Interpreting your data

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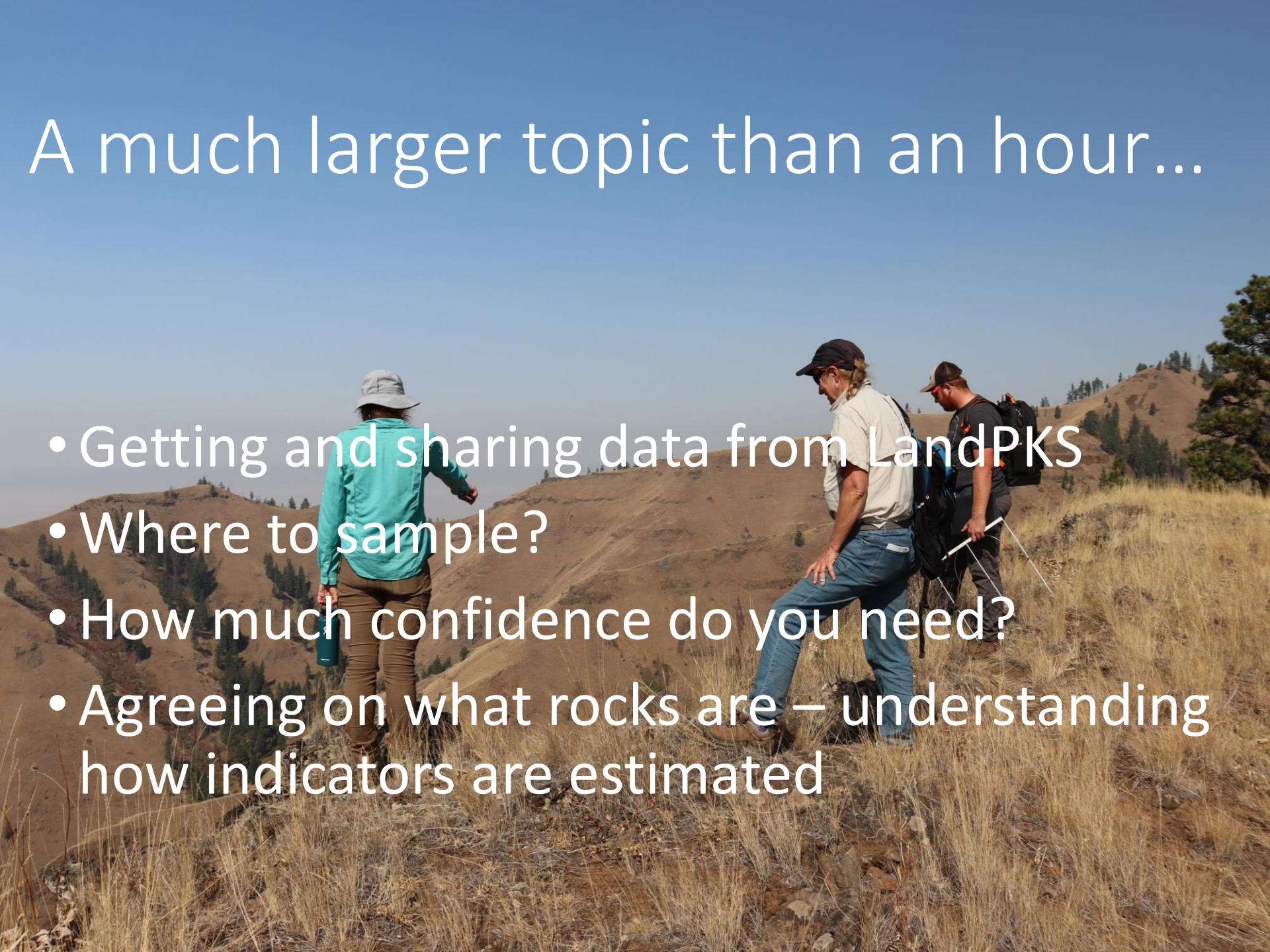
