



Citizen Science Training Workshop

Lesson 4: Level 1 Monitoring Protocol

The Citizen Science Research Team
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Level 1 Vegetation Monitoring Protocol

- Tiered Monitoring Approach
 - Level 1: A simple approach; least cost and time required; collect general location and abundance information
 - Level 2: An approach for more experienced monitoring groups; incorporates more detailed species abundance and habitat information
 - Level 3: A far more detailed approach to mapping and modeling native and non-native species distributions, primarily for researchers; expensive and time-consuming

Level 1

Subjectively Sample Known Locations
(location, cover, area)

Opportunistic Samples of Unknown Locations
note presence/absence, cover, area

First Approximation Model

environmental envelope of presence/absence

logical strata, based on suitable habitats, major environmental gradients, or TM heterogeneity classes

identify information gaps (soils, other data)

Level 2

Add Additional Species And Auxiliary Variables
(height, disturbance, cover of abiotic variables)

Add Stratified-Random Sampling Component
to assess mean conditions within envelope

Second Approximation Model

Validate subjective data and refine Level 1 and 3 monitoring locations

Level 3

Add More Stratified-Random Samples

and/or

Add More Gradient Samples

Iterative Models

Validate all previous data
Continue to refine previous models as new information becomes available

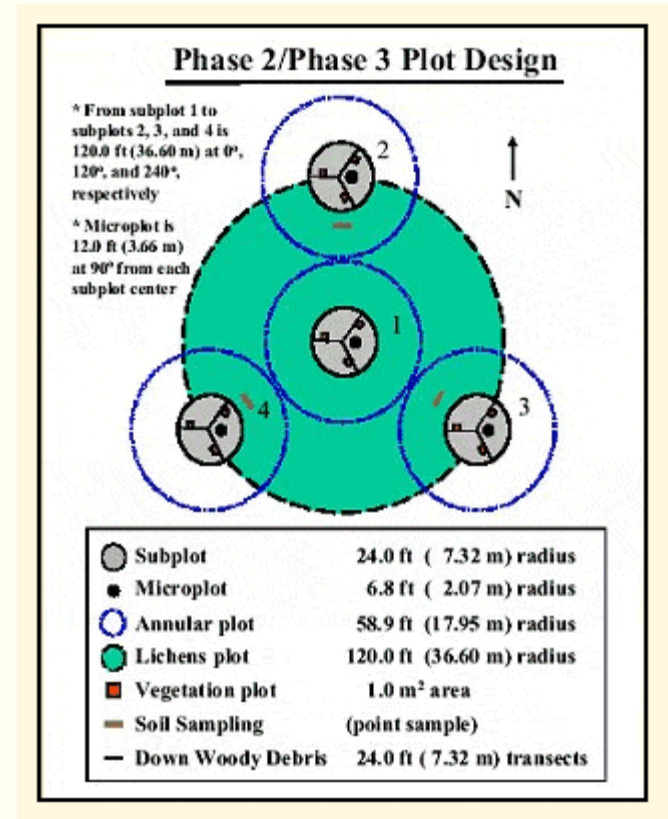
Outputs: (1) Current and potential distribution models; (2) Priority sites for control and restoration; (3) Potential early detection sites; and (4) Probability and uncertainty analyses.

