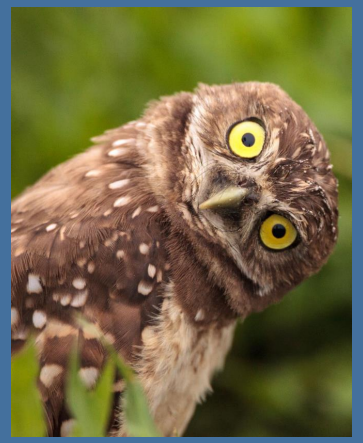
Enabling real time data collection, quality control, reporting, and visualization to enhance field data collection across the west

Justin L. Welty, Biologist, USGS
USGS Forest and Rangeland Ecosystem Science Center

Michelle I. Jeffries, Biologist, USGS
Robert S. Arkle, Supervisory Ecologist, USGS
Jacqueline B. Cupples, Wildlife Biologist, USFWS

PNAMP
Emerging Technologies Information Session
January 22nd, 2025



How Do I Interact With My Data?

Data Life Cycle

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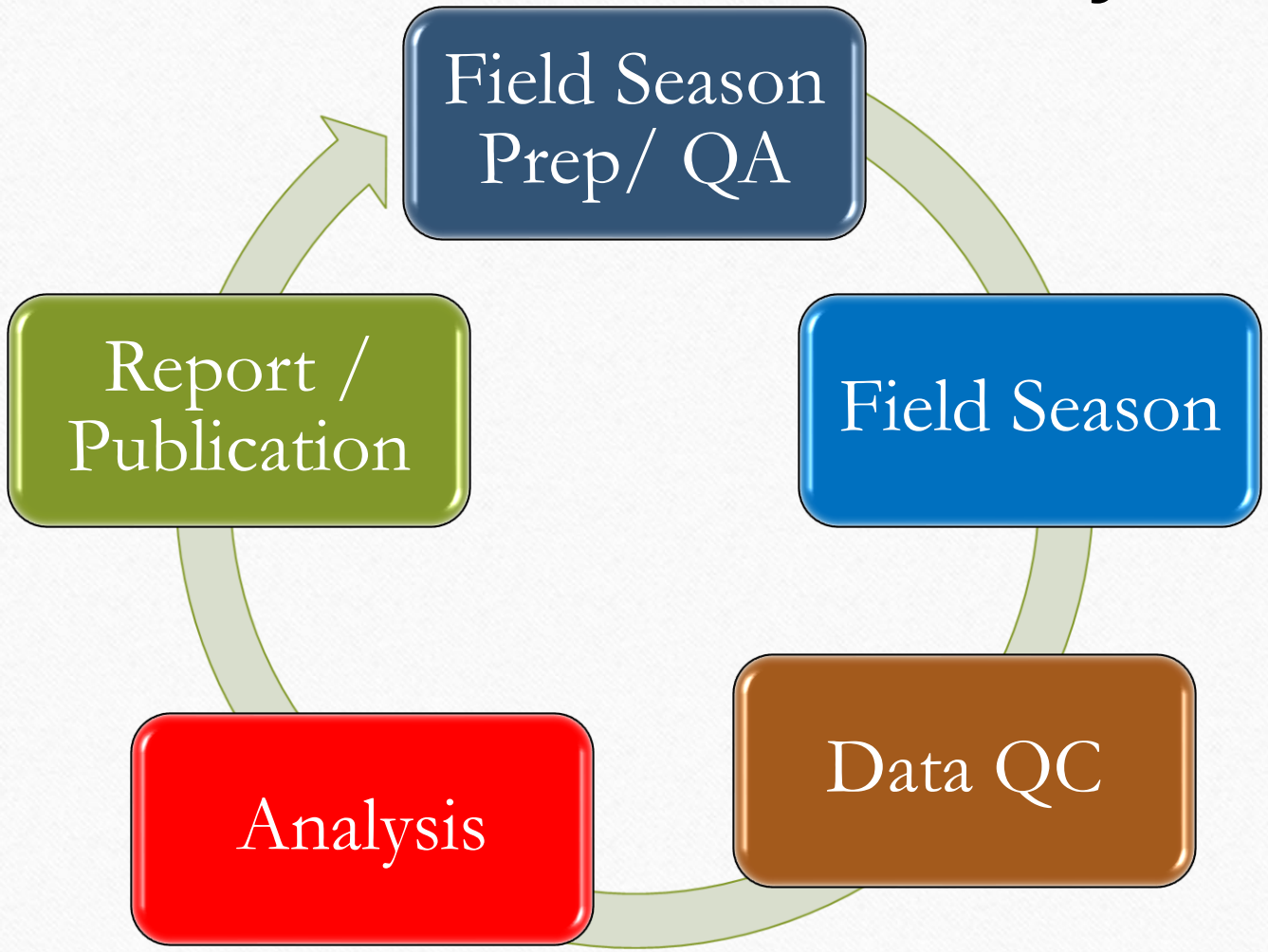
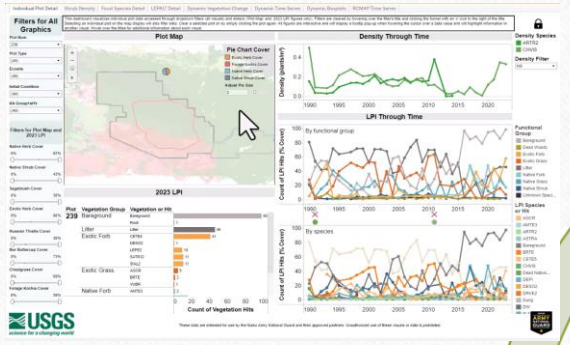
USGS

Traditional Data Life Cycle

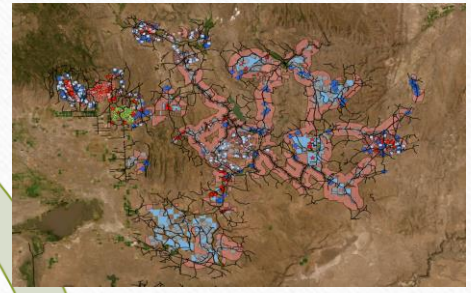


USGS

Proposed Data Lifecycle



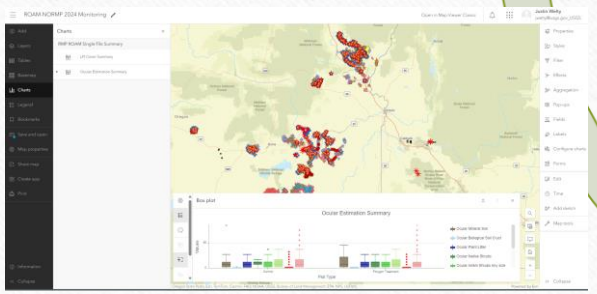
Field Season Prep



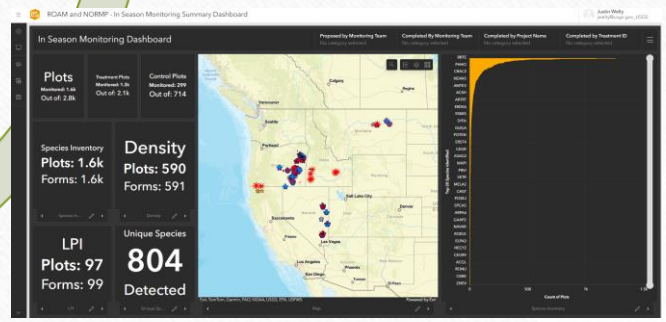
Report / Pub

Data QA/QC and Visualization

Field Season



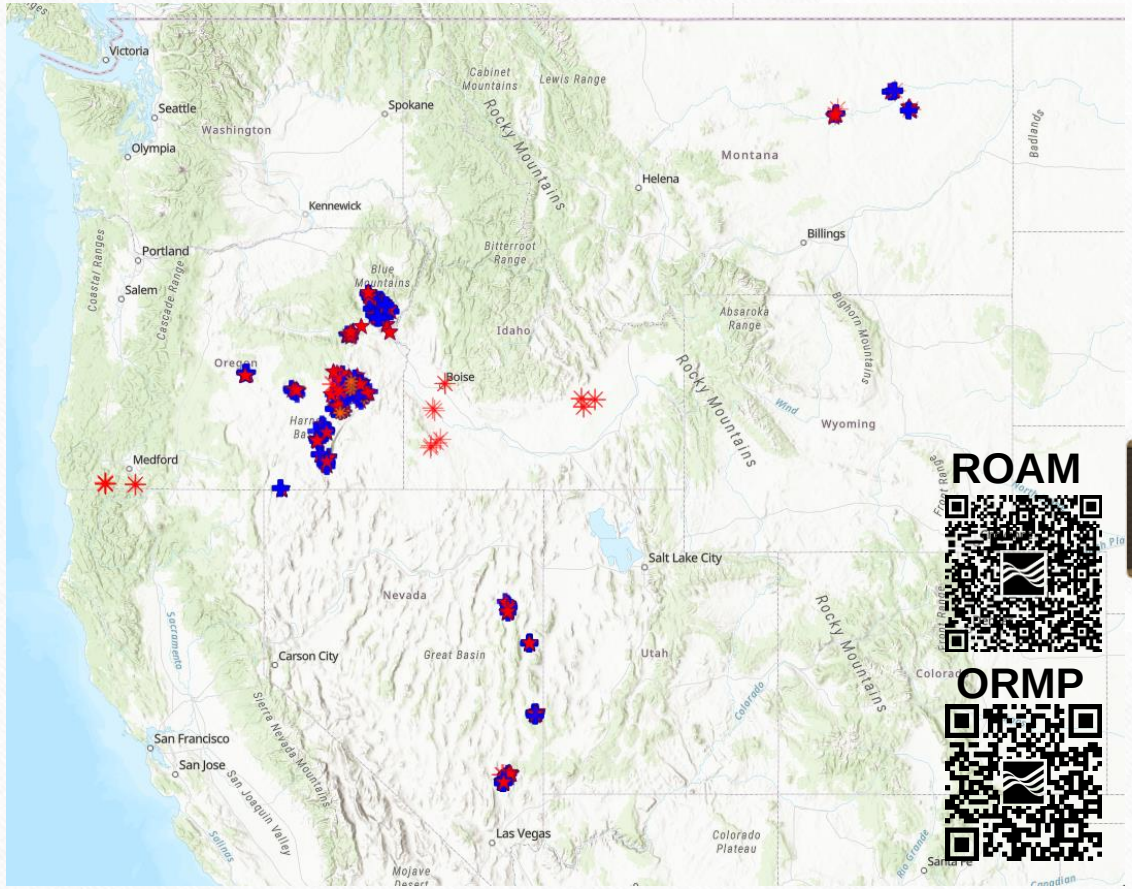
Analysis



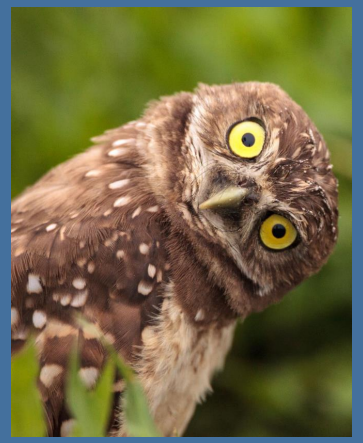
USGS

Rangeland Monitoring Program & Rapid and Other methods for Assessment and Monitoring