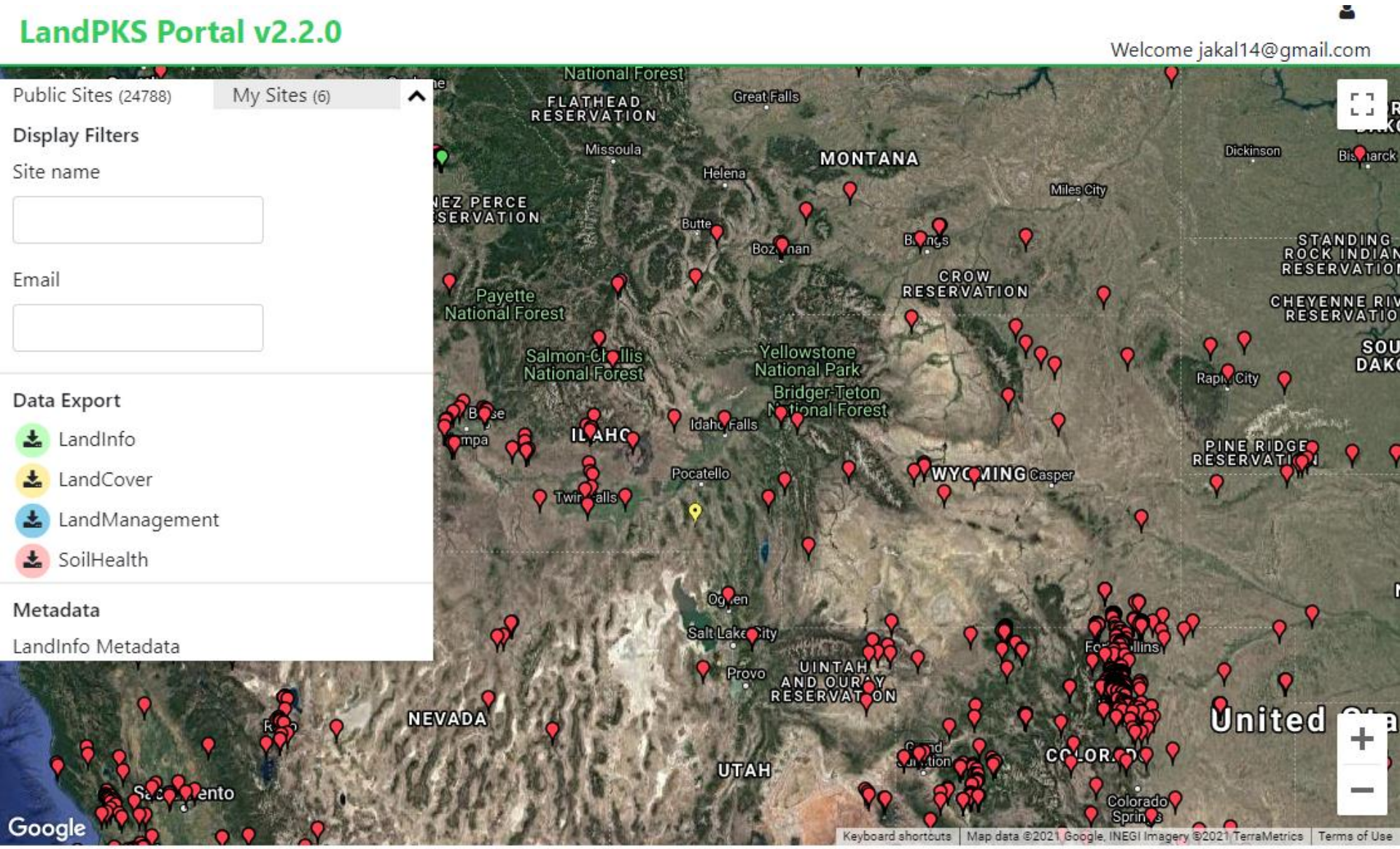
A much larger topic than an hour…