Level of Difficulty



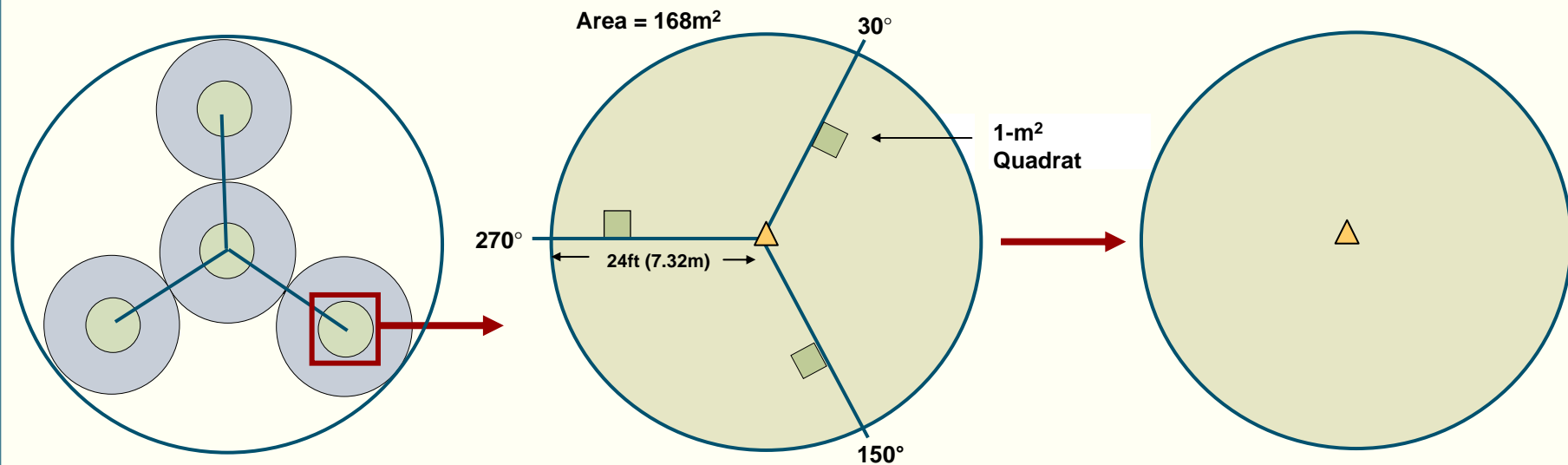
USFS Forest Inventory and Analysis

- Adopted in 1995
- Collects, analyzes, and reports info on the status, trends, and conditions of US Forests
- Includes all forest land in 50 states
- 20% of plots monitored in each state each year



See www.fia.fs.fed.us

Modified USFS FIA Plot



Levels 2 & 3: Barnett et al. 2007

Levels 1 & 2

Why Plots?

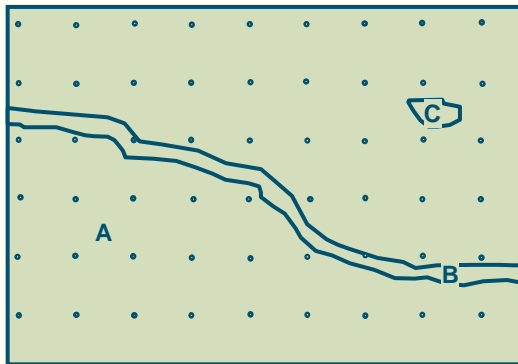
- Comparable to FIA plot size and shape
- Account for species absence
- Integrate data with remote sensing information
- Long-term monitoring in a consistent, comparable data set

Where should we locate our plots?

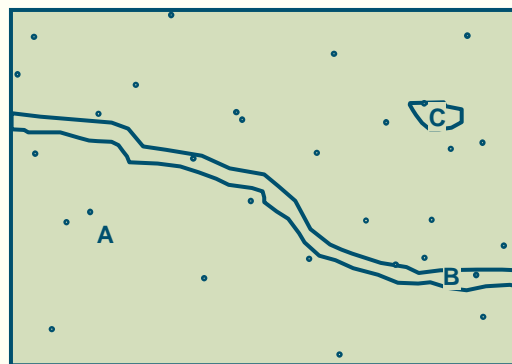
- Integrate all available data for area being surveyed
- Questions to consider
 - Which habitats are currently being invaded?
 - Which habitats share similar characteristics to invaded habitats but have not yet been invaded?
 - Are there rare habitats that are important to monitor?
 - Are you wanting to monitor the success of a removal and/or treatment?

Where should we locate our plots?

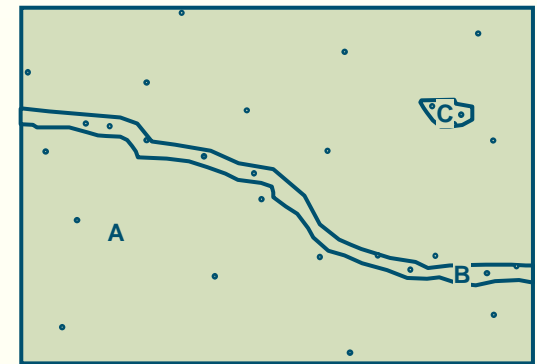
- Sample design
 - Opportunistic
 - Systematic/Stratified Random/Random



Systematic Sampling



Simple Random Sampling



Stratified Random Sampling

Equipment Needed

- >10m tape (1)
- Marking flags (~10)
- GPS Unit
- Ground stakes (1)
- Paper Form, PDA, or Laptop to record data
- Reference materials (floristic keys, etc.)

