculator for Montana Sage Grouse*

Challenge

- Strategically: Help Montana maintain authority to manage its own lands, wildlife, and economy by avoiding ESA listing
- Tactically: Make it easier for land users to propose new disturbances, improve efficiency of consultation by state agency staff, ensure “debits” are calculated accurately and with full chain of custody

Solution

- Simple web app with online mapping to scale consultation process
- Let land users run the disturbance calculator themselves
- Convert the calculator from TSQL to Java



3. Habitat Impact Proposals & Debit Calculator for Montana Sage Grouse

Results

- Interactive, guided proposal process
- No more “JAYSUS what?”
- Full auditability
- Dynamic questionnaire asks only pertinent questions
- Auto-generate letters and other consultation process outputs

The screenshot displays the 'Disturbances for this Agriculture - Land project' section of the web application. It features a map with a blue polygon and a blue line. Below the map is a table with the following data:

Name	Feature	Type	Width	Name	Area
ADP/Grass	Project	Grass			10000
Access Road	Line	Road	10		10000

Below the table, there is a disclaimer: "Disclaimer: Type your location for the road! Make sure you selected the most appropriate Project Type on the Select page - the Type available to choose from are listed on the Project Type."



3. *Habitat Impact Proposals & Debit Calculator for Montana Sage Grouse*

Benefits of Scaled Tools

- **Up-front Cost** ↓ by reducing time to complete consultation
- **O&M Cost** ↓ by integrating calculator in a way that allows it to evolve
- **Risk** ↓ by standardizing workflow and tracking full audit history of every submitted proposal
- **Capabilities** ↑ by providing calculator scores immediately; automating reports for stakeholders; & exports for federal partners



4. Tahoe Basin's Dynamic Dashboards

Challenge

- Provide real-time status of investments in conservation and sustainability
- Support regional coordination across 50+ partners
- Kill the 23 tab spreadsheet

Solution

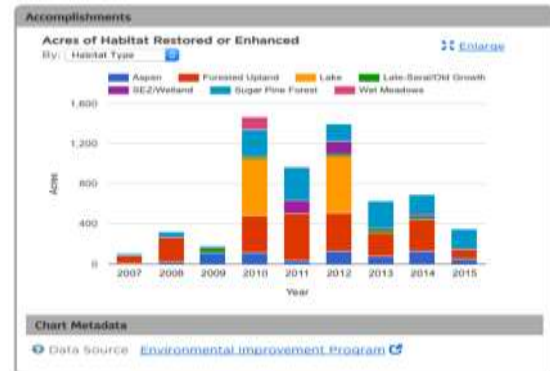
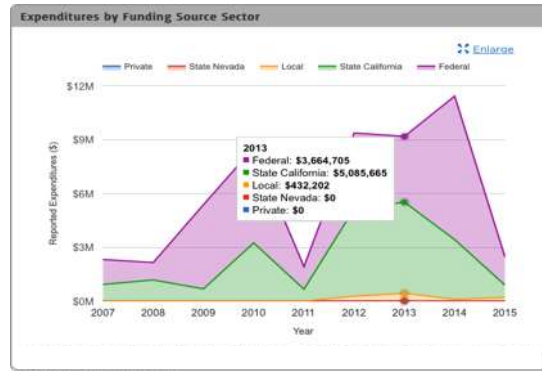
- Streamlined process for project proposals and updates
- Simple web app requires no training
- Automated reports and dashboards



4. Tahoe Basin's Dynamic Dashboards

Results

- Enables strategic planning and collaboration
- Summarizes \$2.3B in program spending and performance based on individual projects
- Improves program transparency for stakeholders and the public



4. Tahoe Basin's Dynamic Dashboards

Benefits of Scaled Tools

- **Cost** ↓ by automating analysis, reports, and visualizations; eliminating some paper reports; reducing fire-drills to answer questions from governors, senators, etc.
- **Quality / Confidence** ↑ by eliminating “data calls” and manual data entry; automating analysis, reports, and visualizations; & providing live data w/ no black boxes!
- **Capabilities** ↑ by freeing up staff to tackle high-order tasks



About Sitka Technology Group

Tools that Scale

Sitka Technology Group designs, develops, and manages environmental knowledge systems for today's performance-driven conservation and restoration programs.

Our company, headquartered in Portland, Oregon, was founded in 2008 on the belief that better data leads to better decision making.

Our success is rooted in decades of experience in natural resource data management, workflow & dataflow analysis, business intelligence & analytics, open standards, and mobile technologies.



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