- 15 different protocols (ROAM)
  - Cover
  - Density
  - Observations
- RMPs group utilize their own set of these protocols
- National, state, and local group participation
  - USGS, USFWS, BLM, NDOW, OR INR, OR DSL, OR HDP, and OR LIT
- 1600 plots monitored in 2024
- Each group has its own set of defaults within a protocol
- All data submitted to a single, centralized location



Project ROAM & the Oregon Rangeland Monitoring Program



How can I protect data integrity while collecting the data?

Data Quality Assurance

Field Season Apps

USGS

Field Maps & Survey123

Field Maps

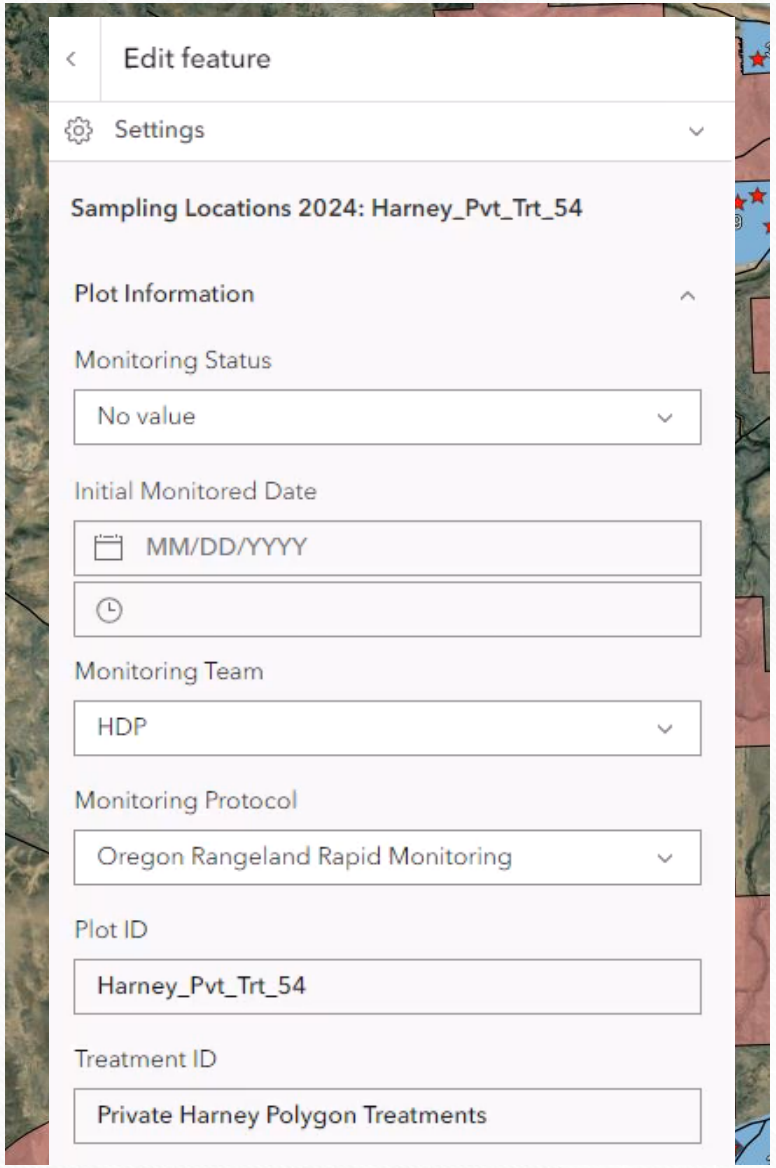
- Used for navigation and basic data entry
- Take advantage of map symbology and layer visibility

USGS

Field Maps & Survey123

Field Maps

- Used for navigation and basic data entry
- Take advantage of map symbology and layer visibility
- Require users to complete fields in Field Maps by using settings and Arcade expressions



USGS

Field Maps & Survey123

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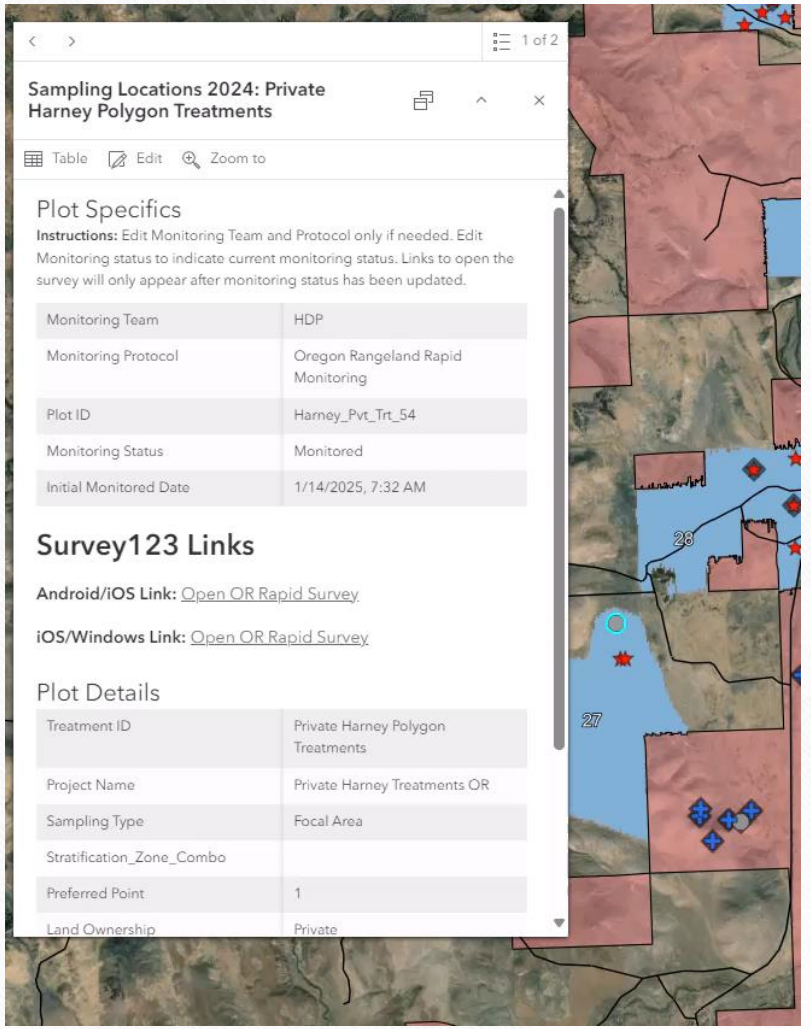
  - Links are created on the fly via Arcade so updates to the Field Map fields create updated links



Field Maps & Survey123

Field Maps

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- Use links to open individual Survey123 forms and pre-populate fields
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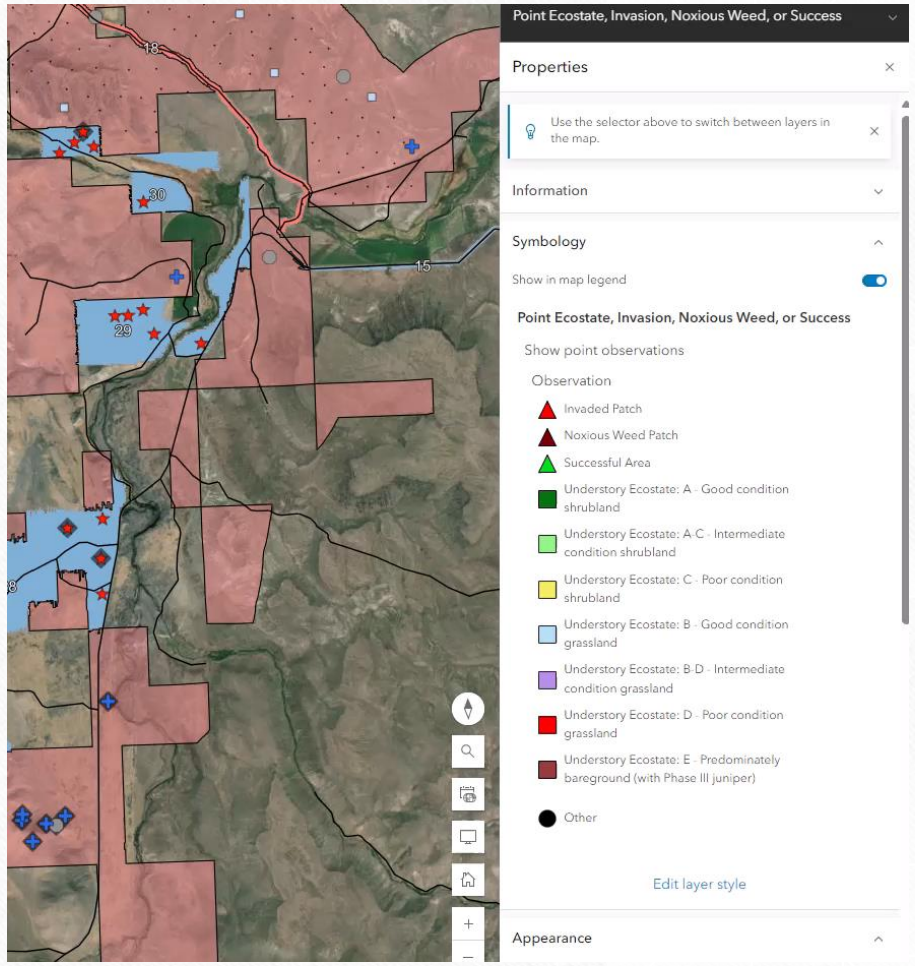
- Create quick capture point, line, and polygon features for rapid, opportunistic data collection