Locate Plot Center

1. Subjectively or randomly locate plot center.

2. Enter the following information on form.

- Date
- Time
- Recorder
- Unique Plot Name
- Coordinates for Plot Center
- Projection: UTM or Geographic
- Datum: NAD83, NAD27, WGS84
- Accuracy: should be <10m to make a valid reading



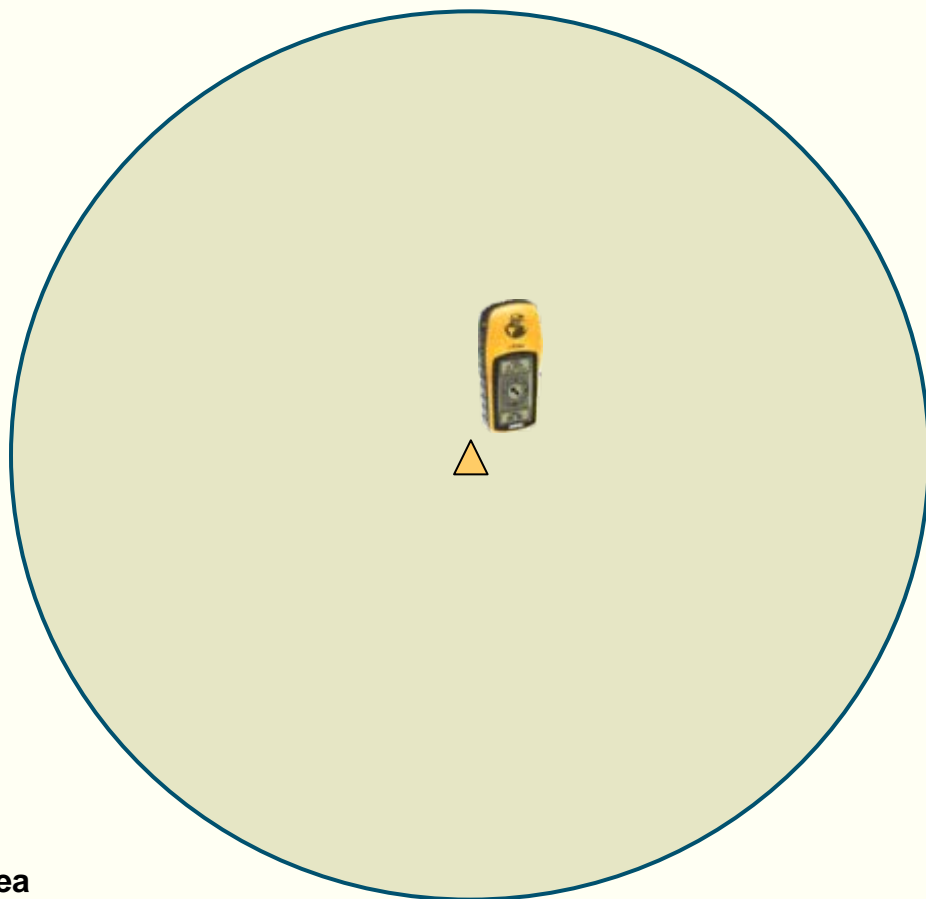
GPS



Stake



Plot Area

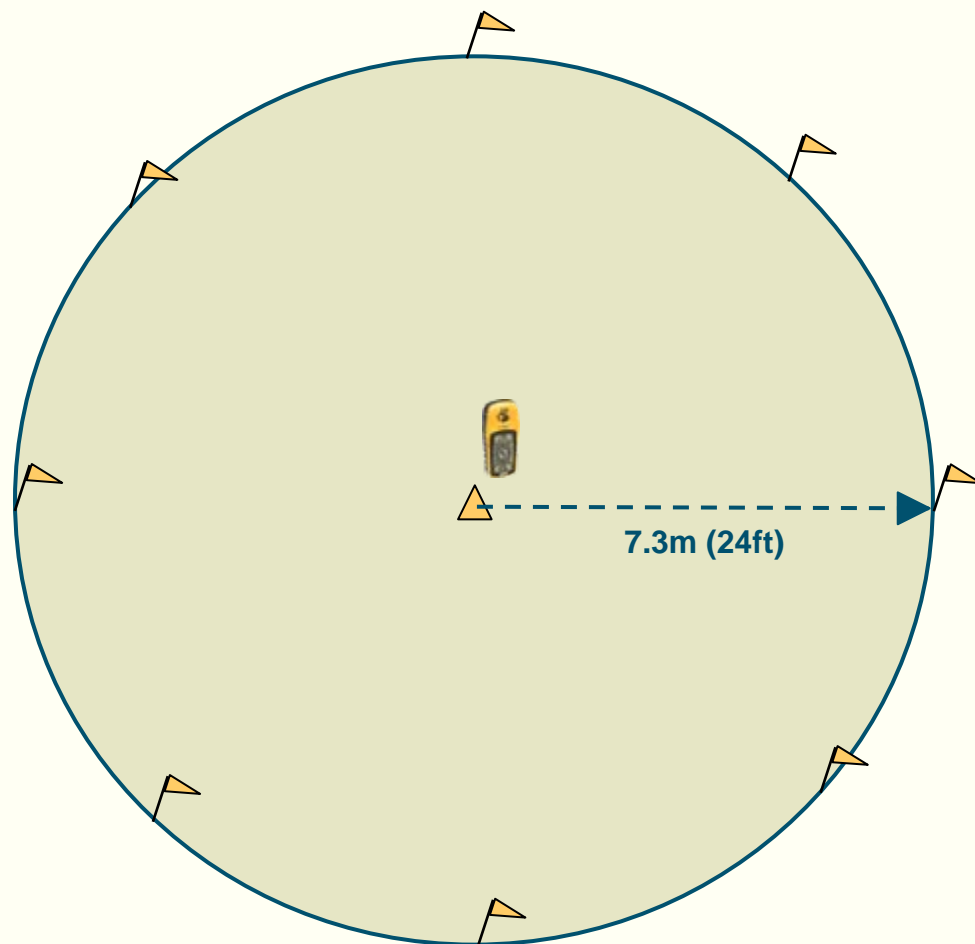


Define Plot Area

1. Mark the center of the plot with a stake.

2. Attach a 10 meter measuring tape to the plot center and measure out 7.3 meters in any direction.

3. Mark this location with a flag. Hold the tape while walking in a circle to define the edge of the circular plot while placing flags in the ground periodically to define plot area.