- Getting and sharing data from LandPKS
- Where to sample?
- How much confidence do you need?
- Agreeing on what rocks are – understanding how indicators are estimated

LandPKS Data Portal



https://landpotential.org/data-portal/

LandPKS Data Portal

- Raw data access/download
- Access to:
  - Data you have collected
  - Data marked as “public”
- Download raw data as CSV
- No climate/land potential predictions

- Recommendation:
  - For few sites, get results/data from the app
  - For large efforts or sharing data with agencies, download CSV from Data Portal

- https://www.landscapetoolbox.org
- https://learn.landscapetoolbox.org

Sampling to Monitor Natural Resources

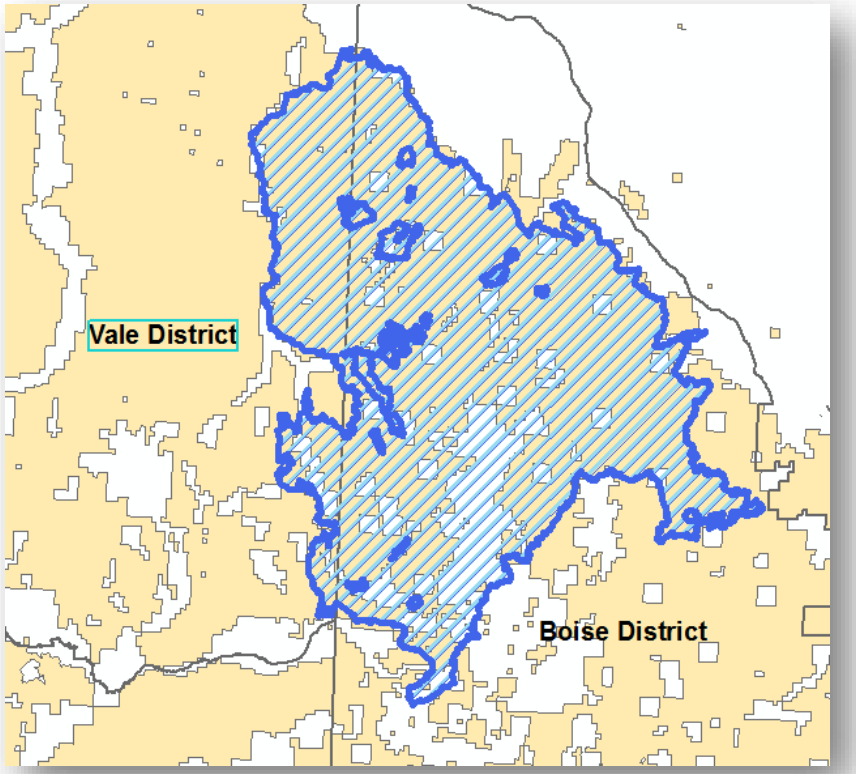
- Most of the time we can't measure all of the resource we're interested in.
- Sampling – Using measurements from a selected subset to estimate attributes of the entire resource
  - E.g., political polls
  - Lots of different ways to pick a sample
  - Goal of sampling is to get an unbiased estimate of the resource

Concept: Population

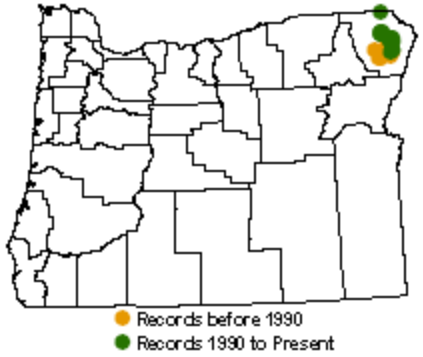
- Defines the study area or the resource you're interested in monitoring
  - E.g., All BLM lands in a Field Office, All perennial streams within an allotment, All fire treatments within a fire boundary
- Maximum area you want to draw conclusions about
- Figuring out the area/population you want to monitor isn't always a trivial task
  - If you need to make conclusions about an area, it should be in your study area!