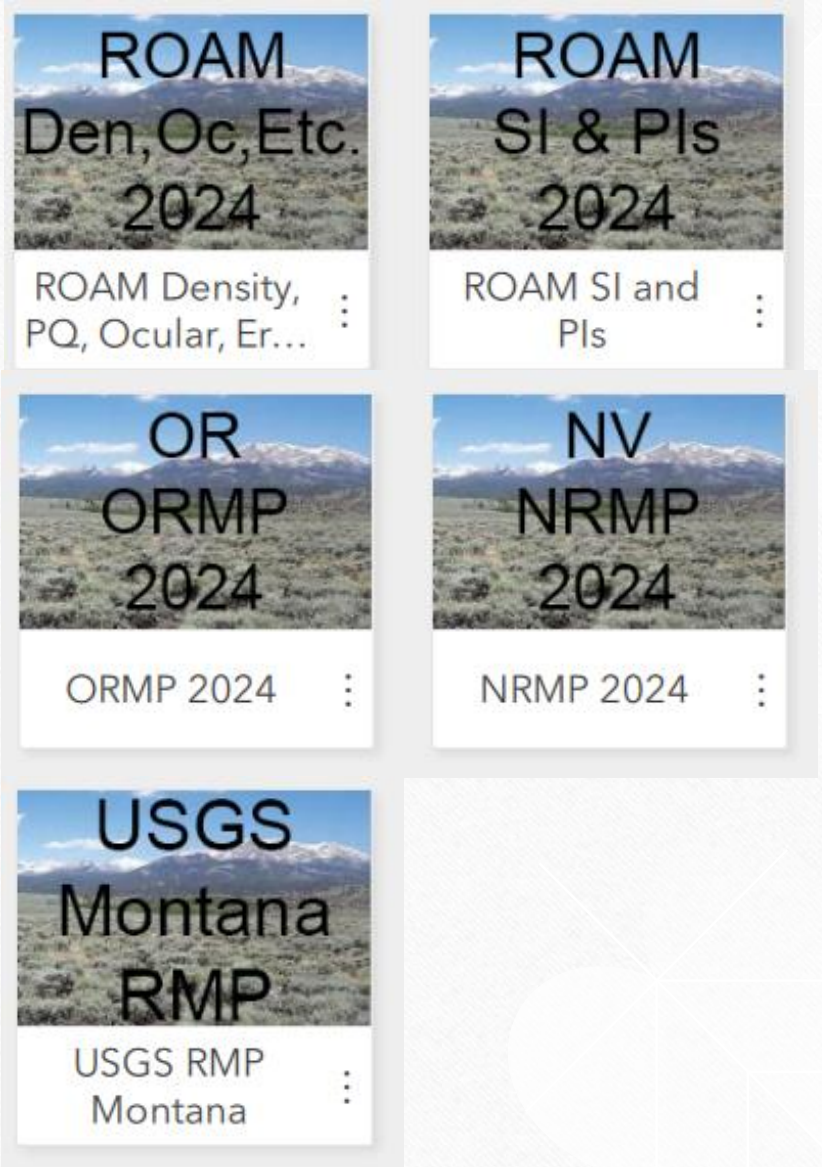


USGS

Field Maps & Survey123

Survey123

- Multiple different “surveys” collected across multiple forms all being submitted to the same source
- Each group gets its own customized form, but all are part of something larger



Field Maps & Survey123

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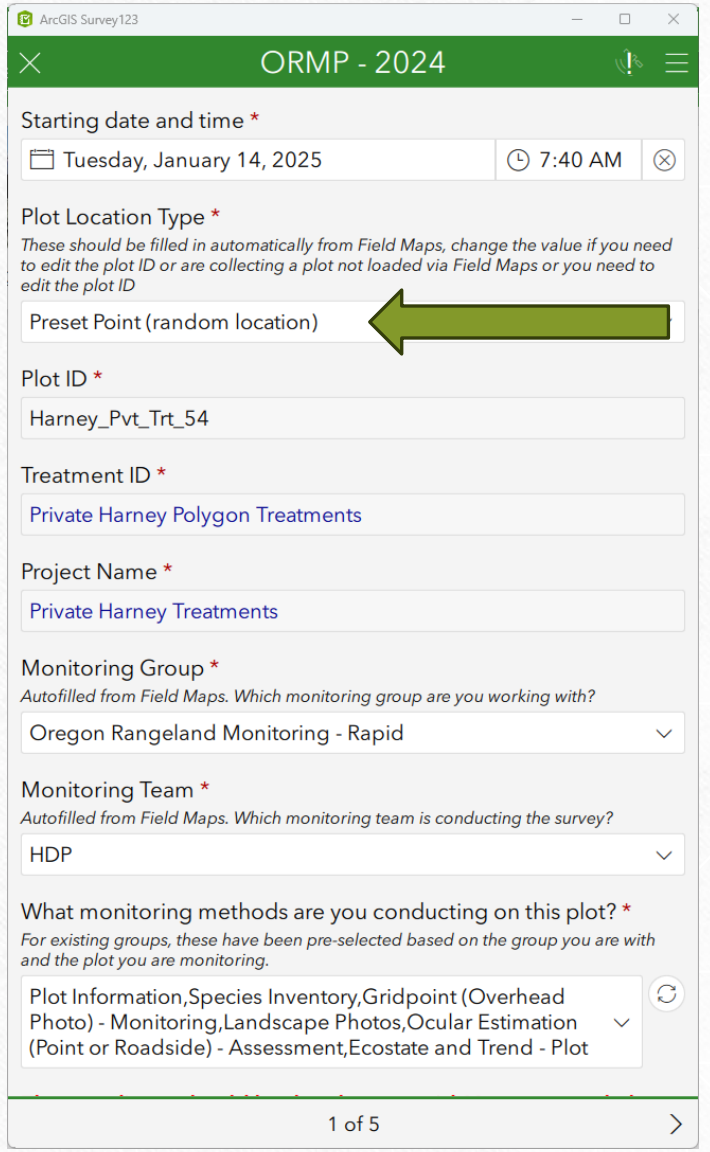
- Auto-populate as many fields as possible
- Ability to accept data from existing, preset, random points or new, non-random points



USGS

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- Walk field users through data collection
- Defaults are specific to each group’s needs

Field Maps & Survey123

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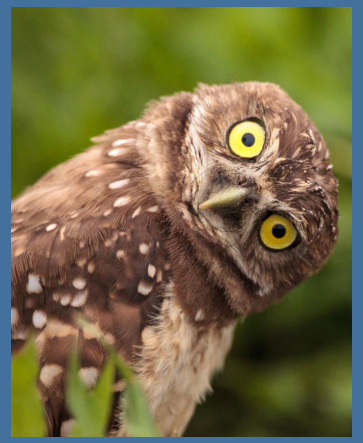
- Ability to accept data from existing, preset, random points or new, non-random points
- Walk field users through data collection
- Defaults are specific to each group’s needs
- Each protocol has a summary section for instant user review

Expand to See Ocular Summary

Ocular Calculation

Mineral Soil - 7.5%
Gravel - 0%
Rock (Larger than Gravel) - 2.5%
Biological Soil Crust - 7.5%
Plant Litter - 17.5%
All Treatment Seeded Species - 0%
Invasive Annual Grasses - 7.5%
BRTE - Bromus tectorum L. (cheatgrass) - 2.5%
TACA8 - Taeniatherum caput-medusae (L.) Nevski (medusahead) - 0%
VEDU - Ventenata dubia (Leers) Coss. (North Africa grass) - 2.5%
Non-Native Perennial Grasses - 12.5%
POBU - Poa bulbosa L. (bulbous bluegrass) - 7.5%
Native Perennial Grasses - 27.5%
POSE - Poa secunda J. Presl (Sandberg bluegrass) - 2.5%
Native Perennial - Deep Rooted - Large Stature Grasses - 12.5%
Invasive Annual Forbs - 2.5%
Invasive Perennial Forbs - 0%
CADR - Cardaria draba (L.) Desv. (whitetop) - 0%
CESO3 - Centaurea solstitialis L. (yellow star-thistle) - 0%
CHJU - Chondrilla juncea L. (rush skeletonweed) - 0%
ONAC - Onopordum acanthium L. (Scotch cottonthistle) - 0%
Native Annual Forbs - 12.5%
Native Perennial Forbs - 2.5%
Native Shrubs - 12.5%
Artem Shrubs - Any size - 7.5%
BAPR5 - Bassia prostrata (L.) A.J. Scott (forage kochia) - 0%
Pinyon or Juniper Trees - 2.5%