GPS



Flag



Stake



10 m Measuring Tape



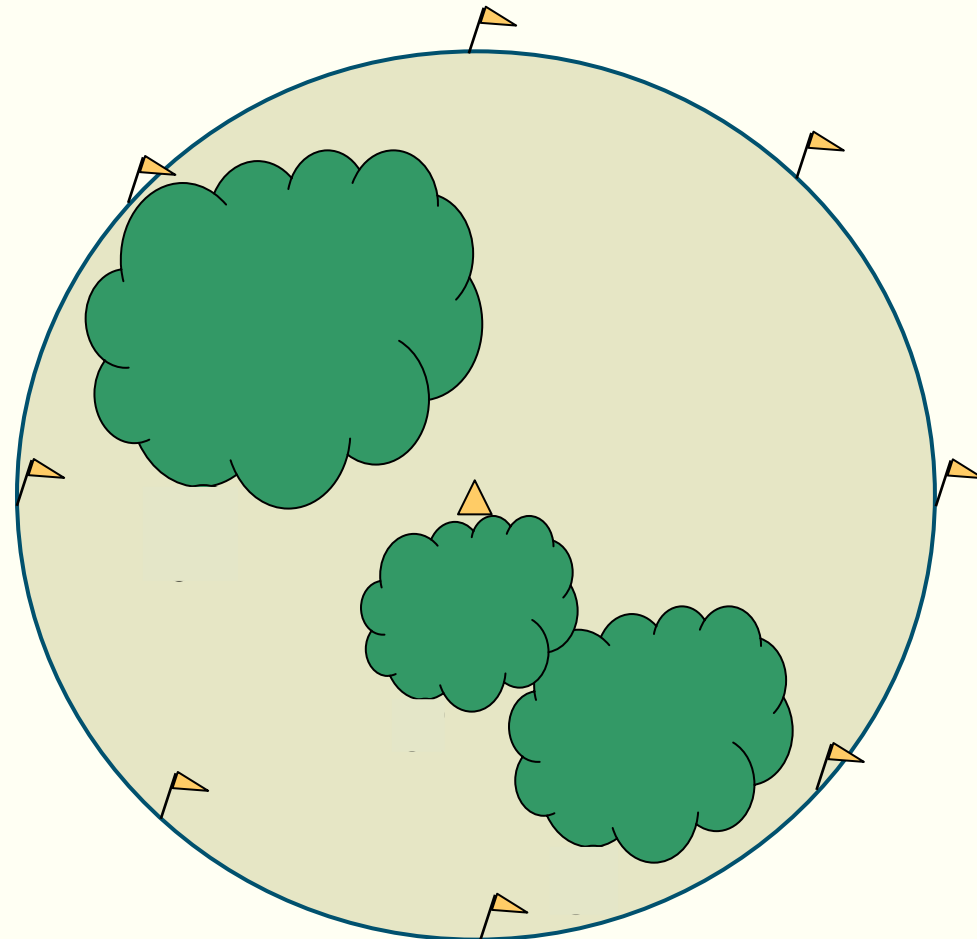
Plot Area

Record Vegetation Data

1. Identify species of interest in plot area. Record and note degree of uncertainty in identification.

2. Mark all species in plot as present and estimate percent cover.

3. Mark all species of interest not in plot as absent.



