



Interpreting your data

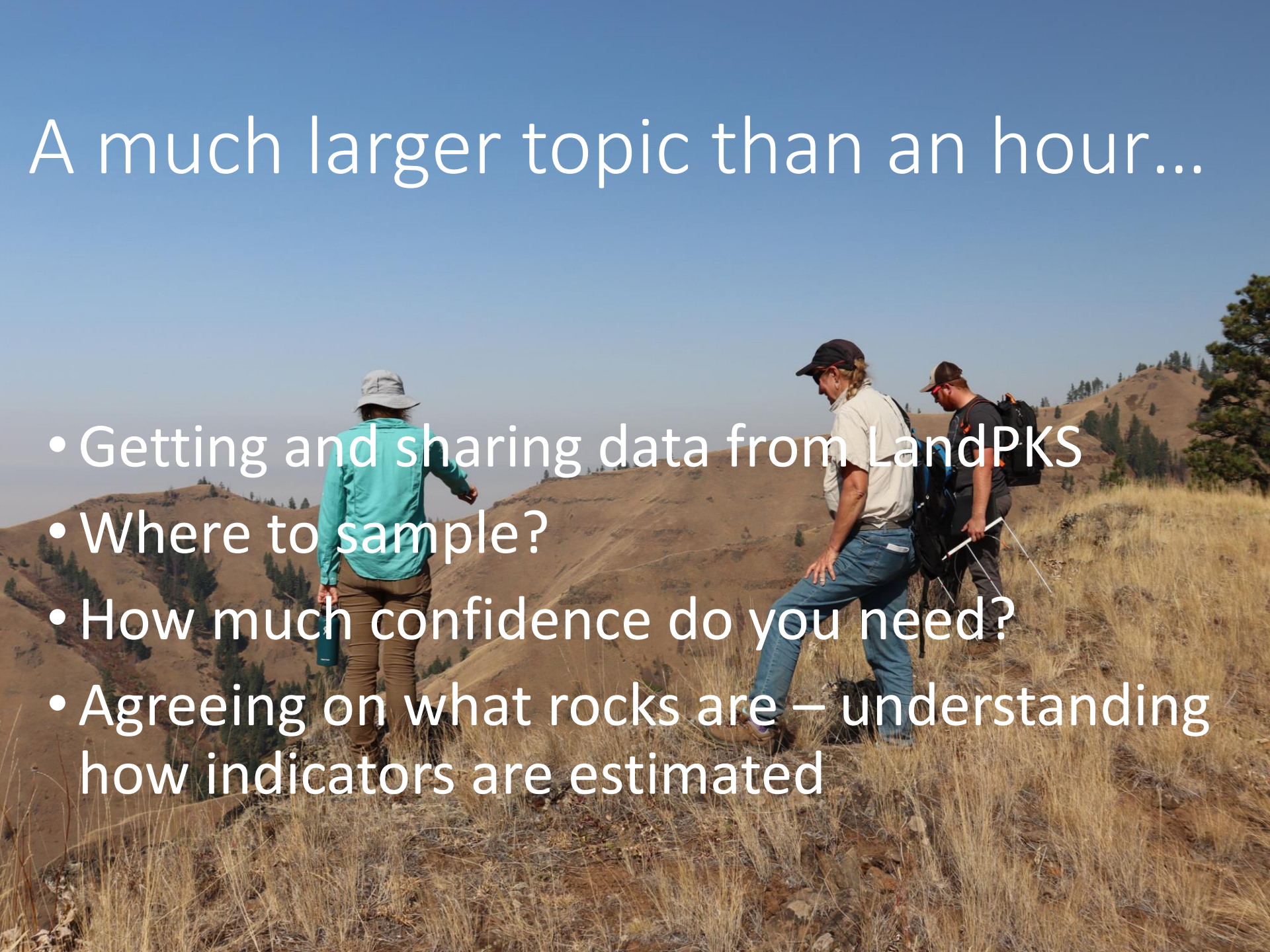
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University of Idaho
College of Natural Resources

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
- 
- A photograph of three hikers on a trail. The hiker in the foreground is wearing a teal jacket and a grey hat, walking away from the camera. The hiker in the middle is wearing a white shirt, blue jeans, and a dark cap, looking down. The hiker in the background is wearing a dark shirt and a dark cap, also looking down. They are on a trail with dry grass and a clear blue sky.