USGS

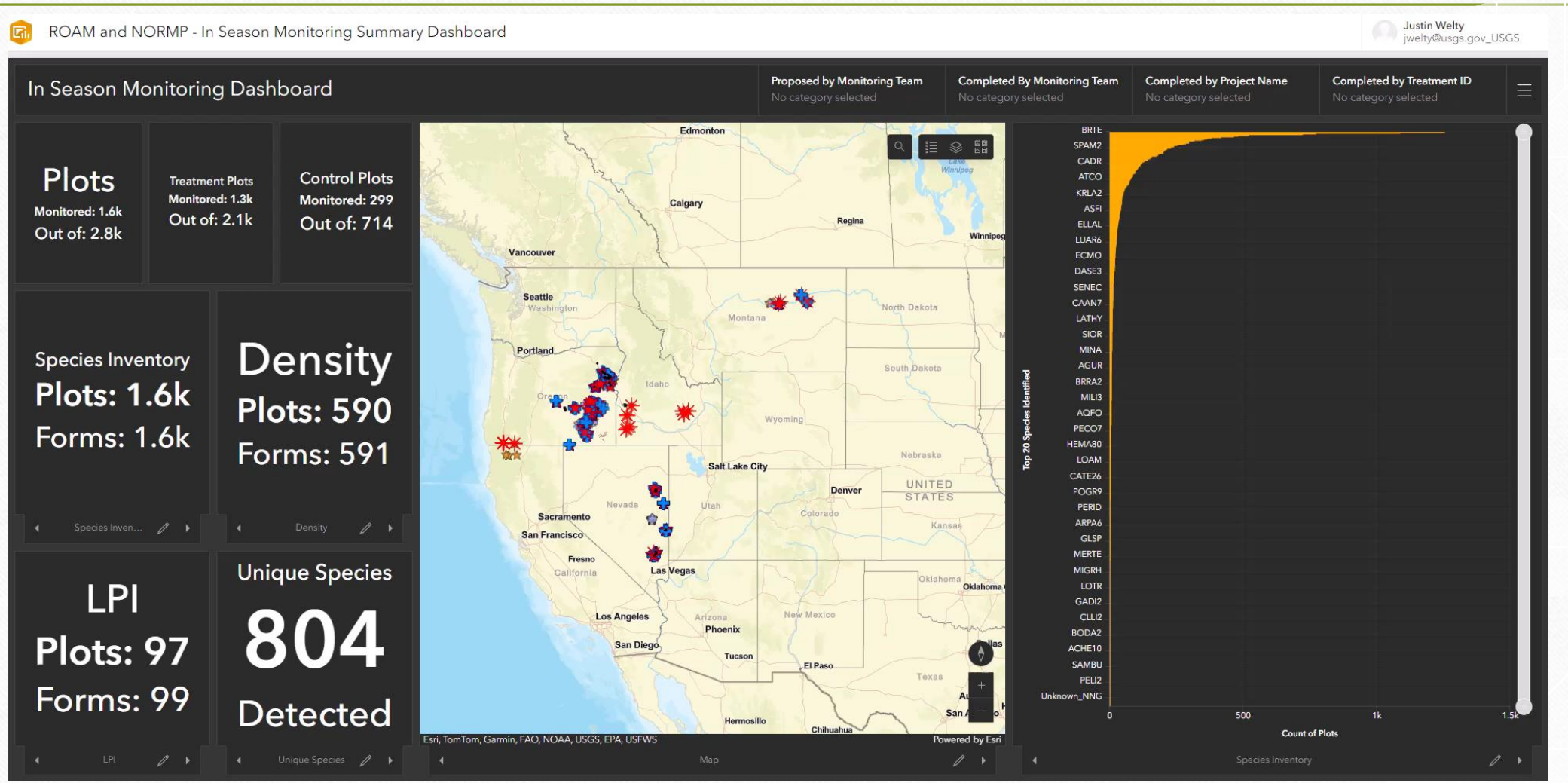


How can I ensure errors are caught quickly and easily identified?

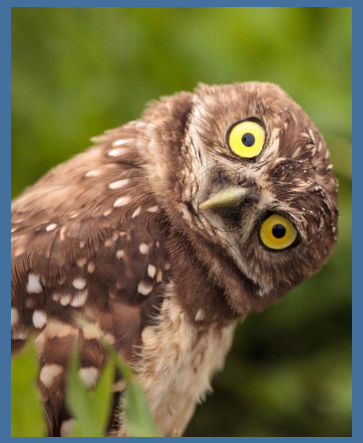
Data Quality Control

In-Season Dashboard

USGS



In-Season Dashboard

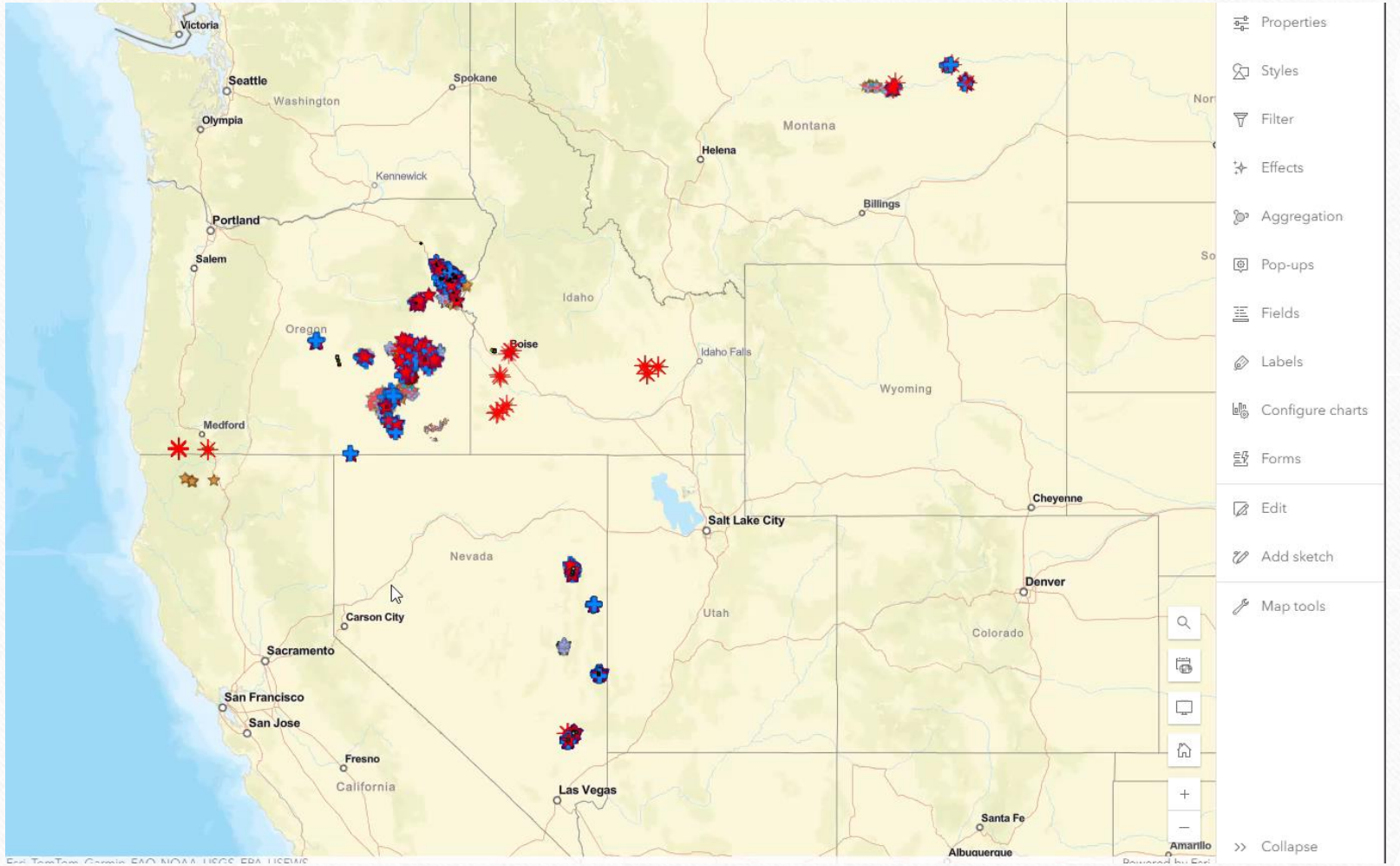


How do allow users easily edit data and how do we track these edits?