 Flag

 Stake

 Plot Area

Tips for Estimating Cover

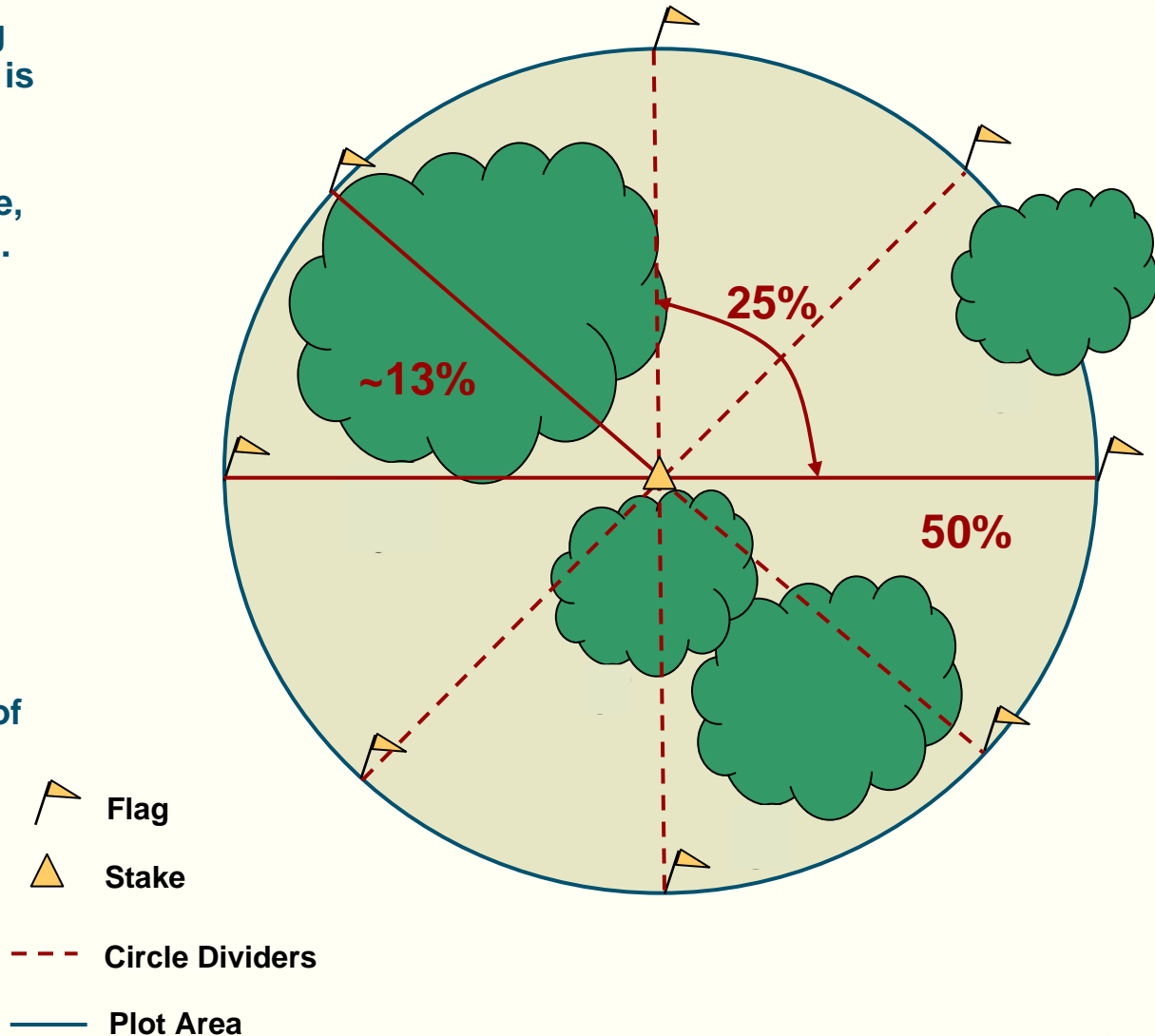
1. Record species that overhang the plot area even if the plant is not rooted in the plot.
2. Visually or using flagging tape, divide the circle into sections.
3. Area= 168m² or 1809 ft²
so 1%= 2 m² or 18 ft²
with 1.5 m or 4.8 ft diameter