LandPKS Data Portal

LandPKS Portal v2.2.0

Welcome jakal14@gmail.com

The screenshot displays the LandPKS Data Portal interface. At the top, the title "LandPKS Data Portal" is centered, with the version "LandPKS Portal v2.2.0" on the left and a user greeting "Welcome jakal14@gmail.com" on the right. The main area is a satellite map of the western United States, densely populated with red location pins. A sidebar on the left contains several sections: "Public Sites (24788)" and "My Sites (6)" with a dropdown arrow; "Display Filters" with a "Site name" search box and an "Email" input field; "Data Export" with icons and labels for "LandInfo", "LandCover", "LandManagement", and "SoilHealth"; and "Metadata" with "LandInfo Metadata". The map shows state boundaries for Montana, Wyoming, Utah, and Colorado, along with various national forests and Indian reservations. A "Google" logo is visible in the bottom left corner of the map area, and a "United States" label is in the bottom right. At the very bottom, there is a footer with "Keyboard shortcuts", "Map data ©2021, Google, INEGI Imagery ©2021 TerraMetrics", and "Terms of Use".

<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

The LandscapeToolbox

Tools & Methods for Effective Land Health Monitoring



Agricultural
Research
Service



MONITORING MANUAL, 2ND EDITION

The current edition of the often-cited Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems Volume I: Core Methods is available for download now.

[READ MORE](#)

Managing and Monitoring Landscapes

- <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

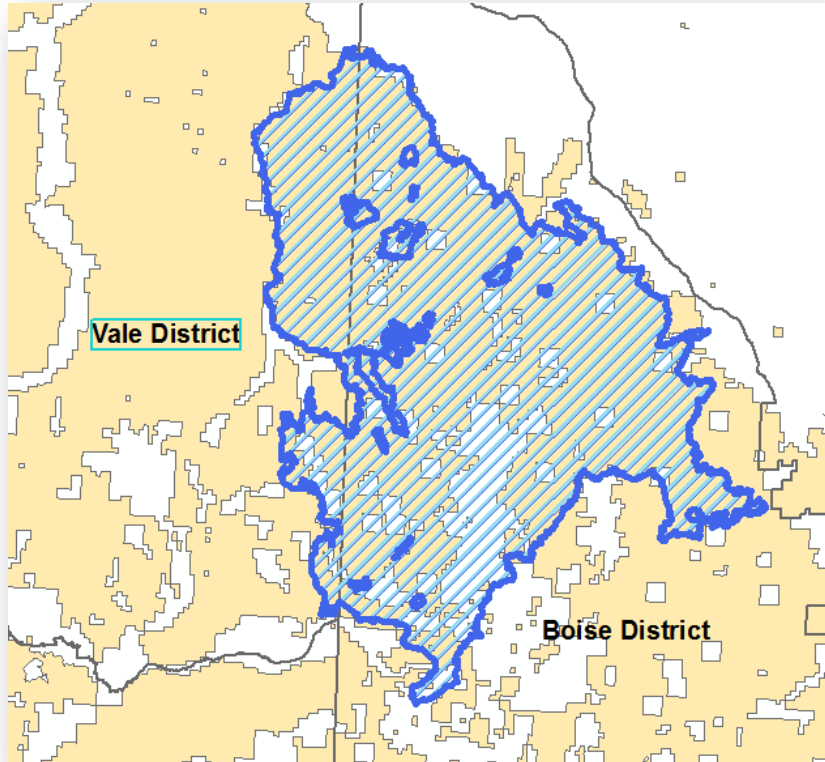


Concept: Population

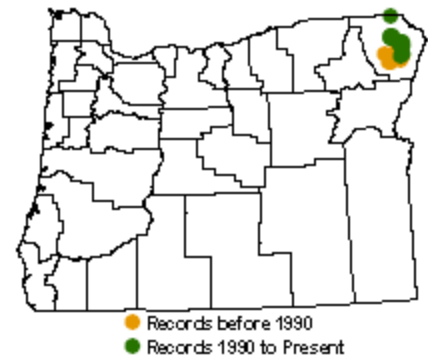
- Defines the study area or the resource you're interested in monitoring
 - E.g., All BLM lands in a Field Office, All perennial streams within an allotment, All fire treatments within a fire boundary
- Maximum area you want to draw conclusions about
- Figuring out the area/population you want to monitor 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