Population Examples

Soda Fire, Idaho/Oregon



Spaulding's Silene Populations

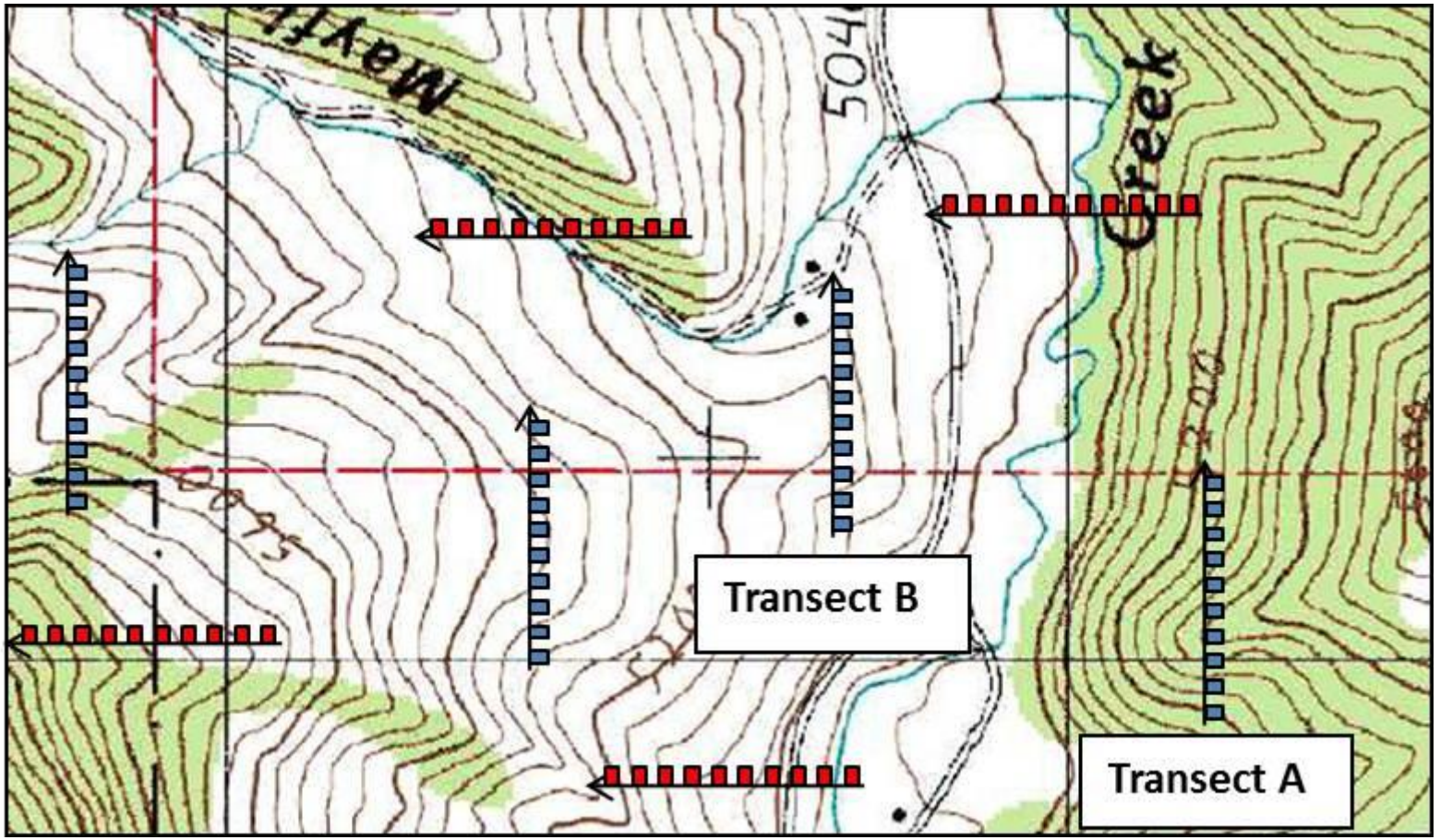


Sampling Unit

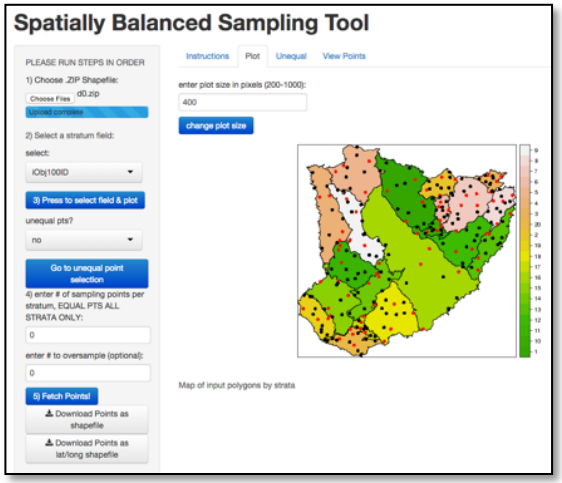
- Sampling unit - a part/unit of the population that can be selected for sampling
  - What you picked through your sampling design
- Observation unit – an object on which a measurement is taken
  - What you are actually measuring
  - Could be a subsample of the sampling unit
- What the sample unit is depends on what the question is you're trying to answer!

What's the sample unit?

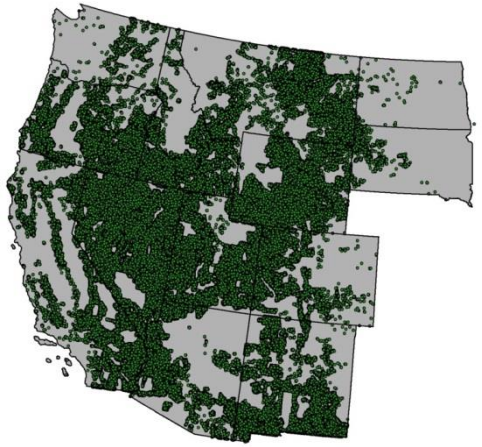
Monitoring question: How has the density of leafy spurge changed in response to herbicide treatments?