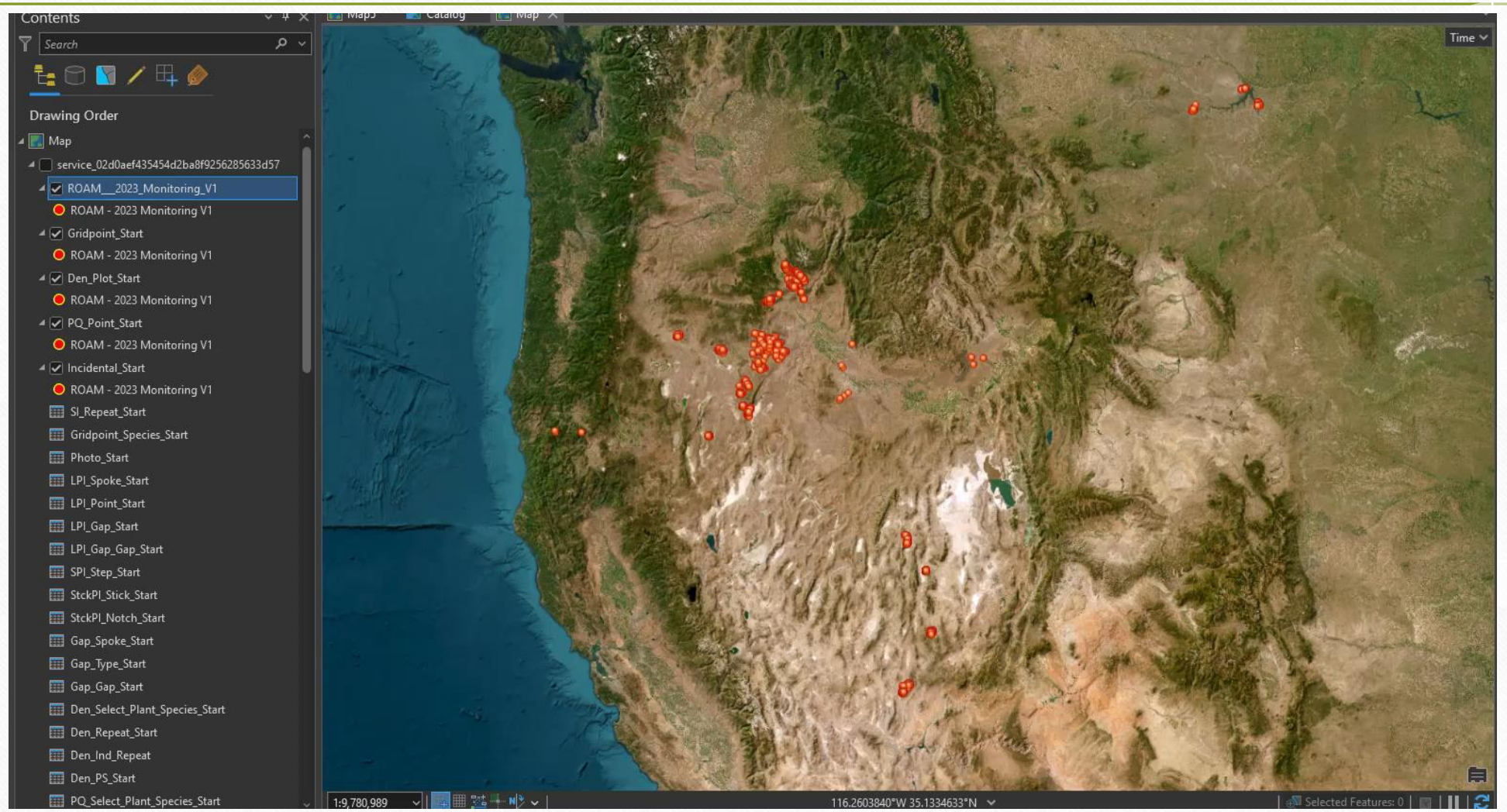
Data Quality Control

Editing Data

USGS



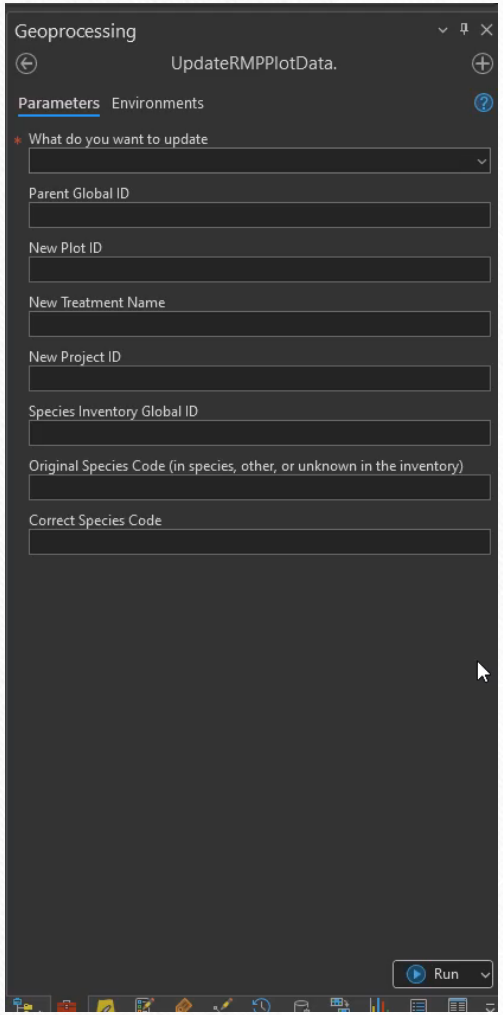
Editable AGOL Web Map



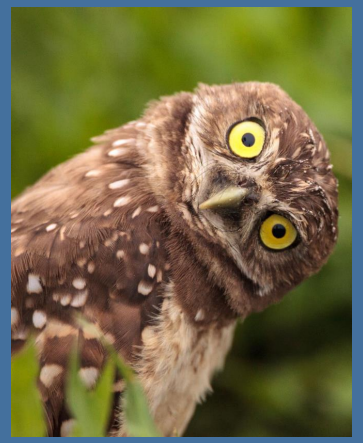
Batch Edits in ArcGIS Pro

Custom Scripts:

- Cons
  - Upfront time to design and test
- Pros
  - Fully customizable QC tools
  - Tailored exactly to your needs
  - Update multiple tables/records at once
  - Long-term time/cost savings



Scripting Edits in Python



How can we quickly get preliminary data to collaborators?

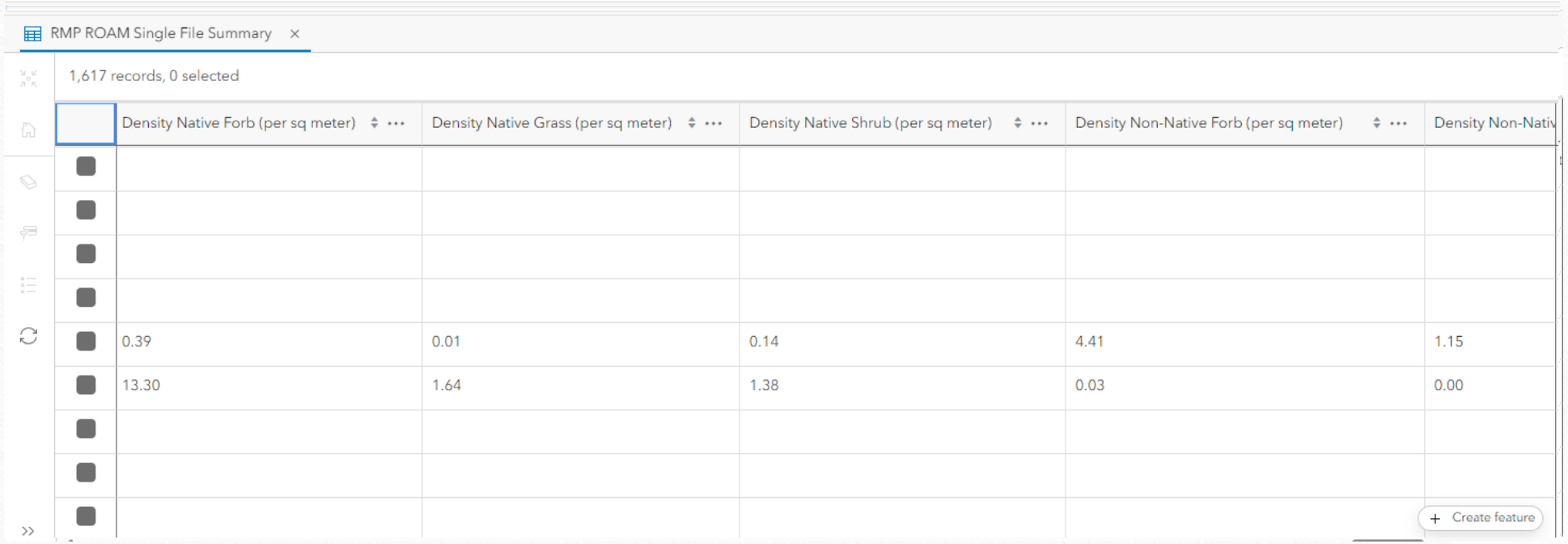
In-Season Rapid Reporting

Quick Summary & Map

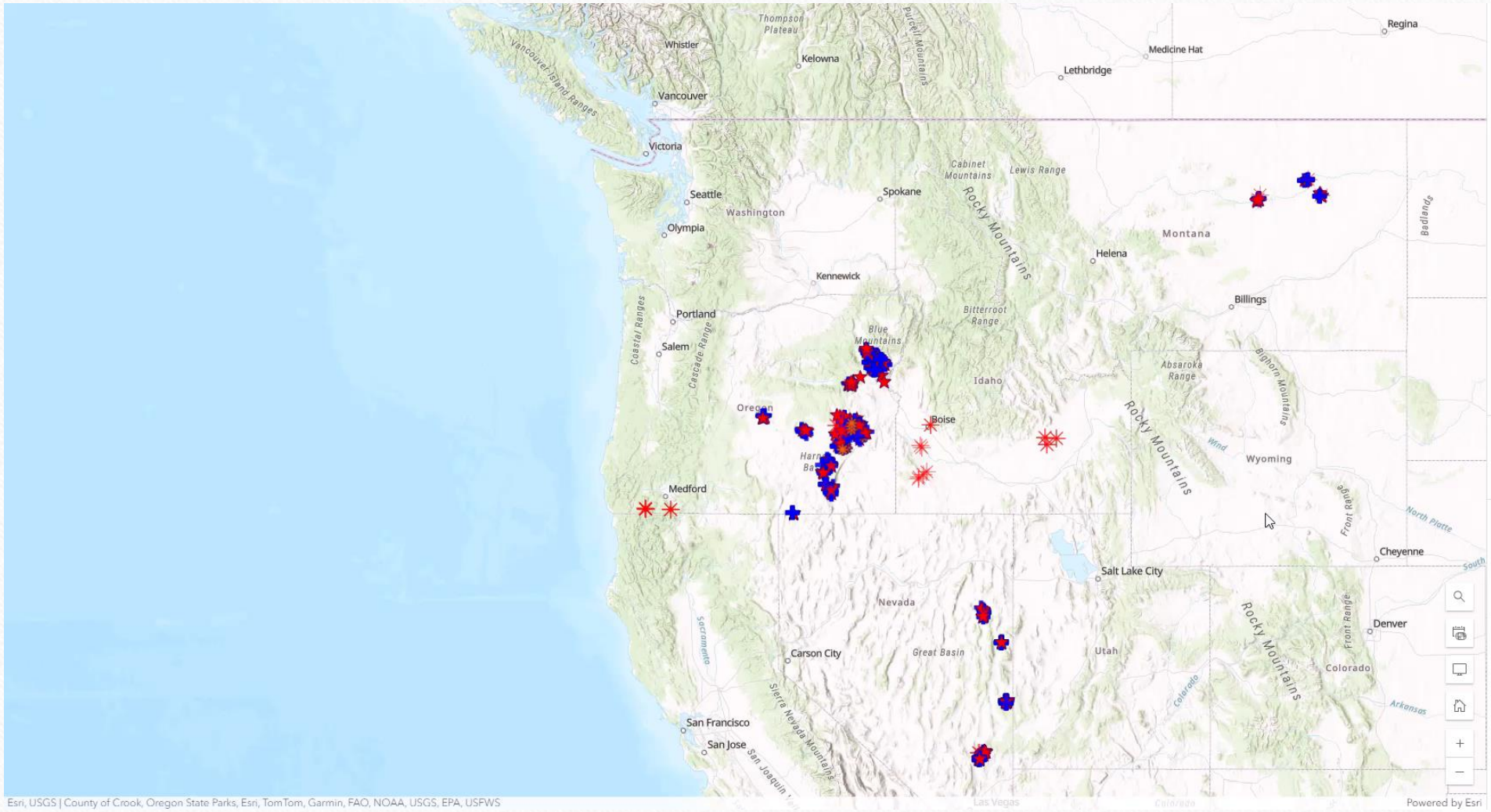
USGS

Single File Summary

- One row per plot
- Plot information
- Species Inventory
- Ocular Estimates
- Ecostate
- Erosion
- Functional Group LPI
- Functional Group Density