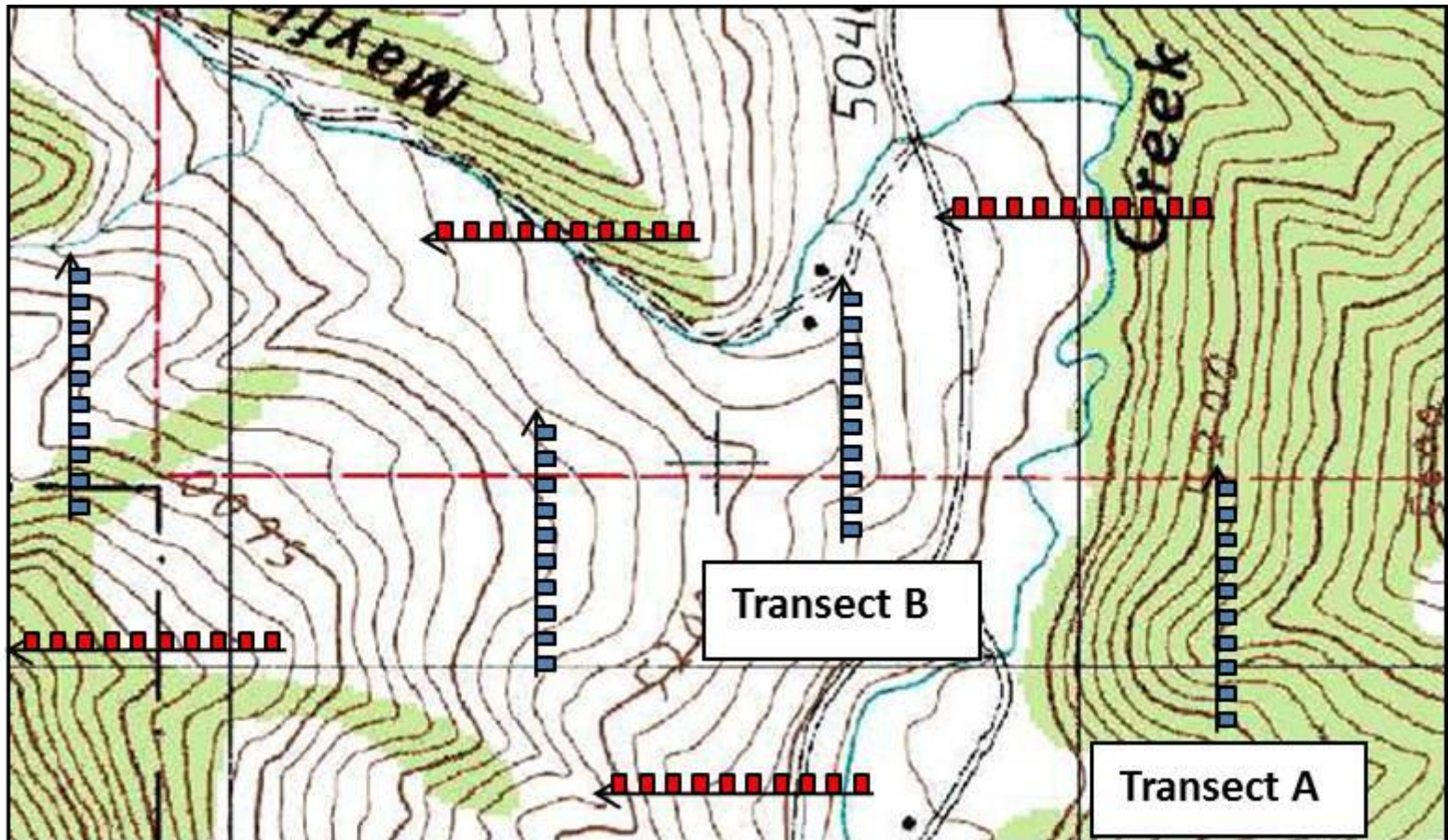


Sampling Unit

- 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!

