

4: Setting Sampling Objectives

Session Objectives

- Identify which types of *management objectives* require complementary *sampling objectives*.
- Identify the components needed to write complete Change/Trend and Target/Threshold sampling objectives.
- After completing exercise 3c, write complete complementary sampling objectives for two management objectives.

Session Outline

Three Monitoring Types

Components of a change/trend sampling objective

Components of a target/threshold sampling objective

Determining realistic sampling objectives, and the consequences of NEGLECTING to specify sampling objectives

In this section of the binder

4.1 Sampling Objectives for Three Monitoring Types

4.2 Which Types of Sampling Objectives Go with These Management Objectives?

4.3 Sampling Objectives for Target/Threshold Management Objectives

4.4 Sampling Objectives for Change/Trend Management Objectives

4.5 Absolute vs. Relative Cover Error Bars

4.6 Factors to Consider when Setting Sampling Objectives

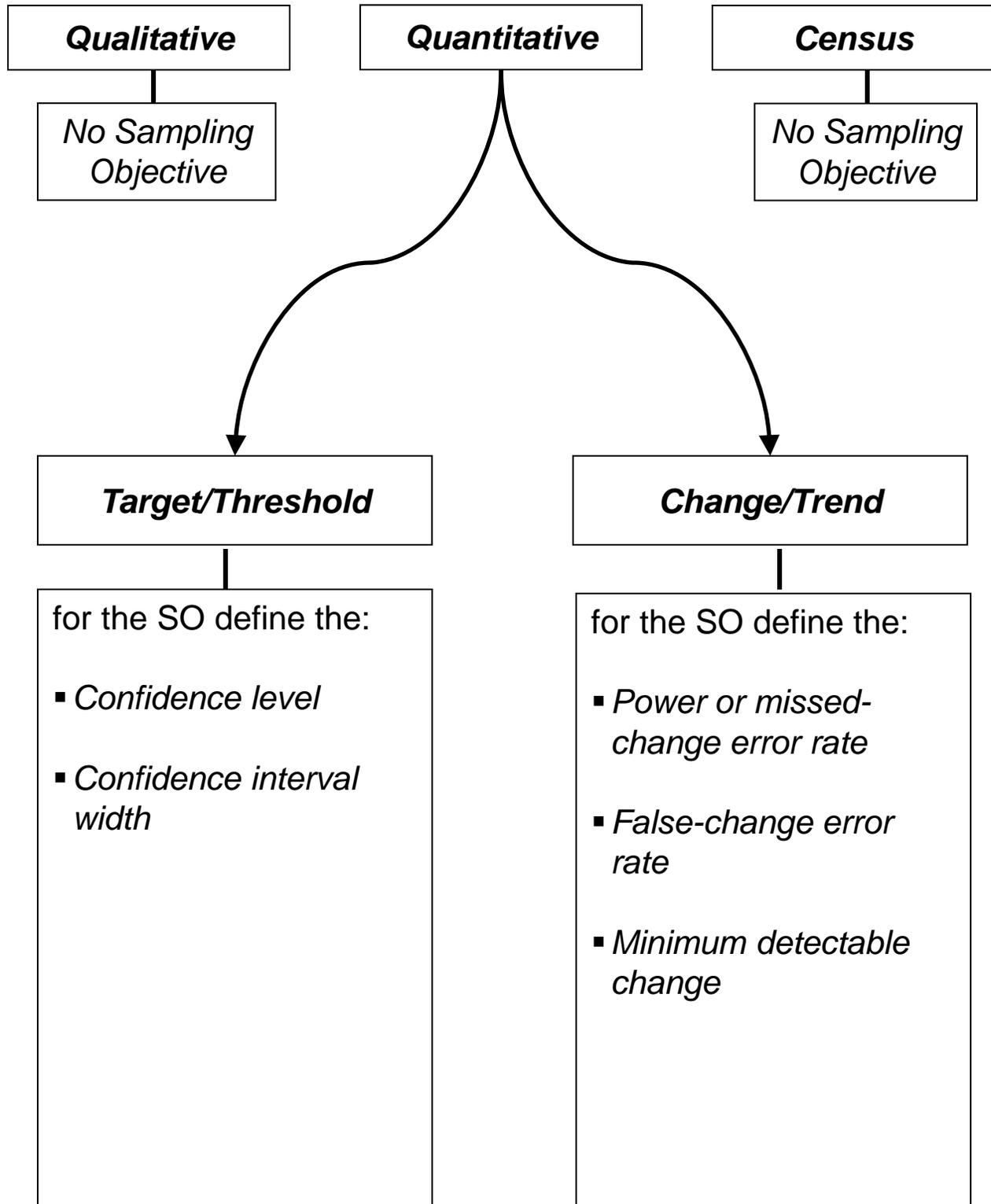
Exercise 4a: Incomplete Sampling Objectives

Exercise 4b: Write Your Own Sampling Objectives (see Exercise 3c for instructions)

Related Technical Reference chapters and appendices

Chapter 6: Sampling Objectives

Sampling Objectives for Three Monitoring Types



Which Type of Sampling Objectives?

1. Maintain the 25 adult individuals of *Quercus kelloggii* at the study site during the next 10 years.

Potential monitoring methodology:

Sampling objective needed? type?

2. Maintain at least 10,000 individuals of *Penstemon lemhiensis* at the study site during the next 10 years.

Potential monitoring methodology:

Sampling objective needed? type?

3. Maintain the knapweed-free condition of the *P. lemhiensis* population at the study site during the next 10 years.

Potential monitoring methodology:

Sampling objective needed? type?