Sample site selection

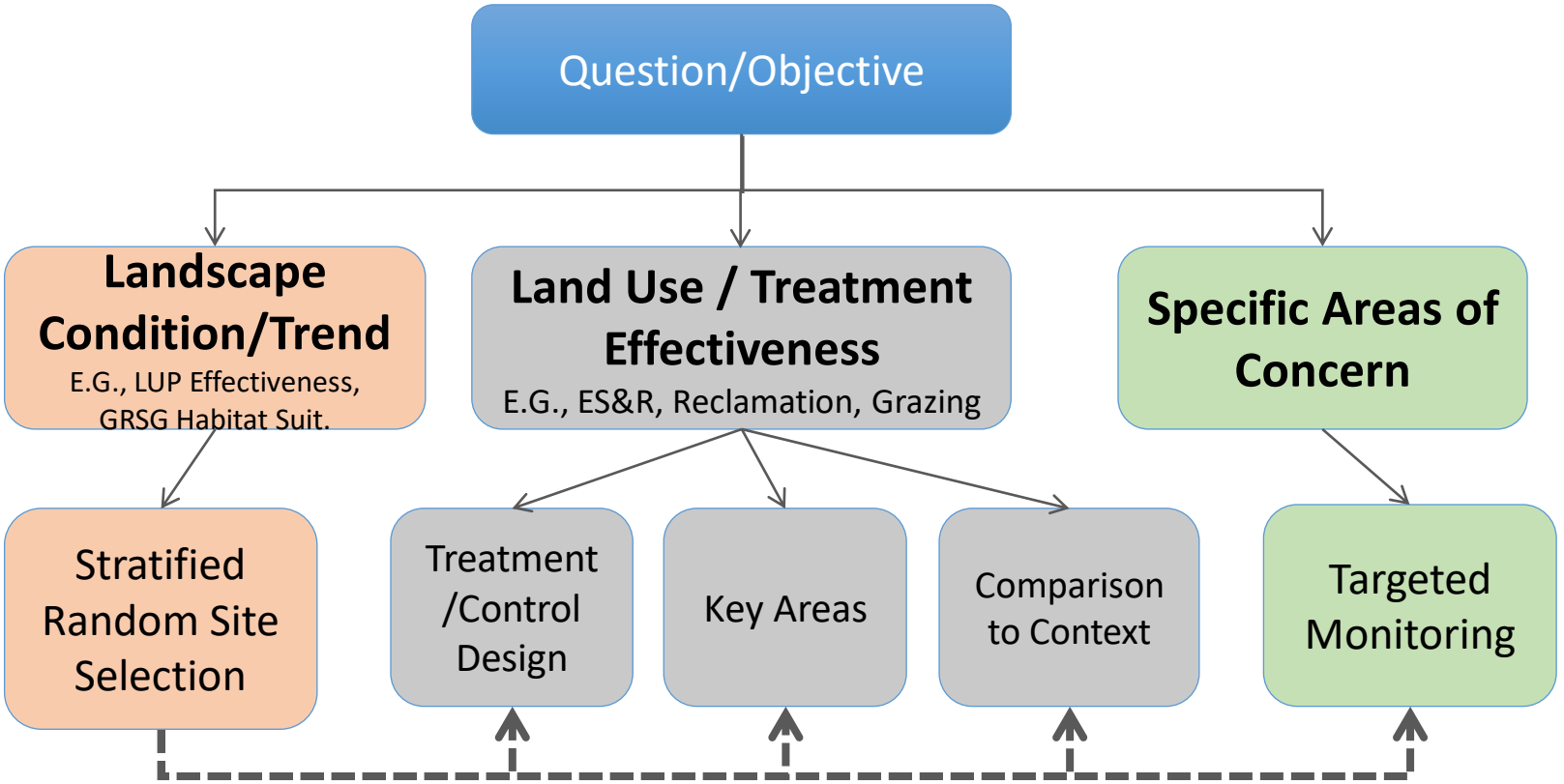


- Where the “rubber meets the road”
  - Selecting sampling locations within the study area
- Lots of different techniques for doing this
- **Sample size selection approach dictates how you will analyze your data!!**
  - Simple site selection = simple analyses
  - Complex site selection = complex analyses!