10%= 17 m² or 181 ft²

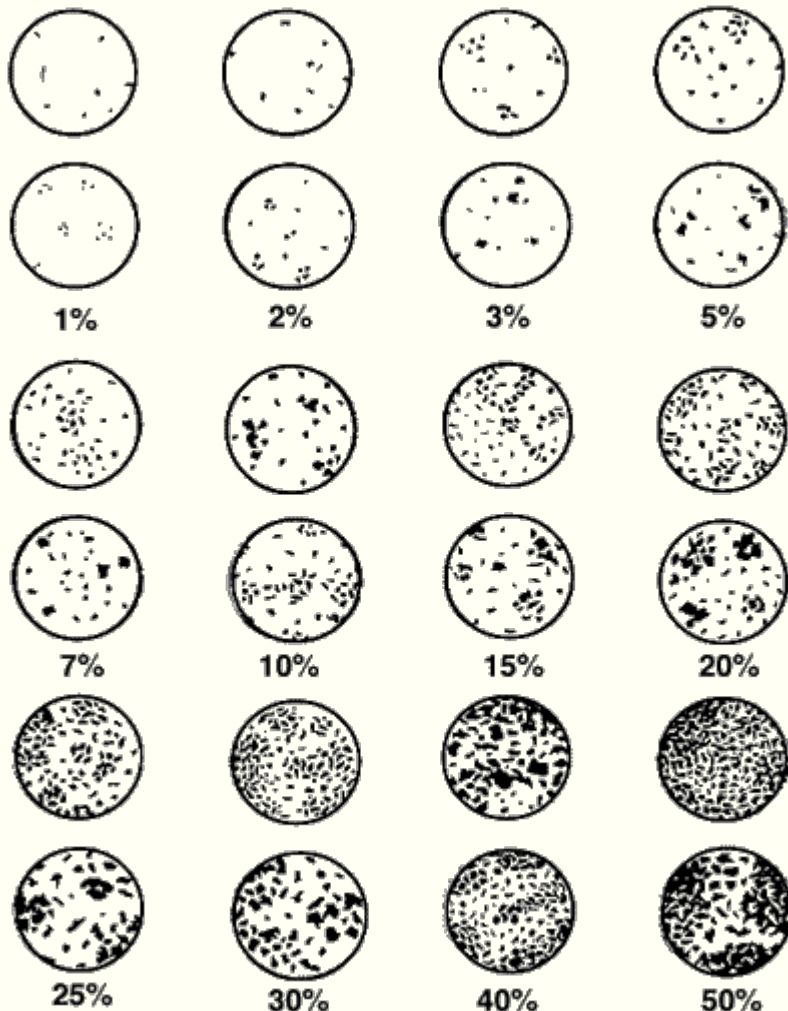
25%= 42 m² or 452 ft²

50%= 84 m² or 905 ft²

4. This measure is an estimate, so don't spend long periods of time trying to determine an exact measurement.



Tips for Estimating Cover



From B.C. Ministry of Environment,
Lands, and Parks, B.C. Ministry of
Forests. 1998.



Congratulations! You can now begin Level 1 monitoring!

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