4. Allow for no more than a 10% increase in cover of *Bromus tectorum* at the study site during the next 10 years.

Potential monitoring methodology:

Sampling objective needed? type?

Target/Threshold Sampling Objectives

Purpose: obtain a snap-shot estimate of an attribute that represents the population (*e.g., plant density, cover*), in order to compare to a desired threshold defined in the Management Objective.

Components of the Sampling Objective:

1. _____: How confident do you want to be that your confidence interval will include the true value?
2. _____: How wide of a range are you willing to accept around your estimated value? Is it $\pm 20\%$ of the estimated mean or total value adequate, or do you need to be within 10%?

Example:

Management Objective:

Increase the number of individuals of *Penstemon lemhiensis* in the Iron Creek population to 1,000 individuals by 2010.

Sampling Objective:

We want to be 95% confident that population estimates are within 20% of the estimated true value.

Change/Trend Sampling Objectives

Purpose: track changes over time in some average value (*e.g.*, *plant density, cover*) in order to address the management objective.

Components of the Sampling Objective:

1. _____ How certain do you want to be that if a particular change does occur you will be able to detect it? (this could also be expressed as the _____, *or* how much risk are you willing to take that, if a change does occur, your monitoring effort will miss it)
2. _____: What is chance of concluding that a change took place when it really did not?
3. _____: This specifies the smallest change that you are hoping to detect with your sampling effort.

Example:

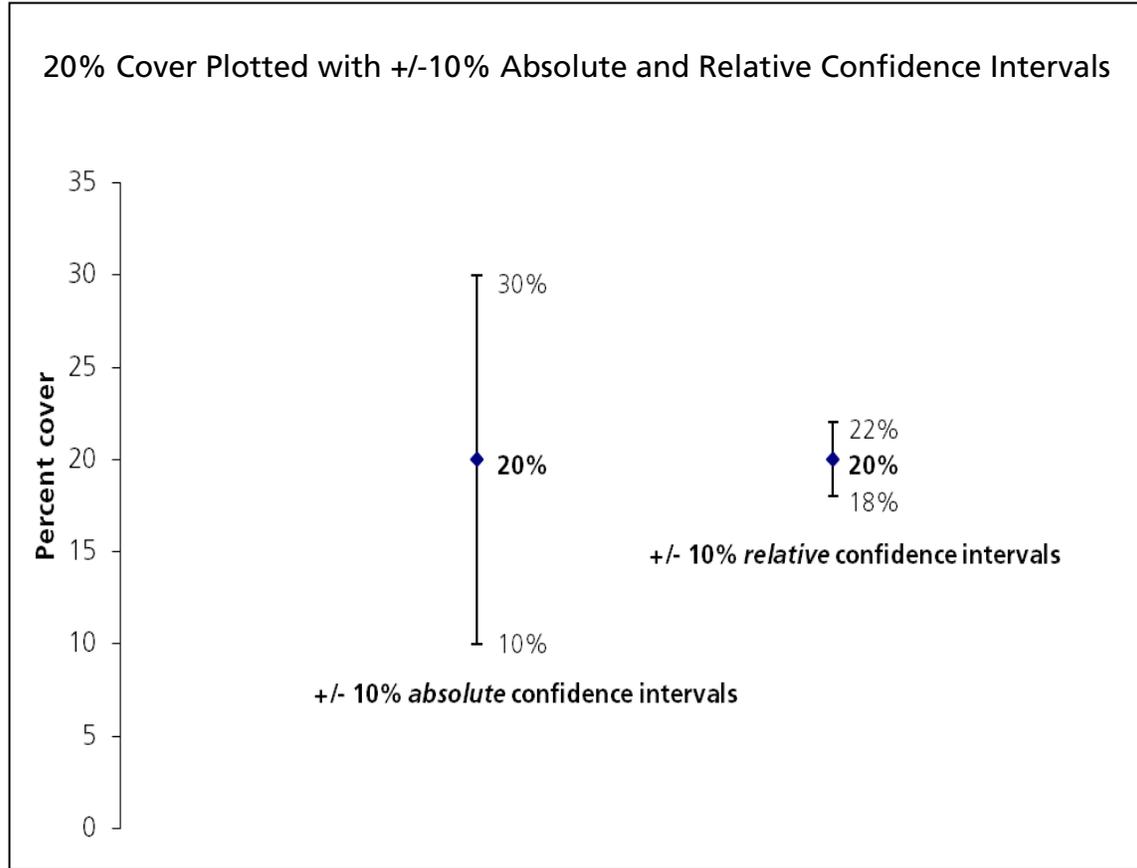
Management Objective:

I want to see a 20% increase in the density of *Lomatium cookii* at the Agate Desert Preserve between 2005 and 2010.

Sampling Objective:

I want to be 90% certain of detecting a 20% increase in density between 2005 and 2010 and I am willing to accept a 10% chance that I will make a false-change error.

Absolute vs. Relative Cover Error Bars



Factors to Consider when Setting Sampling Objectives

Change/trend Management and Sampling Objectives

Number of samples needed is a function of:

- Minimum detectable change
- False-change error rate
- Missed-change error rate
- ➔ Variability between samples

Target/threshold Management and Sampling Objectives

Number of samples needed is a function of:

- Confidence interval width
- Confidence level
- ➔ Variability between samples

Key to Symbols:

- Determined by sampling objective
- ➔ Determined by sample design *and* resource

Bottom line

More samples require more money

Control costs by minimizing variability and setting realistic and meaningful objectives