Single File Summary



Custom Figures

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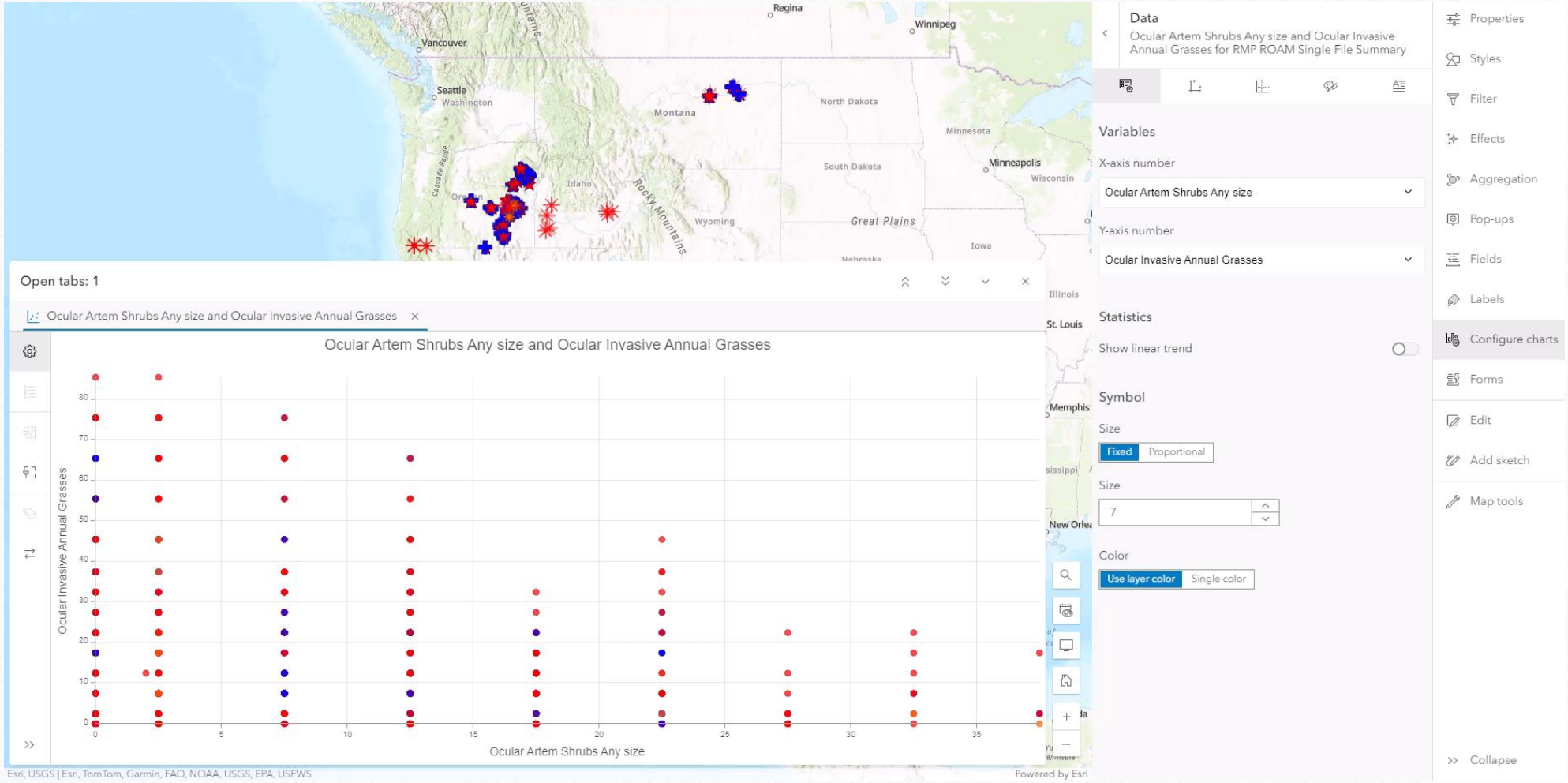

Custom Figures

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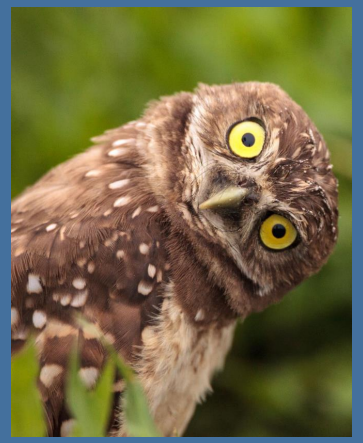


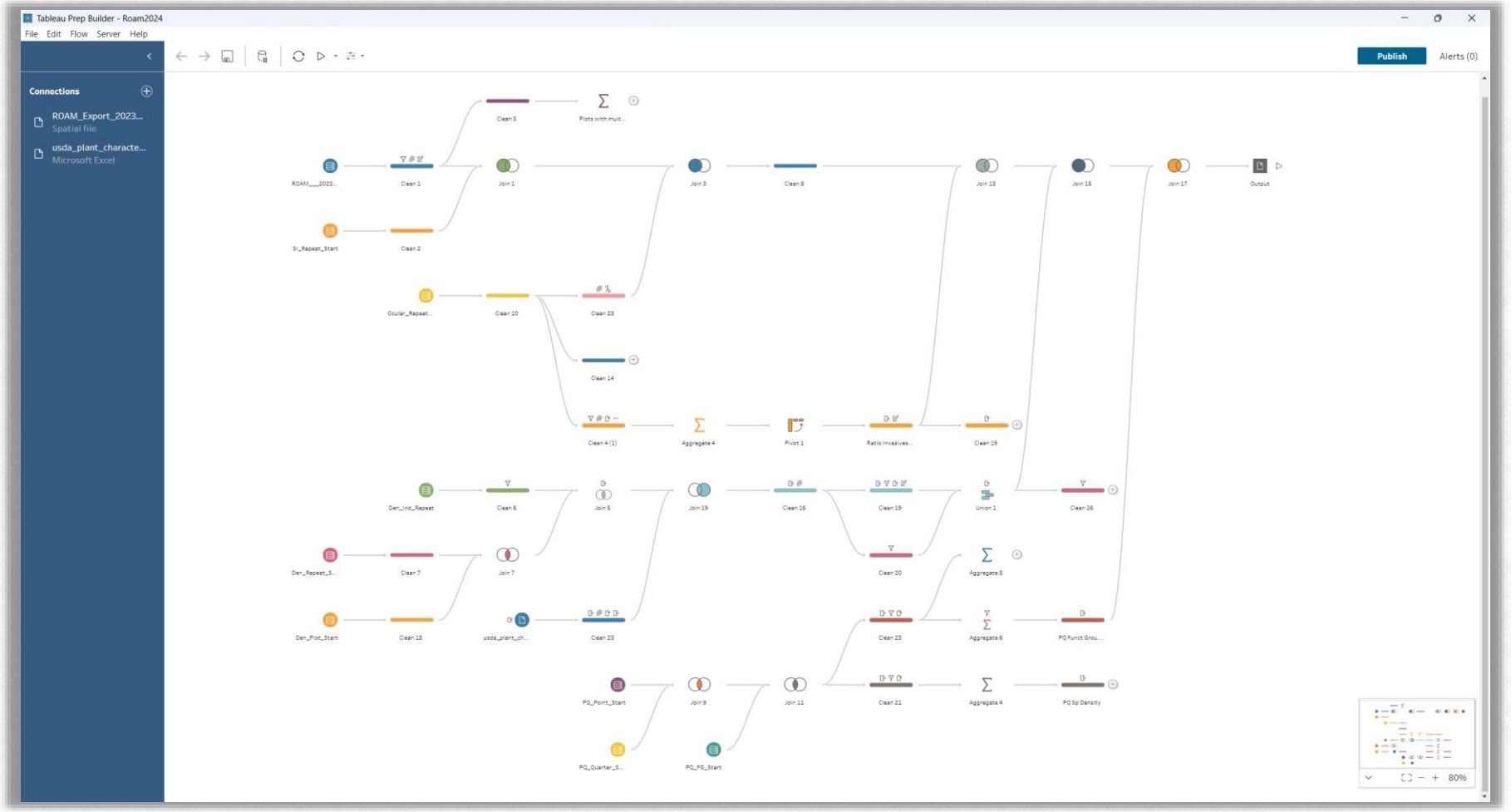
How can we conduct a thorough QC of all data?