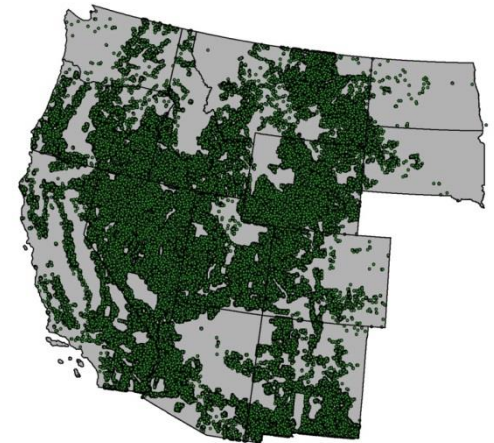
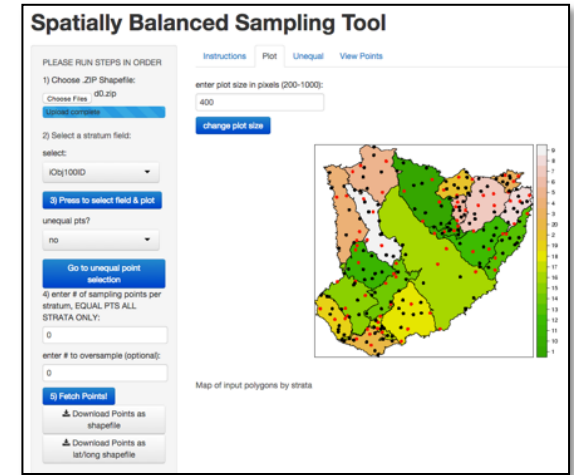
What's the sample unit?

