

Introducing GeoOptix

Tools for Fueling Collaboration and Secure Environmental Data Management in the Cloud

Keith Steele

Founder and Chief Technical Officer

Sitka Technology Group



About Us

- ▶ Focused on applying modern technology, data management, and systems approaches in collaboration with organizations involved in conservation, restoration, and natural resource management. Better info = better decisions = better use of scarce resources.
- ▶ Our clients include federal and state agencies, regional and tribal governments, NGOs, and environmental consulting firms.
- ▶ Applications we have developed help maintain the clarity of Lake Tahoe, improve stormwater management in Southern California, and preserve Greater Sage Grouse habitat in Montana, among many others.
- ▶ Our roots are in the salmon recovery efforts here in the Columbia River Basin.



Learning from the Past

- ▶ We've developed and maintain a number of bespoke environmental data management systems over the years.
- ▶ The work is complex, custom development is expensive in the capital phase, and IT projects often fail in dimensions of cost, schedule, or performance.
- ▶ TCO of projects over the useful life of the application is often higher than organizations expect, which crowds out on-the-ground work that should be the highest priority of most conservation/restoration programs.
- ▶ Millions of dollars later, real-time data sharing, insight, and analysis are still out of reach for many.
- ▶ Investing in disruption

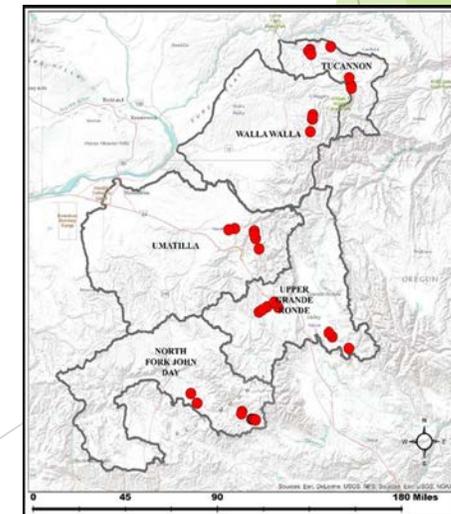
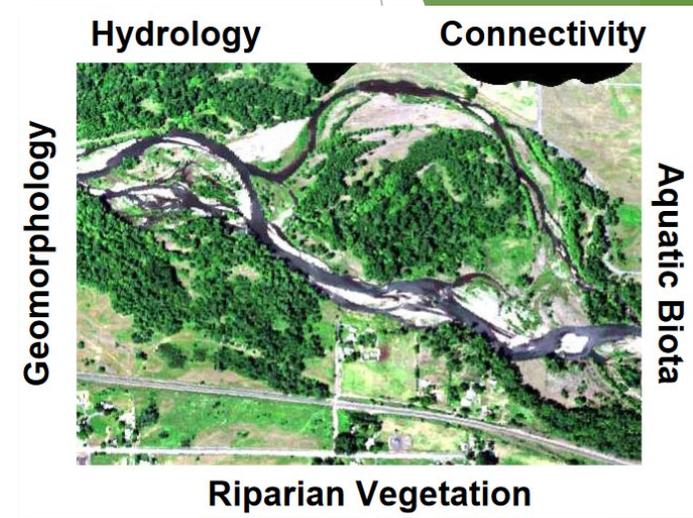
GeoOptix Design Objectives

- ▶ Simple to use and administer - no special training or skills required
- ▶ Secure and open access to data via comprehensive documented API and standard technical protocols
- ▶ Support a wide variety of field protocol and analysis techniques
- ▶ Don't try to be all things to all people - workflow automation and integrations are essential
- ▶ Ability to launch a new project from scratch in an afternoon



Confederated Tribes of the Umatilla Indian Reservation

- ▶ Located just east of Pendleton
- ▶ Multi-watershed bio-effectiveness monitoring
- ▶ Five watersheds in NE Oregon and SE Washington
- ▶ Long-term tributary habitat and biological monitoring program