Annual Quality Control

Tableau Prep

USGS

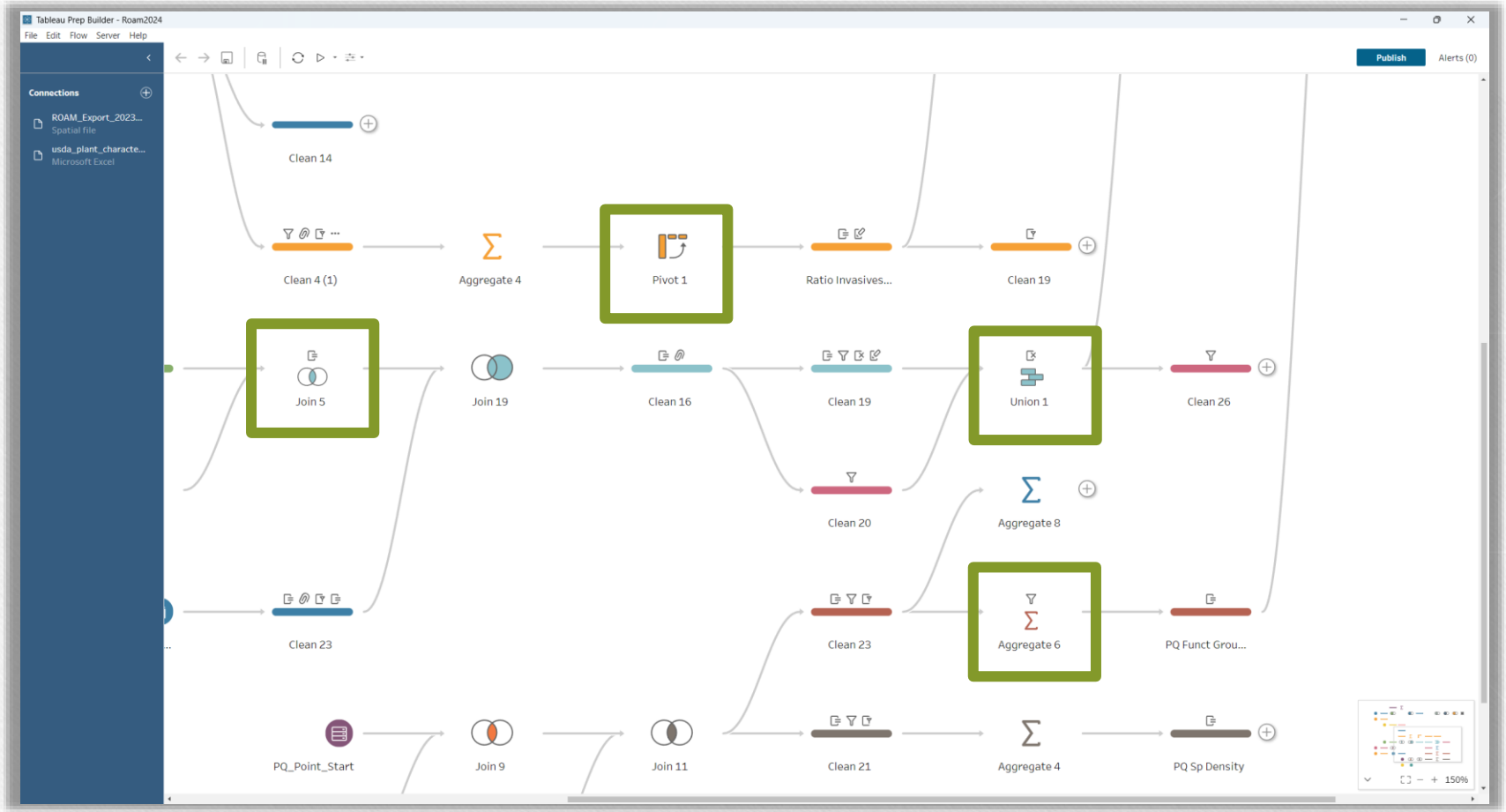
Easy data wrangling and visualization



USGS

Tableau Prep

Easy data wrangling and visualization



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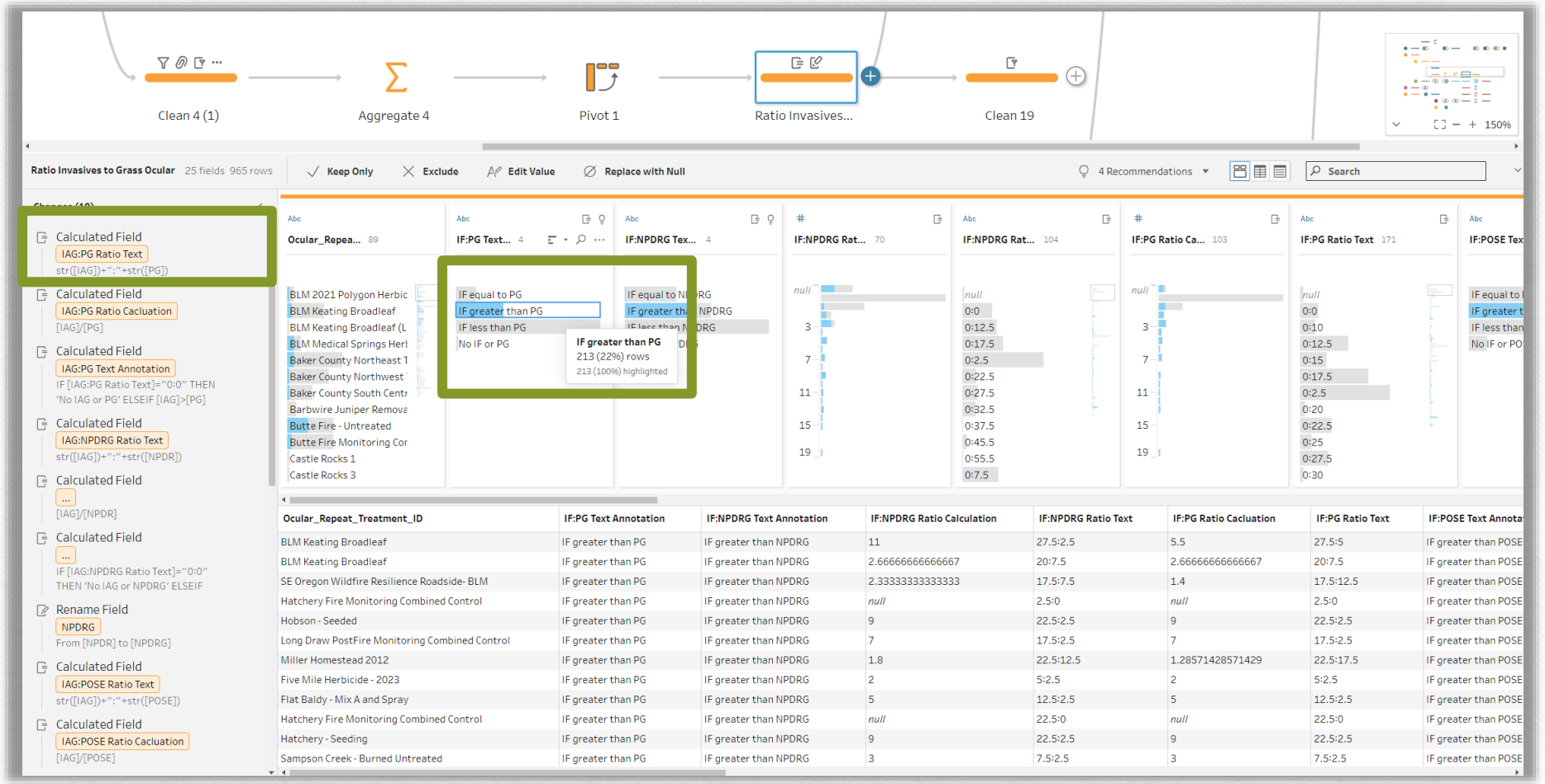
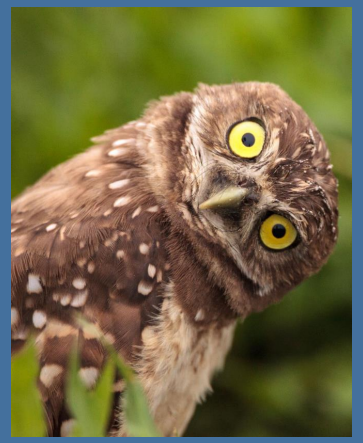


USGS

Tableau Prep



How should the public interact with the data?

Final Reporting

Tableau Dashboard
&
Data Release

USGS

Treatment ID

(Multiple values)

Highlight Treatment ID

Highlight Treatment...

Ocular Search Sp or FG PT

- (All)
- Null
- AGCR - Agropyr...
- AGFR - Agropyr...
- All Treatment Se...
- Artem Shrubs - A...
- BAPR5 - Bassia ...
- Biological Soil Cr...
- BRAR5 - Bromus...

Density Functional Group C..

- (All)
- Null
- EAF
- EPF
- EPG
- EPS
- NAF
- NAS
- NPF
- NPG
- NPS
- NPT

Density Species

- (All)
- Null
- Achillea millefolium
- Achnatherum hy...
- Achnatherum thu...
- Agoseris
- Agoseris glauca
- Agropyron cristat...
- Agropyron fragile
- Allium
- Allium acuminatum
- Allium anceps
- Alyssum deserto...
- Amelanchier
- Amsinckia
- Antennaria
- Antennaria dimor...
- Arabis

Ocular Cover Estimates

Ocular Sear..	Plot Type	Treatment ..	Count of P..
All Treatment Seeded Species	Control	Sampson Creek Fi..	20
	Polygon Treatment	Sampson Creek - ..	20
Artem Shrubs - Any size	Control	Sampson Creek Fi..	20
	Polygon Treatment	Sampson Creek - ..	20
Invasive Annual Forbs	Control	Sampson Creek Fi..	20
	Polygon Treatment	Sampson	20

0 5 10 15 20 25 30 35 40 45

Ocular Cover Estimate

IAG:PG Ratio

Control
Sampson Creek Fire Monitoring Combine..

Polygon Treatment
Sampson Creek - Burned Untreated

Plot Count

0 5 10 15

IAG equal to PG | IAG less than PG | IAG greater than PG | IAG less than PG

Density Search

Native Status Code	Plot Type	Treatment ID
E	Control	Sampson Creek Fire Monitoring Combined Control
N	Control	Sampson Creek Fire Monitoring Combined Control
	Polygon Treatment	Sampson Creek - Burned Untreated

7

73

32

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

Total Density (plants/meter2)

Ecostate Understory Designation

Control
Sampson Creek Fire Monitoring Combined Co..