Terrestrial Master Sample, 2.2 million points

Choosing a sampling approach

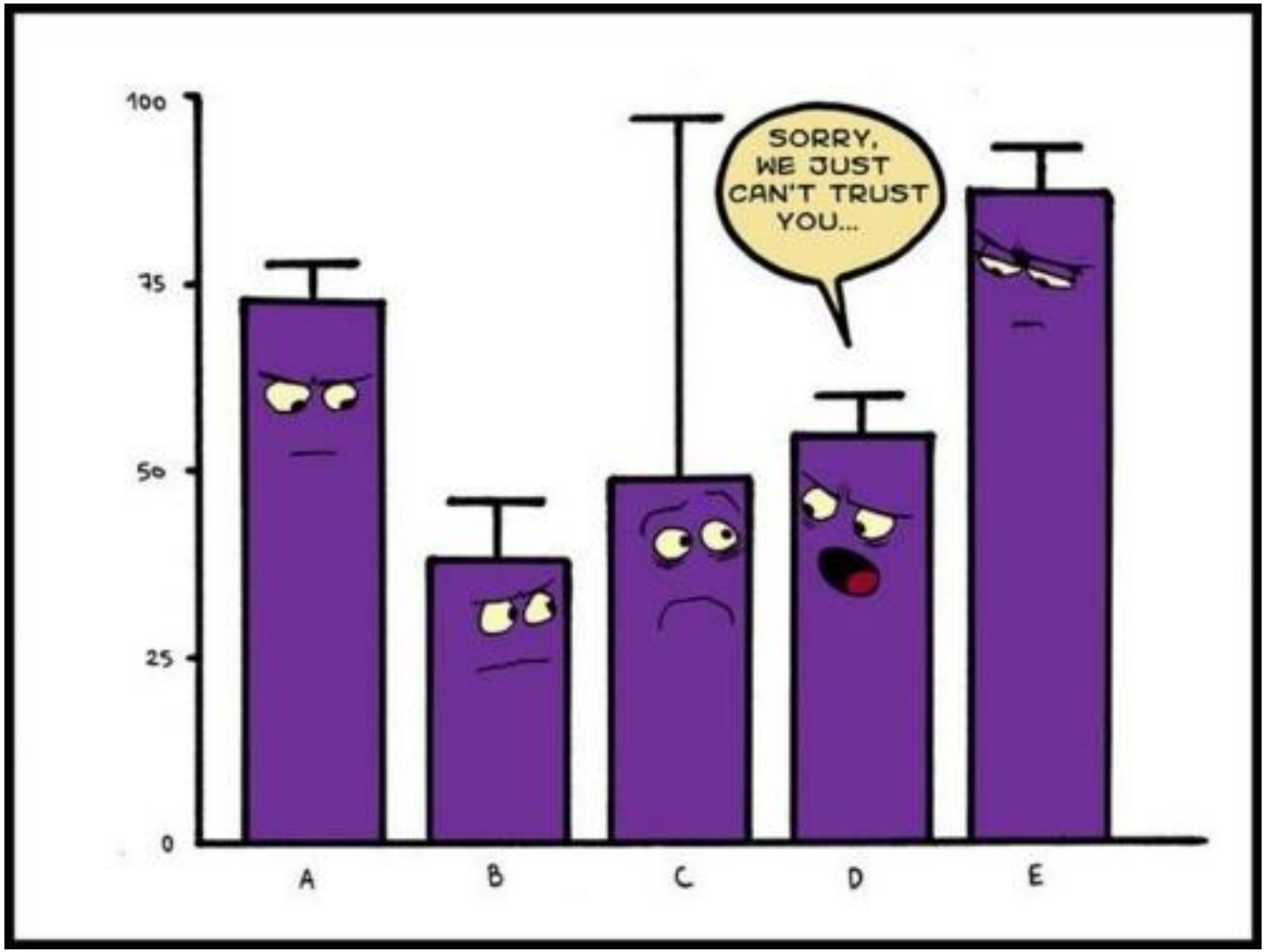


- **Multi-scale, multi-objective**
- **Combine datasets**
- **Does not inform on causality**
- **Provides context to other monitoring**
- **Master Sample**

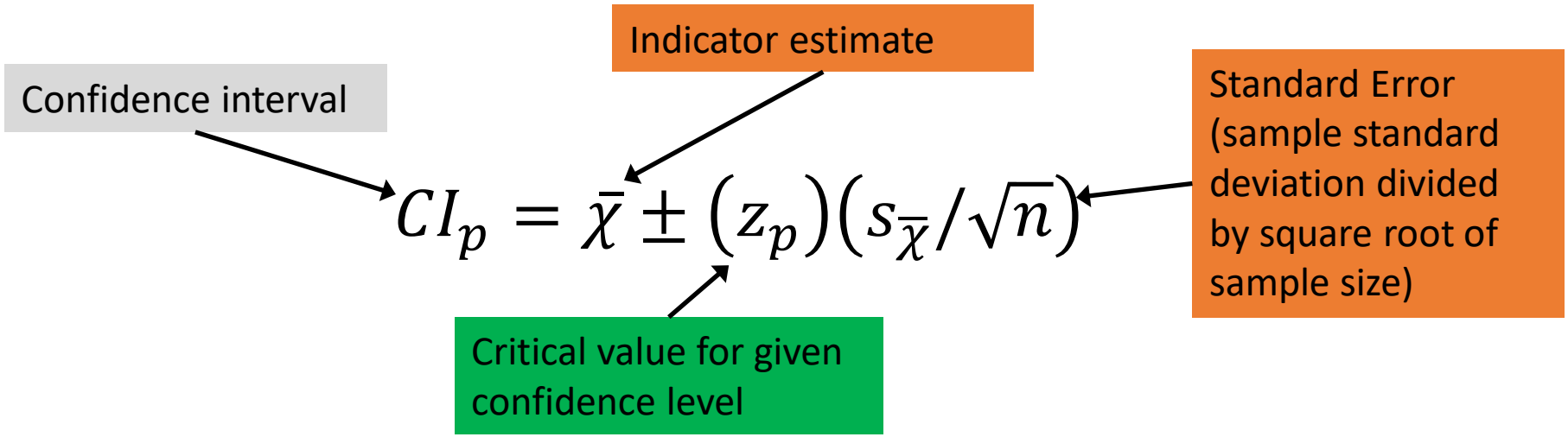
- **Objective-specific**
- **Inform on causality**
- **Limited ability to combine datasets**
- **Master Sample or custom sample selection**