Goals of Summer 2018 Trial

- ▶ 9 years of complete historical data collection to be carried forward
- ▶ Meet reporting, analysis, and data sharing needs
- ▶ Convert data from 14 protocols, 41 field methods, 30,000 field files and over 30GB of legacy data across 165 sites into GeoOptix
- ▶ Replace bespoke mobile application with hybrid-mobile application
- ▶ “Lift and Shift” continuity



Plan • Collect • Protocols

Protocol Details [Show more](#)

CTUIR Biological Effectiveness and Evaluation Plan

Designer Code

12 Method Schemas

| Method Name | Version | Description |
|------------------------------|-----------|---------------|
| Survey Setup | Version 1 | Survey Setup |
| Site Layout | Version 1 | Site Layout |
| Site Attributes | Version 1 | |
| Transects | Version 1 | CTUIR Biolog |
| Channel Units | Version 1 | CU |
| Fish Abundance | Version 1 | CTUIR Biolog |
| Macroinvertebrates | Version 1 | AEM Floodp |
| Air Temperature Readings | Version 1 | Readings fr |
| Solar Input | Version 1 | Solar input |
| Stream Temperature Readings | Version 1 | Files from th |
| Scanned Paper Forms and Maps | Version 1 | Scanned Pap |
| Topographic Data | Version 1 | Topographic |

+ ADD / REMOVE METHODS

Plan • Collect • Method Schemas

Method Schema Details [Show more](#)

Channel Units

Method Schema relationship graph

Method Graph

The screenshot shows a detailed view of a 'Method Schema' for 'Channel Units'. It includes a 'Method Schema relationship graph' and a 'Method Graph' which is a hierarchical tree diagram showing the relationships between various data points and methods.

Benefits of Cloud Deployments

- ▶ Compute / storage elasticity and redundancy
- ▶ Security (believe it or not)
- ▶ Containers, micro-services, and orchestration
- ▶ Time to market and agility
- ▶ Pace of innovation, big data, machine learning, cognitive services, IoT, the Intelligent Edge
- ▶ Cost
- ▶ Ability to compose solutions, API managers, and the “API Economy”
- ▶ Deploy anywhere in the world, at any time

New Capabilities

- ▶ Cloud elasticity and resiliency
- ▶ Documented, secure, and standards-based web API for QC, analysis, and data integrations
- ▶ Built in real-time analysis and reporting using dynamic models
- ▶ Compatible with 3rd party tools like R, Tableau, and PowerBI
- ▶ Workflow integrations through event driven architecture
- ▶ Completely self-service

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# -----
# Geographic Data Download and Plotting Demo
# 11-9-2018
# -----
# comment and run the following lines to load libraries
# install.packages("tidyverse") # Sholuber.ggg@si
# install.packages("ggplot2")
# install.packages("ggvis")
# install.packages("rasterlite")

library(tidyverse)
library(ggplot2)
library(ggvis)

# -----
# Download snorkel_fish_count data
# -----

url_data <- "https://data.groupsix.com/sample-method-fact-files/program/demo/methods/checks/fish-abundance-31/versions/1/record-set-layers/snorkel-fish"
fish <- fromJSON(content(GET(url_data), as = "text"))
# View(fish) # displays downloaded data in a spreadsheet