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



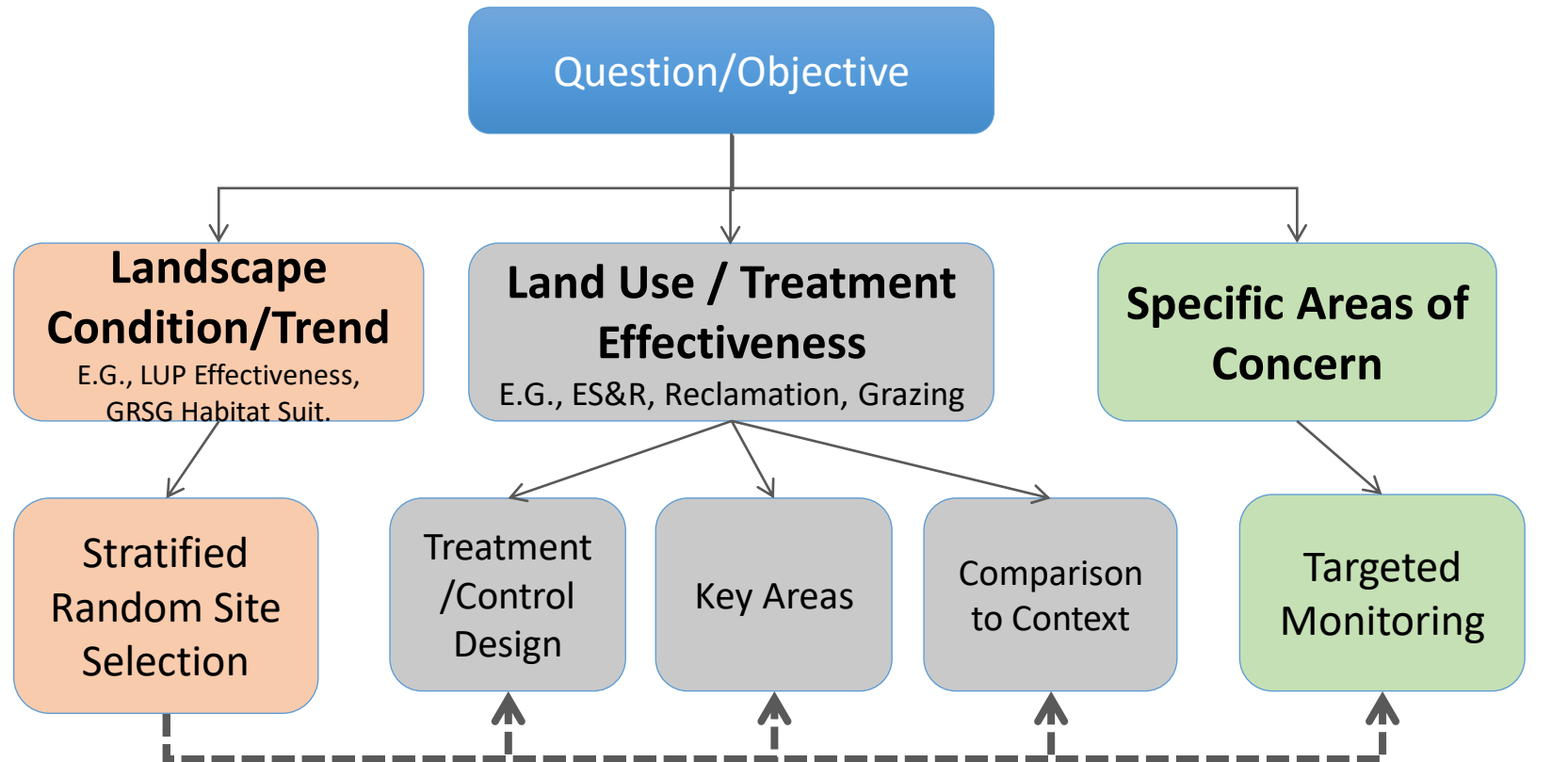
Sample site selection

- 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

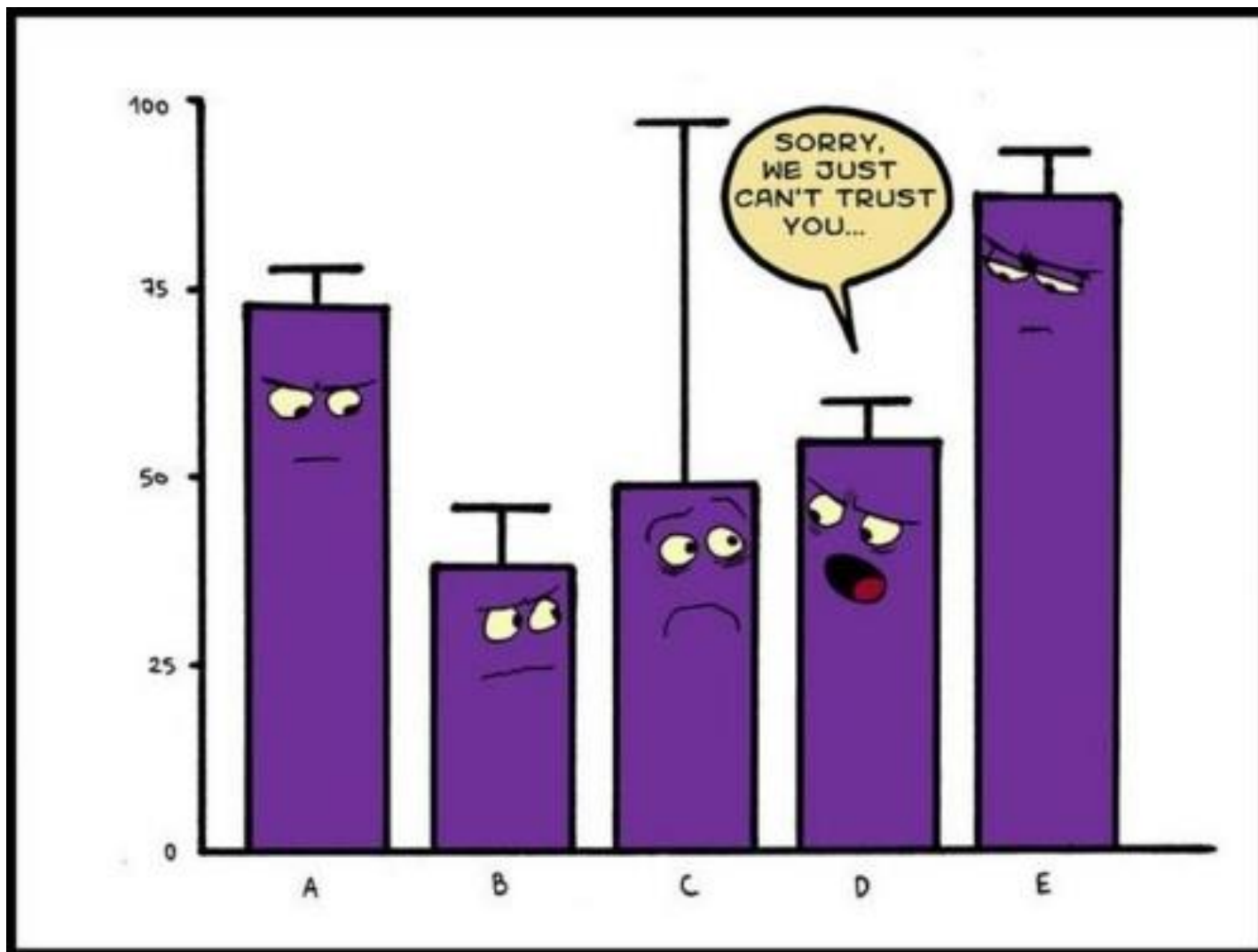


- Multi-scale, multi-objective
- Combine datasets
- Does not inform on causality
- Provides context to other monitoring
- Master Sample

- 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?