- **Site specific info.**
- **Objective-specific**
- **Inform on causality**
- **Key sites or targeted sites**

Confidence Intervals



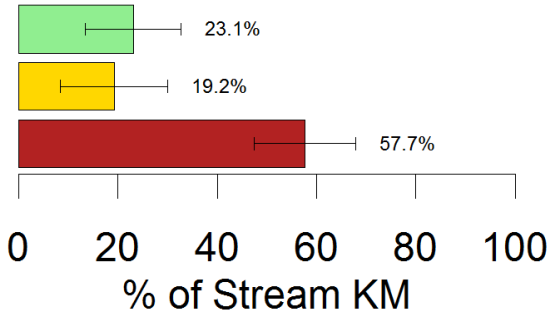
What variables set the confidence interval?

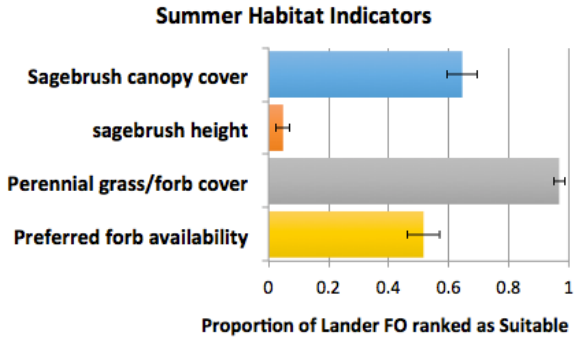


What do confidence intervals mean for management?

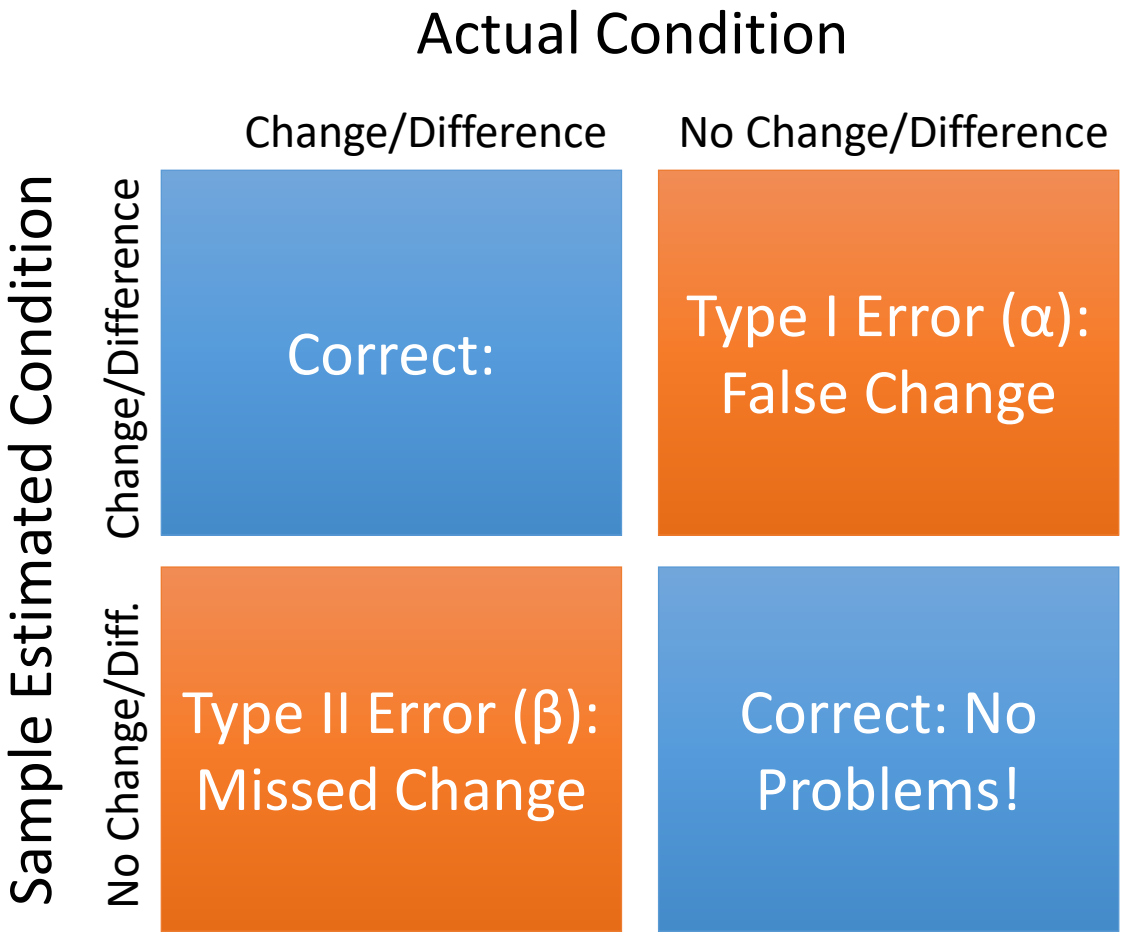
- Provides plausible estimate of the range quantitative uncertainty
- Tells us about the certainty of the estimate
  - Wider CI—relative uncertainty
  - Narrow CI—relative certainty
- Helps us understand chances of a false positive or false negative
  - Too low (lower degree of probability, narrow CI) = potential false alarms
  - Too high (higher degree of probability, wide CI) = potential to miss change/effect