Polygon Treatment
Sampson Creek - Burned Untreated

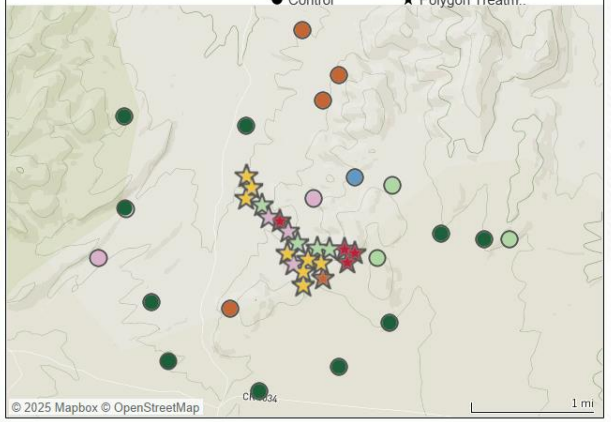
EST UnderstoryEcostate

A | A-C | B | B-D | C | D | E | Null

Ecostate Understory Map

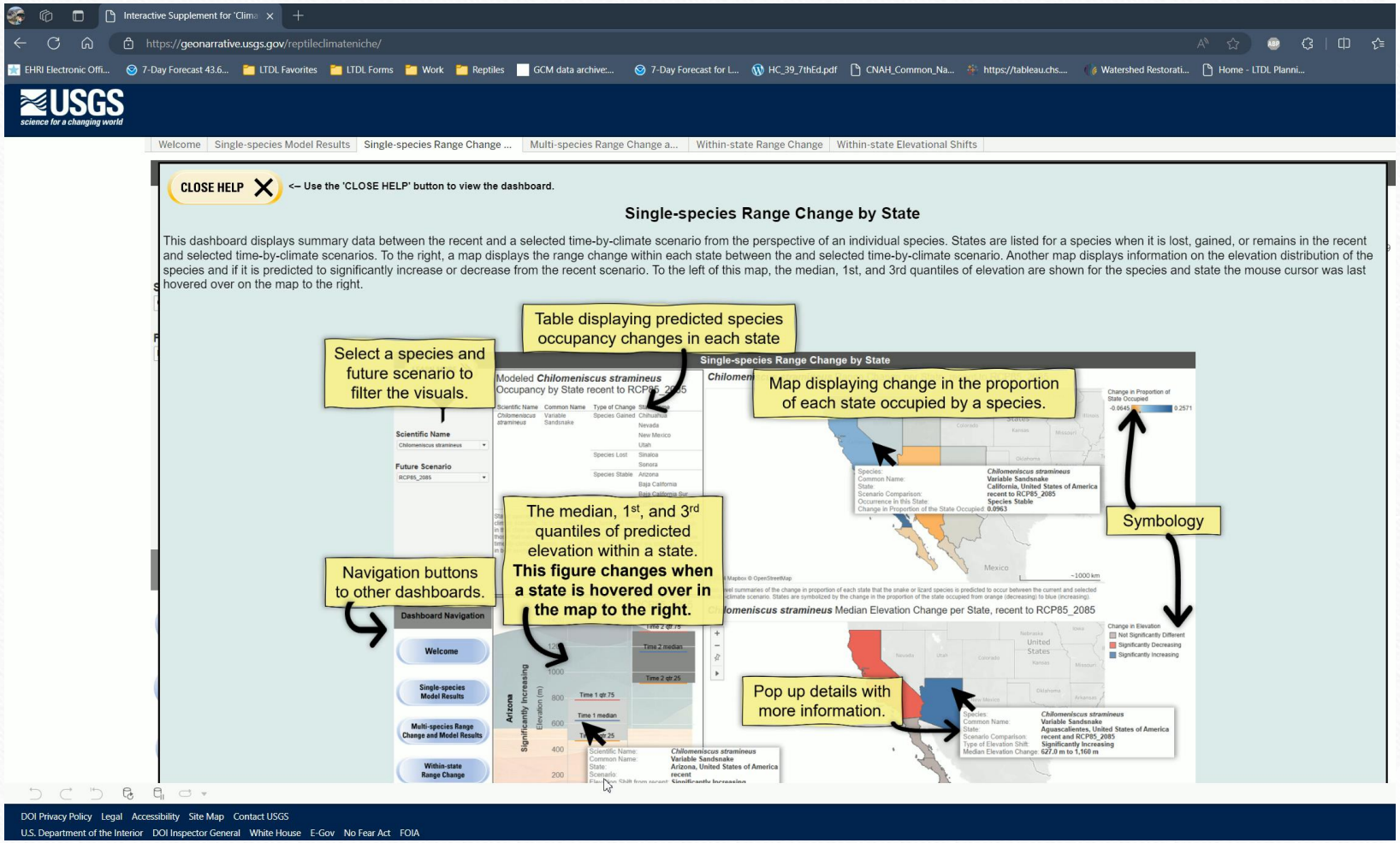
Plot Type

Control | Polygon Treatm..



USGS

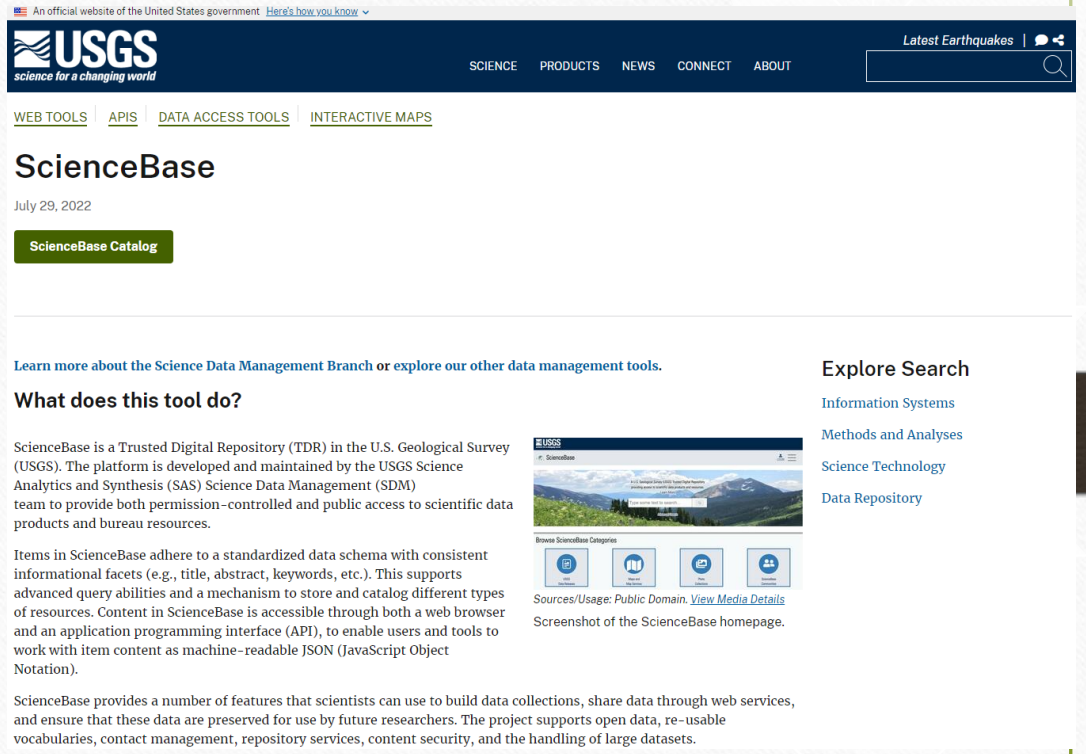
Elegant interactive visualizations



USGS

USGS Data Release Includes:

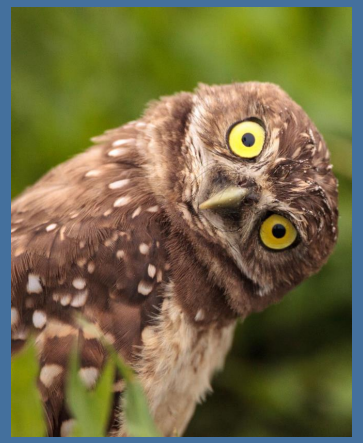
- Independent peer review
- Full metadata
- Ability to control what is released
  - Limit sensitive/private lands data
- Public access
  - Can download and work with the data
- Permanent Record
  - Accessible into the future



https://www.usgs.gov/tools/sciencebase

USGS

Official USGS Data Release



How often and when should I update my forms?

Form v Adaptive Management

USGS

Feedback & Updates

- Folks doing the actual work know more than the designers
- Annual feedback sessions
  - What worked
  - What didn’t work
  - Ideas for improvement
- Annual training
  - Review and calibrate every year
  - Introduce new features
- Listening and adapting
  - Don’t hide from criticism, embrace it
  - Give folks ownership in the product

ORMP Training 2024

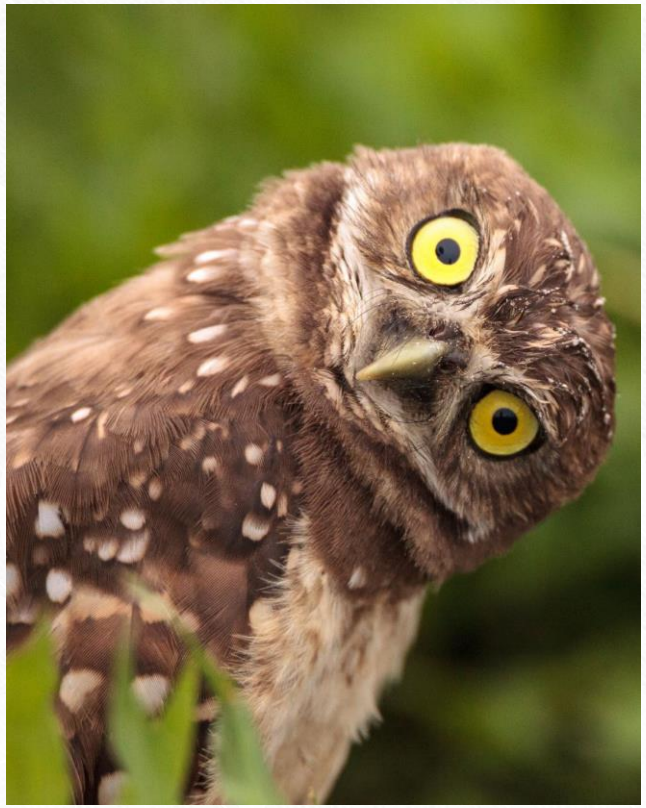
Photo by J. Welty, USGS

Lessons Learned

- Newer technology should change how we interact with data
- Technology is often drag and drop
  - Minimal programming skills and low learning curve
- Software, form creators, field crews, and data analyzers are not perfect
  - Always anticipate everyone will make errors
- Working together we can centralize data from the beginning
- One size DOES NOT fit all
- Waiting until the end is no longer your best option
- Feed back from users has been incredible

USGS

Questions?



Justin Welty
jwelty@usgs.gov

Robert Arkle
rarkle@usgs.gov

Jackie Cupples
jacqueline_cupples@fws.gov

Michelle Jeffries
mjeffries@usgs.gov

ROAM

ORMP

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