Confidence interval

Indicator estimate

$$CI_p = \bar{\chi} \pm (z_p) (s_{\bar{\chi}} / \sqrt{n})$$

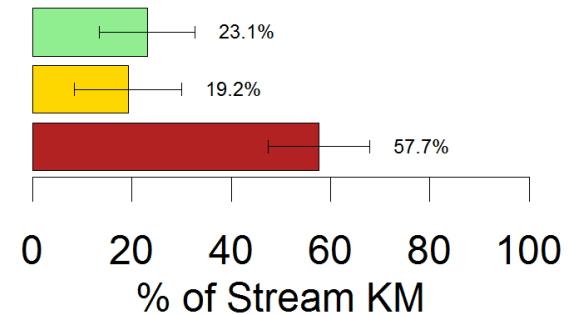
Standard Error
(sample standard deviation divided by square root of sample size)

Critical value for given confidence level

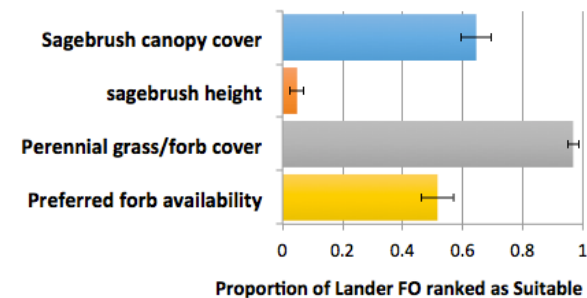
What do confidence intervals mean for management?

- 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



Summer Habitat Indicators



Setting confidence intervals: Two types of statistical errors

| | | Actual Condition | |
|----------------------------|-------------------|---|--|
| | | Change/Difference | No Change/Difference |
| Sample Estimated Condition | Change/Difference | Correct: | Type I Error (α): False Change |
| | No Change/Diff. | Type II Error (β): Missed Change | Correct: No Problems! |

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

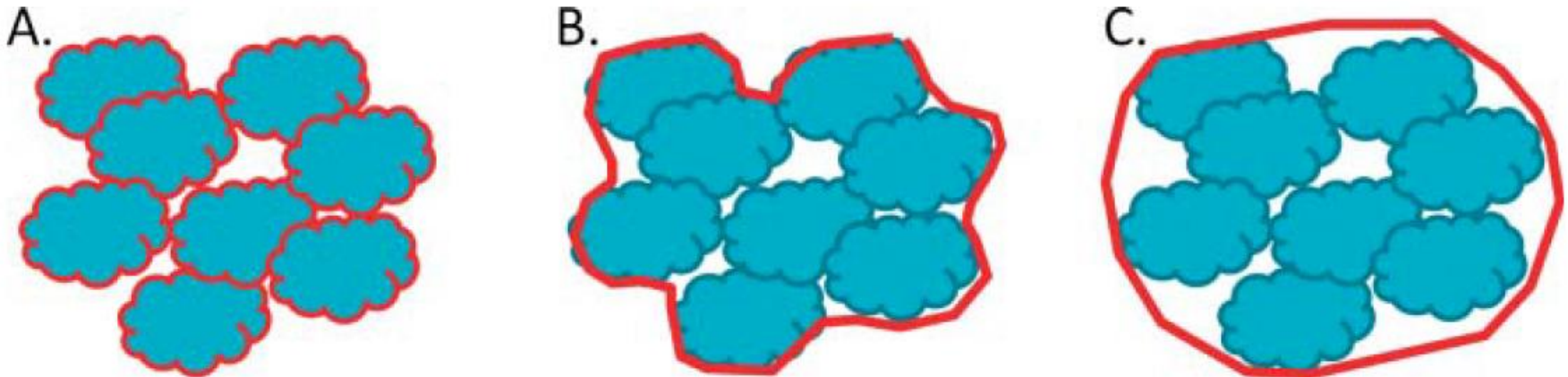
Example: Airport Security Screening

- Decision-making system set up around error costs
- Type I Error (False Charge)
 - Inconvenience a traveler
 - More thorough screening
- Type II Error (Missed Charge)
 - 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!



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 $\sim 1.33 \text{ cm}^2$
 - 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?