Percent of Stream KM in Instream Biological Integrity Classes





Setting confidence intervals: Two types of statistical errors



Consequences of Being Wrong

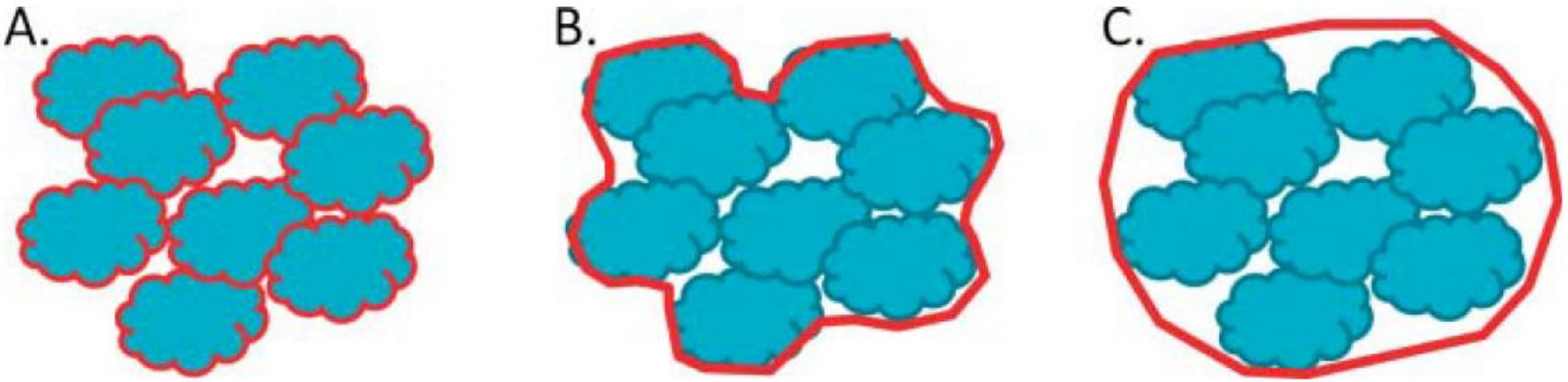
- There are costs/consequences of making Type I and Type II errors
- In natural resource decision making, Type I and Type II errors have meaning
- Error costs/consequences for natural resource monitoring are real and quantifiable
  - Often not difficult to do (or at least approximate)
  - But vary by scale and application
- Costs/consequences should be the basis for setting acceptable error rates
  - Type I error rate = α in statistical tests

Example: Airport Security Screening

- Decision-making system set up around error costs
- Type I Error (False Change)
  - Inconvenience a traveler
  - More thorough screening
- Type II Error (Missed Change)
  - Let a bomb/knife/gun through
  - Injury, Loss of Life
- Designed to minimize Type II Errors!!

Comparing datasets

- Indicators and methods must be compatible/consistent
  - Example: cover definitions
- Important to understand your methods!



From Toevs et al. 2011

M&M Exercise

- Count M&Ms that intercept dots on your plate
- Estimate cover: # hits / total
- Calculate actual cover
  - Area of a single M&M is ~1.33 cm^2
  - Area of the plate is 314 cm^2

M&M Questions…

- What is the actual cover of blue M&Ms?
- What is your estimate of cover for blue M&Ms?

- What could influence your cover estimates?
- How could you improve your estimate of cover of M&M's?
- What happens if the dots are bigger?