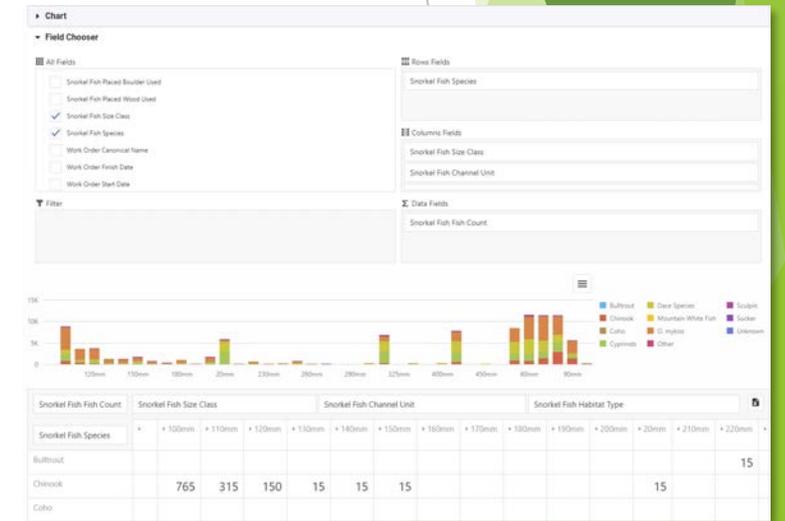
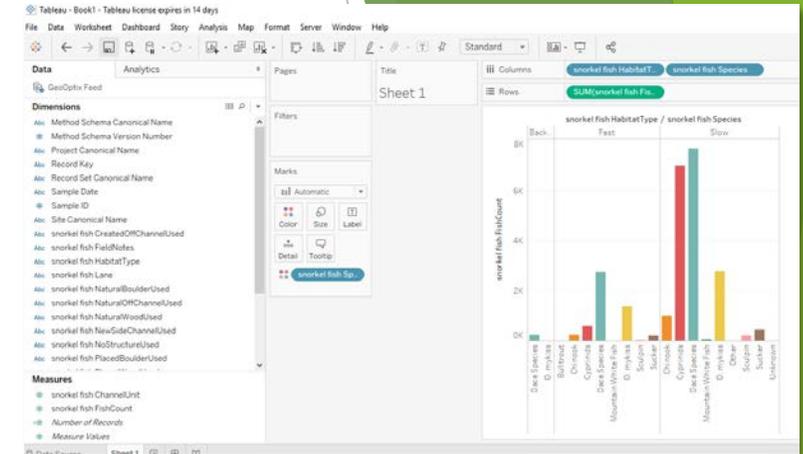
# -----
# Plot data
# -----

# select/filter data
dat <- fish %>%
  select("snorkel_fish_sizeClass", "snorkel_fish_fishCount", "snorkel_fish_Species") %>%
  group_by("snorkel_fish_Species", "snorkel_fish_sizeClass") %>%
  summarize(count = sum(snorkel_fish_fishCount))

# order data
dat$snorkel_fish_sizeClass <- factor(dat$snorkel_fish_sizeClass, levels =
  c("100mm", "120mm", "140mm", "160mm", "180mm", "200mm", "220mm", "240mm", "260mm", "280mm", "300mm", "320mm", "340mm", "360mm", "380mm", "400mm", "420mm", "440mm", "460mm"))

# plot fish size-class (include species)
ggplot(dat, aes(x = "snorkel_fish_sizeClass", y = count, fill = "snorkel_fish_Species")) +
  geom_bar(color = "black") +
  ggtitle("Fish Size-Class Count") +
  theme_minimal() +
  guides(fill=guide_legend(title = "Species")) +
  theme_bw()

# plot title = element_text(fontsize = 8.5, face = "bold", size = 10),
# axis.text = element_text(size = 12, angle = 75, justify = "left"),
# axis.title.y = element_text(size = 12),
# axis.title.x = element_text(size = 12, face = "bold"),
# scale_fill_brewer(name = "Fish Length", palette = "Set1") +
# scale_x_discrete(labels = c("100mm", "120mm", "140mm", "160mm", "180mm", "200mm", "220mm", "240mm", "260mm", "280mm", "300mm", "320mm", "340mm", "360mm", "380mm", "400mm", "420mm", "440mm", "460mm"),
  
```



In Retrospect

“The main benefit of the GeoOptix data collector app has been the streamlining of our field data collection planning all the way to reporting...”

...The increased data accuracy resulting from QA components in the field and the ability to upload and QA online seamlessly has cut down on data entry time and created an easy to use system for a complex habitat protocol.”

- Kaylyn Costi, Biomonitoring Project Leader, CTUIR

Thank You!

Keith Steele
503-318-6867 (mobile)
keith@sitkatech.com

